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Cover page : Clinical appearance of oral squamous cell carcinoma and photomicrograph of indirect immunofluorescence of oral squamour cell carcinoma. Picture courtesy of Prof. Dr. Ong Siew and Prof. Dr. Nirmala Rao.

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CONTENT

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MALAYSIAN DENTAL JOURNAL

EDITORIAL: THE CHANGING TRENDS IN DENTISTRY

Warmest Greetings to all of you.

First of all, I wish to share some good news with all of you. With regards to the indexing of MDJ with EBSCO Publishing as mentioned by Dr. Ngeow in the previous issue of MDJ, I am glad to inform that we have been successful in renewing the contract for further three years (2008-2010). A good working relationship has been established owing to the prompt provision of the content of MDJ for the past three years. The next task is to obtain the index status with Index Medicus, of which I have been in contact with Scopus International with regards to this matter.

I would like to take this opportunity to briefly mention about integrating the current knowledge of the caries process into everyday clinical practice in the provision of oral health care. A Commission of the FDI has reported a decline in caries rates in nine countries i.e. in many developed countries, caries is no longer a pandemic disease. The clinicians were seeing fewer patients with active caries than two decades ago. It is recommended therefore that treatment of caries should ideally be a combination of community based and also patient centred, that is, treatment should be designed to meet the specific needs of the individual.

Caries is a slowly progressing disease controlled by numerous interacting factors and the ultimate consequence is the cavitation in the tooth. The dental practitioners, therefore is faced with the tasks of identifying caries prone individuals, diagnosing the level of caries activity and eventually to design appropriate management programme that meet the needs of the individual. Therefore, routine dental examination ideally should include caries risk assessment to provide patient with an idea of his/her own caries risk profile and advice can be given accordingly. Saliva flow rate, saliva pH, plaque pH and diet are amongst the few basic areas in the risk assessment and can be conducted at minimum cost and time, the dental surgery assistant can be trained to get involve in the procedure. The assessment can provide the patients with invaluable information to alter the risk profile.

Traditionally, dental practitioners replaced the tooth structure destroyed by caries process with various restorative materials. The caries process has largely being viewed as an irreversible process from the point of restoration. With the changing philosophy and advancement in dental materials, there has been a paradigm shift in this aspect. Emphasis has been placed on attempts to remineralise eg. internal remineralisation of caries affected tooth tissues. Clinical trials have shown promising results in the remineralisation procedures.

Last but not least, I wish to extend my heartfelt thanks to all for giving me the opportunity to serve MDA and be the Editor of MDJ. I would also like to record my sincerest thanks to Dr. Ngeow Wei Cheong, the ex-editor of MDJ, for his guidance and support. I have the opportunity to work with him in the previous few issues of MDJ.

Thank you.

Associate Professor Dr. Seow Liang Lin

Editor

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Estimation of Calcium, Phosphate and Alpha Amylase Concentrations in Stimulated Whole Saliva of Children with Different Caries Status: A Comparative Study

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ABSTRACT

Saliva being one of the important host factors, along with its components influences the process of dental caries. The aim of the present study was to compare the salivary calcium, phosphate and alpha-amylase concentrations in stimulated whole saliva of children with different caries status. Sixty 9-10 year-old children were grouped into caries free group (DMFS+dfs=0), low to moderate caries group (DMFS+dfs= 3-8) and high caries group (DMFS + dfs ≥ 9). Three saliva samples were collected from each child at seven days interval and analyzed for calcium, phosphate and alpha-amylase concentrations using an autoanalyzer. From the results obtained, it was found that, with the increase in the calcium, phosphate and alpha-amylase concentrations in the saliva, the caries status of the individual decreases. Hence it could be concluded that the above mentioned factors play a significant role in influencing the caries status of the individual.

Key words

Caries, Salivary Calcium, Phosphate and Alpha-Amylase.

INTRODUCTION

The oral cavity is a distinctive ecosystem, which performs a wide range of functions, harbours a plethora of microorganisms and is unique in accommodating exposed mineralized tissues. In spite of this it has its own inbuilt defensive mechanisms to fight against oral diseases[1]. Dental caries is the most common chronic disease affecting the human race. It affects individuals of both sexes and is independent of age, race and socio-economic status. It has been reported that factors like dietary habits, oral hygiene and structure of the tooth and saliva have profound effect on dental caries.[2, 3]

Saliva has a profound influence in the prevention of dental caries. Its proper secretion and composition provide a better quality of life [4, 5]. To a large extent it fosters oral health; whereas lack of its secretion contributes to the disease process. No other etiological factor can influence the outcome of a disease such as dental caries, as much as the saliva could.

Saliva is involved in the maintenance and protection of the tooth hard tissues by providing a source of calcium and phosphate ions [2, 4, 5]. These ions influence the driving force for the precipitation or dissolution of calcium hydroxyapatite (HAP), the principal inorganic component of dental hard tissues [6]. These ions play a key role in the post-eruptive maturation of the enamel and facilitate the remineralization of incipient carious lesions [5, 7].

Another important role of the saliva is in the maintenance of oral hygiene. Among the enzymes of saliva, α-amylase is important in the catabolism of starch and glycogen. This is a hydrolytic enzyme which cleaves α (1-4) glycosidic linkage with in the chemical structure. This way starch containing food debris retained around teeth and the oral mucosa are degraded and removed from the oral cavity [5, 8, 9]. One of the striking features of this enzyme is that it is exclusively of salivary origin when compared to other enzymes of saliva which are of both salivary and bacterial origin. This enzyme was found to bind with various bacteria. This close relation of α-amylase with carbohydrate digestion and oral microbial flora complicates its action in the dental caries process.

The normal concentrations of these components of saliva found to vary from person to person and from place to place. According to Jenkins the concentration of salivary calcium in a healthy individual is 5.8mg/dl (2.2-11.3mg/dl) in resting saliva and 6mg/dl in stimulated saliva. Phosphate concentration is 16.8mg/dl (6.1-71mg/dl) in resting saliva and 12mg/dl in stimulated saliva. Amylase concentration is 60U/ml in resting saliva and 120U/ml in stimulated saliva[4]

This study holds its uniqueness by making an attempt to explore the possible nature of the relation between the most abundant inorganic components of saliva like calcium, phosphate and the enzyme α-amylase of stimulated whole saliva with the severity of caries among children.

Hence the present study was conducted with the aim of estimating and correlating the concentrations of salivary calcium, phosphate and α-amylase with the caries status of 9 – 10 year old children.

METHODS

The present study was conducted in the Department of Pedodontics and Preventive Dentistry, Bapuji Dental College and Hospital, Davangere, in collaboration with the Central Laboratory, Bapuji Hospital, Davangere, Karnataka, India.

Sample selection

Sixty children (31 boys and 29 girls) aged 9-10 years from four schools in Davangere city were selected for the study. Informed written consent was obtained from parents. Ethical clearance was obtained from the institutional review board.

The criteria for inclusion were the child should be:

a) Free from systemic or local diseases which affect salivary secretion.
b) A permanent resident of Davangere city and consuming only municipal water.

Those children who fulfilled the above criteria were screened for dental caries status under the natural light using mouth mirror and explorer. The caries status of each child was scored by using DMFS and dfs indices and categorized into three groups depending on their caries status [10].

1. Group I: Control group- Caries free group (DMFS+dfs = 0)
2. Group II: Low to moderate caries group (DMFS +dfs = 3-8)
3. Group III: High caries group (DMFS+dfs ≥ 9)

The study sample of 60 children (31-boys and 29-girls) was selected employing multistage stratified random sampling procedure from the group of children screened. Each group had 20 children.

Collection of Salivary Samples

On the day of collection, the participating children were instructed not to eat or drink anything for at least 1 hour before the collection of saliva samples. This was to avoid the influence of immediate food consumption and contamination on the composition of saliva.[6, 11, 12]. The circadian rhythm can change composition of saliva in the same individual at different times of the same day. To control the circadian variation, all the three samples from all the children were collected between 10 am -11.30 am [11-13]. The children were asked to rinse their mouth thoroughly 10 minutes before collection to avoid any residual food debris. Then they were made to sit in a well-ventilated and well-lit room[11-13]. Each child was given a piece of approximately 2 gms of paraffin wax and asked to chew it on both sides of jaw[6]. Children were asked to spit out the initial saliva collected in the mouth as it might contain food debris. Collection was done by allowing the children to drool or gently expectorate into clean, sterile, ice chilled test tubes [4,6,13]. 2-3 ml of saliva was collected from each child, the quantity which is sufficient for analysis of all the three components [12]. Immediately after collection the lid of the test tubes were closed and transferred to laboratory within 30 minutes of collection. These samples were stored at 40ºC, until analysis on the same day[12]. Three samples were collected from each child at weekly interval with a gap of seven days between collections.

Salivary Analysis:

Analysis of the saliva samples was carried out on the same day of collection. Samples were centrifuged at 5000 rpm for 5 minutes to remove debris [6]. Then each sample was estimated for calcium (O-Cresolphthalein reagent) [6], phosphate (phosphomolybdate reagent) [6] and alpha-amylase (CNPG3 method using 2 chloro-4 nitro alpha-maltotrioside reagent)[14] concentrations. Estimation of these parameters was done using an autoanalyzer which works on the principle of atomic absorption spectrophotometry[3, 6] (Ciba Corning, USA). The values obtained were tabulated and subjected to statistical analysis.

Statistical Analysis:

Descriptive statistics that included mean, standard deviation and minimum and maximum values were determined for each of the test groups. One-way ANOVA was used for simultaneous multiple group comparisons followed by Mann-Whitney Test for pair wise comparisons. Pearson's correlation coefficient was used to assess the relationship between caries status and various salivary parameters. Significance for all the statistical tests was predetermined at a p-value of 0.05 or less.

RESULTS

The range, mean scores and standard deviations for calcium, phosphate and alpha-amylase in the 3 caries groups are presented in Table 1. The mean values of salivary components estimated are exhibited in Figure 1.

In Group I (caries free) the mean concentrations of calcium, phosphate, α-amylase were 9.7 mg/dl, 12.7 mg/dl and 85.0 U/ml respectively.

In Group II (Low-moderate caries), the mean concentrations of calcium, phosphate, α-amylase were 6.2 mg/dl, 7.4 mg/dl, 74.6 U/ml respectively

In Group III (High caries), the mean concentrations of calcium, phosphate, α-amylase were 4.4mg/dl, 6.5 mg/dl and 64.6U/ml respectively.

TABLE 1: THE CONCENTRATIONS OF SALIVARY CALCIUM, PHOSPHATE AND α-AMYLASE IN THREE DIFFERENT CARIES GROUPS

Groups (Caries Status)	Particulars	Calcium (mg/dl)	Phosphate (mg/dl)	α-Amylase (U/ml)
Group I (caries free) N=20 DMFS+dfs=0	Range	6.8 – 12.9	8.4 – 17.6	46 – 118
	Mean ± (SD)	9.7 ± (2.0)	12.7 ± (2.5)	85.0 ± (23.1)
Group II (low to moderate caries) N=20 DMFS+dfs=3-8	Range	3.3 – 8.1	4.0 – 10.2	42 – 121
	Mean ± (SD)	6.2 ± (1.1)	7.4 ± (1.5)	74.6 ± (21.3)
Group III (high caries) N=20 DMFS+dfs≥9	Range	2.3 – 6.6	3.1 – 10.9	26 – 99
	Mean ± (SD)	4.4 ± (1.2)	6.5 ± (1.8)	64.6 ± (20.0)

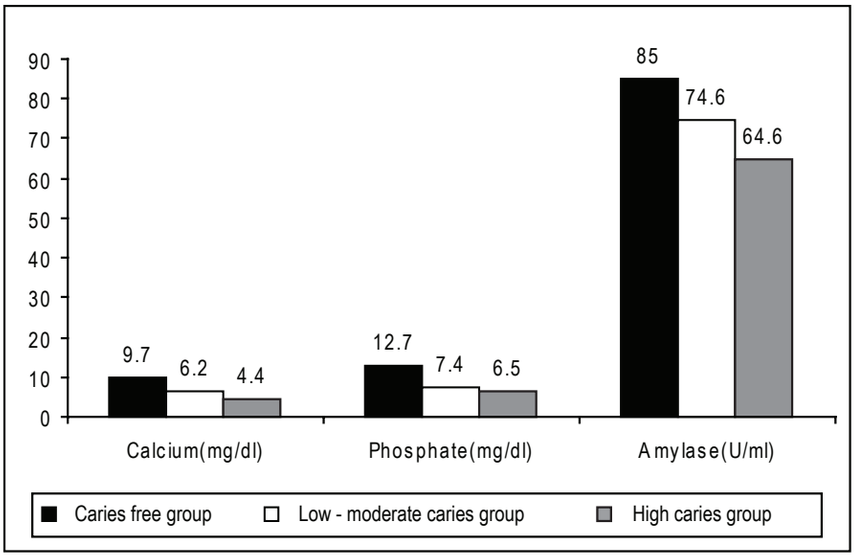

FIGURE 1: MEAN SALIVARY CALCIUM, PHOSPHATE AND ALPHA AMYLASE CONCENTRATIONS IN THREE CARIES GROUPS.

Inter-group comparisons of the calcium concentrations:

The difference in the mean calcium concentration between the three groups was statistically significant ($p<0.001$) (Table 2).

TABLE 2: INTER-GROUP COMPARISON OF SALIVARY CALCIUM CONCENTRATION

Groups	Mean(mg/dl) ± (SD)	Difference Between Groups *		
		Groups Compared	Mean Difference	Significance
Group I (Control)	9.7 ± (2.0)	I vs II	3.5	p<0.001
Group II	6.2 ± (1.1)	II vs III	1.8	p<0.001
Group III	4.4 ± (1.2)	I vs III	5.3	p<0.001

One way ANOVA (F = 65.9)
* Mann-Whitney Test
p<0.001, Highly significant
SD – Standard deviation

Inter-group comparisons of the phosphate concentrations:

The inter-group comparisons of the phosphate concentrations between group I and group II as well as group I and group III were statistically highly significant ($p<0.001$), but the difference was not significant ($p>0.05$) between group II and group III (Table 3).

TABLE 3: INTER-GROUP COMPARISON OF SALIVARY PHOSPHATE CONCENTRATION

Groups	Mean (mg/dl) ± (SD)	Difference Between Groups *		
		Groups Compared	Mean Difference	Significance
Group I (Control)	12.7 ± (2.5)	I vs II	5.3	p<0.001
Group II	7.4 ± (1.5)	II vs III	0.9	p=0.9
Group III	6.5 ± (1.8)	I vs III	6.2	p<0.001

One Way ANOVA (F = 57.1)
* Mann-Whitney Test
p>0.05 Not significant
p<0.001 Highly significant
SD – Standard deviation

Inter-group comparisons of the alpha-amylase concentrations:

The inter-group comparison of the salivary alpha-amylase concentrations was not statistically significant when group I and II as well as group II and group III were compared (p> 0.05). However there was significant difference between group I and group III (p<0.05) (Table 4).

TABLE 4: INTER-GROUP COMPARISON OF SALIVARY α-AMYLASE CONCENTRATION

Groups	Mean(U/ml) ±(SD)	Difference Between Groups *		
		Groups Compared	Mean Difference	Significance
Group I (Control)	85.0 ± (23.1)	I vs II	10.4	p=0.16
Group II	74.6 ± (21.3)	II vs III	10.0	p<0.19
Group III	64.6 ± (20.0)	I vs III	20.4	p=0.05

One Way ANOVA (F = 4.51)

* Mann-Whitney Test
p < 0.05 Significant.
p > 0.05 Not Significant.
SD – Standard deviation

Comparison between boys and girls:

Table 5 represents the comparison of calcium, phosphate and alpha-amylase concentrations among males (n=31) and females (n=29) irrespective of their caries status. The difference in the mean calcium concentration and alpha-amylase concentrations between boys and girls was not statistically significant (p>0.05). The difference in the mean phosphate concentrations was statistically significant (p<0.05).

TABLE 5: COMPARISON OF SALIVARY CALCIUM (mg/dl), PHOSPHATE (mg/dl) and α-AMYLASE (U/ml) CONCENTRATIONS AMONG BOYS AND GIRLS IRRESPECTIVE OF CARIES GROUPS.

	Boys (n=31)	Girls (n=29)	Boys vs Girls	
	Mean ± (SD)	Mean ± (SD)	t*	p Value
Calcium (mg/dl)	6.31 ± (2.77)	7.20 ± (2.44)	1.32	= 0.19
Phosphate (mg/dl)	7.99 ± (3.31)	9.86 ± (3.18)	2.23	<0.05
Amylase (U/ml)	73.04 ± (22.03)	76.57 ± (23.72)	0.60	= 0.55

* Unpaired t-test
p<0.05 Significant
p>0.05 Not Significant
SD – Standard deviation

DISCUSSION

Design of the study:

Since the quality, quantity and composition of saliva secreted depends on various factors like flow rate, differential gland contributions, duration and nature of stimulus, neurological control, diet, age, sex, stress and the number of samples collected, [2,4,6,9,11-13,15] the saliva sample collection was framed considering most of these factors. Saliva samples were collected three times from each participant at weekly intervals as the mean value would be more representative and reliable of the subject's mineral level[16, 17].

Though it is the resting saliva which keeps the mouth moist continuously, it is difficult to be certain that feeble, undetected stimuli are not present. Considering this, stimulated saliva was chosen and the yielded volume could be readily collected [4]. The children selected were permanent residents of the place and having similar dietary habits.

Salivary calcium concentrations:

Salivary calcium and phosphates provide post eruptive maturation of enamel[7] and influence the precipitation or dissolution of hydroxyapatite of ename [16,18]. It has been reported that salivary calcium and phosphate concentration influences their concentration in plaque fluid by diffusion.[16,19,20] It was shown that the calcium concentration when compared among three different caries groups, there was a statistically significant inverse relation between caries status and calcium concentration ($p<0.001$) [19,20].

In the present study, the mean calcium concentration in caries free group was found to be 9.7± 2.0 mg/dl, in low-moderate caries group it was 6.2 ±1.1mg/dl and in high caries group it was found to be 4.4±1.2 mg/dl. However these values were higher than calcium concentrations reported by Shaw et al (1983)[20] , where they found it to be 2.73 ± 2.23 mg/dl in caries free group and 2.2 ± 1.42mg/dl in caries group. This difference could be due to the difference in the salivary samples and age group selected, as they estimated submandibular and sublingual saliva in 13-15 year old children.

This decrease in the caries status in children with high calcium concentration in saliva is attributed to the process of remineralization of the incipient caries lesions. The saliva which is saturated with calcium and phosphate acts as a reservoir for these essential ions [2,5,6]. In such an environment the process of remineralization overrides demineralization[6]. Plaque fluid that is responsible for the initiation of caries process derives its calcium and phosphorus from the saliva [19].

In contrast to the present study, a direct relation between the caries status and salivary calcium concentration in children has been reported [21-23]. This high calcium concentration of saliva in children with high caries is attributed to calcium release and redistribution from demineralization of tooth [21-23].

Salivary phosphate concentrations:

Although hydroxyapatite contains phosphate in the form of PO_4^{3-} ions, this ion cannot exist in solution at physiological pH values except in very minute concentrations. Being a part of the buffering mechanism phosphate ions maintain the salivary pH. [6,7, 18] Hence when the pH becomes highly acidic, immediately this ion gets converted into HPO_4^{2-} and then H_2PO^{4-} ions. In this way it acts as one of the salivary buffers. Hence if the saliva is not saturated with phosphate, tendency for the enamel dissolution and release of phosphate ions into saliva increases [15].

In the present study, the mean phosphate concentration in caries free group was found to be 12.7±2.5 mg/dl, in low-moderate caries group it was 7.4±1.5 mg/dl and in high caries group it was found to be 6.5±1.8 mg/dl. However these values were comparable to phosphorus concentrations reported by Shaw et al (1983)[20], where they found it to be 11.7 ± 5.31 mg/dl in no caries group and 9.0±4.47mg/dl in caries group. This minimal difference could be due to the difference in the salivary samples and age group selected, as they estimated submandibular and sublingual saliva in 13-15 year old children, whereas we used stimulated whole saliva in 9-10 year old children.

When the phosphate concentrations were compared, there was a statistically significant difference between the Caries free group and the various caries groups ($p<0.001$). However, between Low-moderate caries group and High caries group, it was not statistically significant ($p>0.05$). There was an inverse relation between salivary phosphate concentration and caries in the present study. These results were comparable with the results obtained by Shaw et al [20] and Bardow et al [21]. The low caries experience in children with high phosphate concentrations can be explained by the same reasons as for the calcium [5,6].

A direct relationship between the caries status and salivary phosphorus concentrations was also reported [1,22,24,25]. This high salivary phosphate concentration in children with high caries was attributed to the dissolution of hard tissues of tooth in the oral cavity in the presence of saliva [1,24].

Concentration of salivary α- amylase:

Salivary α- amylase has a digestive function and it clears the carbohydrate debris present on the teeth [8,9,26]. One of the striking features of this enzyme is that it is exclusively of salivary origin when compared to other enzymes of saliva which are of both salivary and bacterial origin. This enzyme was found to bind with various bacteria [27]. This close relation of α-amylase with carbohydrate digestion and oral microbial flora complicates its action in the dental caries process.

In the present study, the mean α-amylase concentration in No caries group was found to be 85.0±23.1 U/ml, in Low-moderate caries group it was 74.6±21.3 U/ml and in High caries group it was 64.6±20.0 U/ml. Concentration of α-amylase is high in parotid secretions and this gland contributes more for the stimulated salivary secretion. Hence α-amylase concentration will be high in

stimulated saliva compared to unstimulated saliva[8].

In this study, when the enzyme concentrations compared among three different caries groups showed an inverse relationship between caries status and α-amylase concentrations of saliva. There was a statistically significant difference between Caries free group and High caries group ($p<0.05$). These results were comparable with the results obtained by Ziegler et al.[28] and Bardow et al.[21]. The low caries status in individuals with high α-amylase concentration could be due to the starch clearance action of α-amylase [5,8,9,26].

Comparison between girls and boys irrespective of caries groups:

When comparisons were done between girls and boys irrespective of their caries status the concentrations of phosphate were significantly higher in girls than in boys ($p<0.05$). These results were comparable to the results of Mazengo et al [13]. However, on comparison between boys and girls, the concentrations of calcium and α-amylase were not statistically significant ($p>0.05$).

CONCLUSION

Salivary calcium, phosphate and alpha-amylase concentrations were highest in Caries free group and lowest in high caries group. The concentrations of these ions were moderate in low-moderate caries group. Salivary calcium, phosphate and alpha-amylase concentrations increased with the decrease in the caries status of the individual. The outcome of the study elicits the fact that calcium, phosphate and alpha-amylase concentrations in saliva definitely influence the dental caries process. However, clinical interpretation of the results obtained in the present study should be made carefully as it involved only one of the host factor components of the multifactorial etiology of dental caries.

This article is of importance to paediatric dentist as:

- Major oral disease among children is dental caries. This paper evaluates the role played by a host protective factor, 'saliva', in the etiology of dental caries.
- The salivary factors evaluated here may prove to be useful measures of caries experience in children and allow paediatric dentists to target preventive measures appropriately.

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Radiological Features Of Different Histopathological Variants Of Ameloblastomas

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ABSTRACT

The aim of present study was to determine if the radiological features noticed on dental panoramic radiographs can ascertain the different variants of ameloblastomas. Methods: A total number of 177 cases of ameloblastoma diagnosed in 5 centers in Malaysia were reviewed. The clinical records of these cases were analyzed with respect to age, sex, ethnicity, diagnosis of the lesions, anatomic site, size, side, year of diagnosis, status of the lesion, and characteristics of the lesions. Detailed radiographic features such as septation, calcification, effect on adjacent structures, periosteal reactions, demarcation and cortication of the border of the lesions were recorded. Results: The unicystic, plexiform and acanthomatous ameloblastomas tend to have unilocular radiolucencies as opposed to the follicular ameloblastoma, which demonstrated commonly multilocular radiolucency with soap-bubble appearance. The well-demarcated borders with thin condensed sclerotic border of the lesions appeared to be more significant in unicystic ameloblastoms. Moderately and poorly demarcated lesions are commonly found in follicular and acanthomatous ameloblastomas. Multiplanar pattern of root resorptions, protrusion of roots into lesions and cortical expansions with intact visible margins are commonly seen in ameloblastomas. Conclusion: The various histopathological patterns are not closely related to any specific radiological appearances in the jaws and there seems to be no direct or obvious correlation between the histopathological patterns of the tumours and the radiological appearance of ameloblastomas.

Key words

Ameloblastoma, radiological features, histopathological patterns.

INTRODUCTION

Ameloblastoma is a benign, locally invasive epithelial odontogenic neoplasm that bears a morphological resemblance to the early cap-stage ameloblastic element of the developing tooth germ.[1-3] It is the most commonly encountered of the clinically significant odontogenic tumours. Several histopathological patterns of ameloblastoma are commonly described and these include the follicular, plexiform, acanthomatous, granular cell, and basal cell pattern.[4-6]

Ameloblastoma occurs primarily in middle-aged adults, with predilection for the posterior mandible. Radiographically, it exhibits an expansible unilocular, or more often, multilocular pattern with discrete margins, and association with an impacted tooth is commonly observed. Expansion of the cortex was common, but cortical erosion or perforation was not observed.[7] Among the unilocular lesions, the plexiform type was seen more frequently than the follicular type and the follicular type predominated among the multilocular lesions.[8]

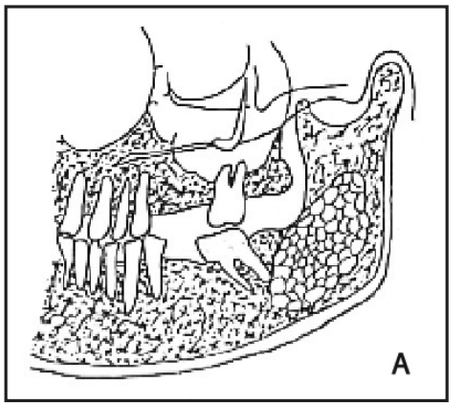
The purpose of this study (done in 2003) was to determine if it was possible to distinguish the histopathologically different ameloblastomas from the observed radiological patterns.

MATERIALS AND METHODS

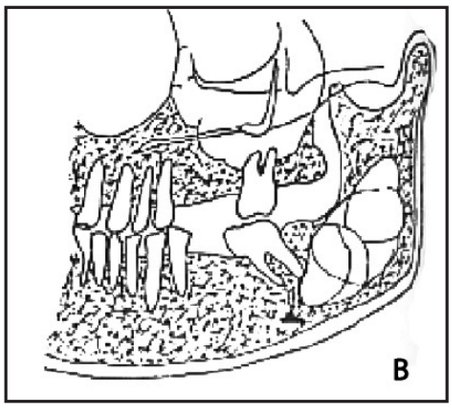
A total of 177 cases of histologically verified ameloblastomas and complete with dental panoramic radiographs were obtained from the Dental Faculty, University of Malaya, Kuala Lumpur; Oral and Maxillofacial Surgery Department, General Hospital of Kuala Lumpur; Oral and Maxillofacial Surgery Department, Sarawak General Hospital, Sarawak; Oral and Maxillofacial Department, Tengku Ampuan Rahimah Hospital, Klang; Oral and Maxillofacial Surgery Department, University of

Science Malaysia, Kelantan. The clinical records of these cases were analysed with respect to age, sex, ethnicity, diagnosis of the lesions, anatomic site, size, side, year of diagnosis, status of the lesion, and characteristics of the lesions. Detailed radiographic features (Fig 1)[9] such as septation, calcification, effect on adjacent structures, periosteal changes, demarcation and cortication of the border of the lesions were recorded.

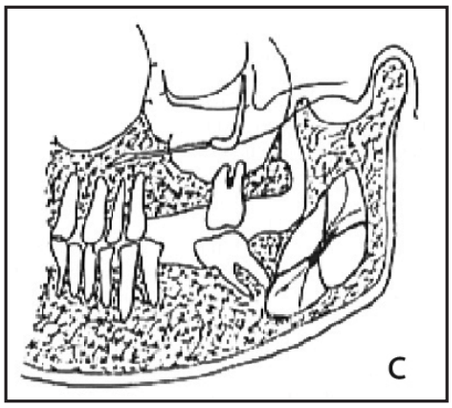
Figure 1. Multilocular patterns.



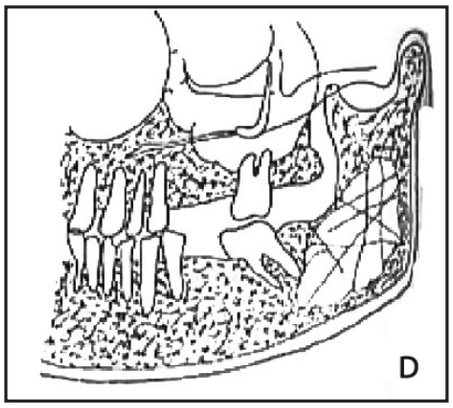
Honeycomb



Soap bubble



Spider



Tennis racket

Figure adapted from: Langlais RP, Langland OE & Nortje CJ (1995). Principles of interpretation of jaw images. In: Dignaostic Imaging of the Jaws. Pg. 28.9

RESULTS

Plexiform Ameloblastoma

Thirteen of the 17 cases of the plexiform ameloblastomas were unilocular, and those in 4 cases were multilocular. Of the 4 multilocular lesions, half of them had honeycomb and the other half had soap-bubble appearance. Five (29.4%) lesions were well demarcated, 6 (35.3%) were moderately demarcated and 6 (35.3%) were poorly demarcated. Some of the lesions (52.9%) had thin condensed sclerotic margin while only 6 lesions (35.3%) were with scalloped margins. The plexiform ameloblastoma did not cause any loss of teeth and widening of the periodontal tissue. However, there were 4 cases (23.5%) which caused root resorption with knife edge type of pattern. Moreover, 3 cases (17.6%) had lesions where the roots of the teeth were protruded into the radiolucent areas. Six lesions (35.3%) had caused displacement of the teeth and 4 (23.5%) were associated with impacted teeth. Two lesions (11.7%) were located pericoronally, while 2 of the 17 lesions (11.7%) had caused expansions and the expansions were intact and visible (Table 1).

Follicular Ameloblastoma

In 13 (72.2%) of the 18 patients, the radiographic appearance on the dental panoramic radiographs was that of multilocular radiolucent areas. Of these radiolucencies, 4 (22.2%) presented as honeycomb appearance; 9 (50%) had soap-bubble pattern. Unilocular radiolucent lesions were seen in 5 patients. The lesions of these subtype of ameloblastoma were well demarcated in 3 cases (16.7%); 3 moderately demarcated; 9 poorly demarcated; and 3 lesions were undemarcated. The borders of 11 cases (61.1%) had generally thin, condensed sclerotic margin. Eleven of the lesions (61.1%) had scalloped internal margins while the others were not. No displaced or impacted tooth

Table 1: Radiographic features of different histopathological variants of amelobalstomas

Radiographic features	Plexiform (%)	Follicular (%)	Acanthomatous (%)	Mixed Plexiform and Follicular (%)	Desmoplastic (%)	Unicystic (%)
Unilocular	13 (76.5)	5 (27.8)	10 (83.3)	4 (100)	2 (100)	38 (62.3)
Multilocular						
Honeycomb	2 (11.8)	4 (22.2)	0 (0.0)	0 (0.0)	0 (0.0)	5 (8.2)
Soap-bubble	2 (11.8)	9 (50.0)	2 (16.7)	0 (0.0)	0 (0.0)	12 (19.7)
Spider-like	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (6.6)
Tennis racket	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (3.3)
Lesions with condensed sclerotic margin	9 (52.9)	11 (61.1)	8 (66.7)	4 (100.0)	2 (100.0)	42 (68.9)
Scalloped border	6 (35.3)	11 (61.1)	6 (50.0)	0 (0.0)	0 (0.0)	22 (36.1)
Root resorption						
Knife-edge	4 (23.5)	0 (0.0)	2 (16.7)	0 (0.0)	0 (0.0)	16 (26.2)
Multiplanar	0 (0.0)	4 (22.2)	0 (0.0)	0 (0.0)	0 (0.0)	18 (29.5)
Protrusion of roots into lesions	3 (17.6)	9 (50.0)	2 (16.7)	2 (50.0)	0 (0.0)	35 (57.4)
Displacement of teeth	6 (35.3)	0 (0.0)	2 (16.7)	2 (50.0)	0 (0.0)	13 (21.3)
Impaction of teeth	4 (23.5)	0 (0.0)	0 (0.0)	2 (50.0)	0 (0.0)	6 (9.8)
Missing of teeth	5 (29.4)	15 (83.3)	4 (33.3)	0 (0.0)	0 (0.0)	20 (32.8)
Expansion						
Intact and visible	2 (11.8)	4 (22.2)	4 (33.3)	0 (0.0)	0 (0.0)	16 (26.2)
Intact and invisible	0 (0.0)	2 (11.1)	0 (0.0)	0 (0.0)	0 (0.0)	5 (8.2)
Perforated	0 (0.0)	2 (11.1)	4 (33.3)	2 (50.0)	0 (0.0)	6 (9.8)
Demarcation						
Well demarcated	5 (29.4)	3 (16.7)	2 (16.7)	2 (50.0)	2 (100)	21 (34.4)
Moderately demarcated	6 (35.3)	3 (16.7)	2 (16.7)	0 (0.0)	0 (0.0)	24 (39.3)
Poorly demarcated	6 (35.3)	9 (50.0)	6 (50.0)	2 (50.0)	0 (0.0)	12 (19.7)
Undemarcated	0 (0.0)	3 (16.7)	2 (16.7)	0 (0.0)	0 (0.0)	4 (6.6)

was associated with this type of ameloblastoma. Fifteen (83.3%) of the lesions had caused missing teeth and the roots of teeth were affected in 4 of the 18 cases (22.2%). The roots were resorbed in a multiplanar pattern in all the 4 cases. Roots of teeth protruded into the radiolucency in 9 cases (50.0%). Five cases (27.8%) were at the periapical region of the teeth while 13 (72.2%) were not specific in relation to the neighbourng teeth. Eight cases of the lesion (44.4%) caused expansion of the mandible while 4 of the borders of the expanded lesions (50.0%) were intact and visible on the panoramic radiographs. In 2 cases (25%) the borders were expanded but the margins were intact but invisible on radiographs. In two cases (25.0%) the cortical margins were perforated.

Acanthomatous Ameloblastomas

Of the total 12 cases, 10 lesions (83.3%) appeared as unilocular radiolucencies. Two (16.7%) presented as multilocular radiolucencies. All the multilocular radiolucencies had soap-bubble pattern type of appearance, while more than half of the lesions had poorly demarcated borders. There were 2 (16.7%) lesions which appeared well demarcated; 2 moderately demarcated (16.7%); and 2 lesions (16.7%) were undemarcated. In 8 cases (66.7%), the margins of certain parts of the lesions were thin, condensed, and sclerotic. The remaining 4 (33.3%) were not having any sclerotic margin at all. Two cases (16.7%) of the acanthomatous ameloblastoma caused destruction of the periodontal tissues and the teeth appeared as floating in the radiographs. The type of root resorption that was

caused by the lesions was the knife edge pattern. In another 2 cases the teeth had protruded into the radiolucent areas. The lesions had also displaced teeth in 2 instances (16.7%) and 4 (33.3%) cases had missing teeth. In relation to the teeth, 2 cases (16.7%) were located pericoronally and also 2 (16.7%) were located periapically. For this type of ameloblastoma, 8 lesions (66.7%) had expanded cortical margins. Among the expanded lesions, half of the cases had the border intact and visible and the other half had the margins perforated.

Desmoplastic Ameloblastomas

The lesions appeared as unilocular on the panoramic radiographs. The borders were well demarcated with thin condensed sclerotic margin. There was no root resorption, widening of the periodontal ligament space, protrusion of roots into the lesions or any expansion of the cortex.

Mixed Follicular and Plexiform Ameloblastomas

The mixed follicular and plexiform ameloblastoma presented as unilocular radiolucency on the panoramic radiographs. Half of the lesions were well demarcated and the other half was poorly demarcated. The margins of 2 lesions were thin, condensed and sclerotic. Root resorptions were noticed in 2 cases but it was not able to distinguish whether it was knife-edge or multiplanar type of resorption. In 2 cases, the ameloblastoma was associated with displaced teeth and in 2 cases the teeth were impacted. The lesions also caused expansions of the cortical plates and half of them were perforated.

Unicystic Ameloblastomas

For the unicystic ameloblastoma, 38 (62.3%) panoramic radiographs presented with unilocular radiolucencies and 23 (37.7%) with multilocular radiolucencies. Of the 23 multilocular lesions, 5 (21.7%) had honeycomb appearance, 12 (52.2%) had soap-bubble appearance, 2 (8.7%) had tennis racket appearance and 4 (17.4%) had spider-like appearance. Forty-five lesions (73.8%) were well and moderately demarcated. Four (6.6%) were undemarcated while the others were poorly demarcated. Majority of the internal margin of the lesions (68.9%) were of the thin condensed sclerotic variety and 22 of the lesions (36.1%) were scalloped margins. Six cases (9.8%) had floating teeth appearance in the panoramic radiographs and there were 2 cases (3.3%) with widened periodontal ligament space. Most of the lesions (55.7%) had caused root resorptions. Sixteen (26.2%) lesions produced knife edge type of root resorption, whereas 18 (29.5%) cases were of the multiplanar variety. There were 35 cases (57.4%) where the roots of the teeth were protruded into the lesions. Thirteen lesions (21.3%) caused displacement of teeth while 6 cases (9.8%) were associated with impacted teeth. Approximately one third of the cases demonstrated missing teeth. Nine (14.8%) lesions were located pericoronally, 10 (16.4%) periapically and 2 (3.3%) were in the interradicular area. Of the 61 lesions, 27 (44.3%) patients had cortical expansion. Sixteen (59.3%) of the expanded lesions had marginsthat were intact and visible on plain radiographs. Five (18.5%) had intact margins but invisible whereas 6 (22.2%) had cortical perforations.

DISCUSSION

This study probably represents the largest study done on the detailed radiographic features of histopathologically varied ameloblastomas. In the present study, the plexiform variant tends to have unilocular radiolucent appearance, which corresponds to the study by Ueno et al.[8] This finding, however contradicts to the finding by Sirichitra and Dhiravarangkura[10] who stated that plexiform variant tends to have multilocular appearance, either as honeycomb or soap-bubble (Table 2). On the other hand, follicular variant tends to have soap-bubble type of multilocular appearance. Unlike the report by Sirichitra and Dhiravarangkura[10], in this study acanthomatous pattern also tends to show unilocular radiolucency appearance. Multilocular patterns of bone destruction can be associated with locally aggressive benign conditions and generally implies cortical expansion. Thus, multilocularity can help to rule out malignancy. As a function of their aggressiveness, multilocular lesions have a tendency to recur as reported in many surgical excisions of ameloblastoma. The recurrence rate of multilocular lesions is higher than that of other unilocular lesions of similar size and with an equal degree of cortical expansion. The higher recurrence rate of the follicular variant of ameloblastoma, could be safely predicted because they commonly produce multilocular radiolucency. In desmoplastic variant, there are frequently bone tissues in the tumour, and radiographic examination shows a mixed radiolucent-radiopaque lesions that is similar to a fibro-osseous lesions.[7,11-17] In this study, there was no radio-opaque material in the unilocular radiolucencies.

There was higher percentage of poorly demarcated border with thin condensed sclerotic internal margin in follicular variant compared to the plexiform variant. This feature was also disclosed in the acanthomatous variant of ameloblastoma. Scalloping of the margins of the lesions were more common in follicular than plexiform variant. However, 50% of the acanthomatous variant also produced scalloped margin. Among all the variants of ameloblastoma, only the acanthomatous variety was found to cause “floating teeth”, a feature of malignancy and aggressive behaviour of the tumour. The radiological findings may cause interpretation as either being benign or malignant lesion and this can cause confusion in concluding the nature and behaviour of the acanthomatous variant of ameloblastoma. The borders of the lesions were well demarcated and with thin condensed sclerotic rim which suggested a less aggressive type of ameloblastoma. In addition, follicular and acanthomatous variant also caused expansion, normally with intact and visible margins of the cortex on radiographs. The expanded cortex is an important indicator that the variants are benign.

Plexiform type of ameloblastoma caused knife-edge pattern of root resorption while the follicular pattern

Table 2:The relationship of histopathological patterns and radiographic appearances of ameloblastoma in three regional series.

Histopathological patterns with different radiographic appearances.	Sirichitra et al. (Thailand)	Ueno et al. (Japan)	Present study (Malaysia)
Follicular (F			
Unilocular (%)	9 (19.5)	19 (31.7)	5 (22.7)
Multilocular (%)	28 (60.9)	28 (46.7)	13 (59.1)
soap-bubble (%)	9 (19.6)	13 (21.7)	4 (18.2)
Plexiform (P)			
Unilocular (%)	22 (36.1)	27 (73.0)	13 (68.4)
Multilocular (%)	36 (59.0)	8 (21.6)	4 (21.1)
soap-bubble (%)	3 (4.9)	2 (5.4)	2 (10.5)
Mixed P+F			
Unilocular (%)	0 (0)	nil	4 (100)
Multilocular (%)	10 (83.3)	nil	0 (0)
soap-bubble (%)	2 (16.7)	nil	0 (0)

presented multiplanar type of root resorption. Although they were different type of root resorption, they indicated a more aggressive growth pattern, a well-recognised behaviour of ameloblastoma. As for the acanthomatous variant, a small number of cases had root resorption. From the present study, it was discovered that plexiform and the mixed plexiform and follicular variant of ameloblastoma was often associated with displacement and impaction of teeth. This observation was not evident on radiographs of patients with the follicular variant of ameloblastoma. Dispalcement and impaction of teeth may be interpreted as a sign of a benign process, although exceptions do occur.

Radiologically, unicystic ameloblastoma may have either unilocular or multilocular radiolucency. The multilocular radiolucencies may produce honeycomb, soap-bubble appearance that were similarly noticed in the conventional ameloblastoma. However, unlike conventional ameloblastoma, unicystic variant can also present with spider-like and tennis racket patterns of multilocular radiolucency. Moreover, less than half of the lesions had scalloped margins.

Mixed radiolucent and radioopaque lesions were not seen in the unicystic ameloblastoma. The borders of the lesions were normally well or moderately demarcated and these internal margins usually appeared as thin condensed sclerotic rim, which was also noticed by Eversole et al.[7] These findings were also reported by Thompson et al18 who mentioned a lesion with well-demarcated and condensed sclerotic margin, causing displacement and resorption of the roots of teeth. Some of the lesions were associated with “floating teeth” while more than half of the cases had root resorptions, either having a knife-edge or a multiplanar pattern. Besides, unicystic ameloblastoma commonly had root protrusions into the lesions. In addition, these lesions were associated with impacted teeth and displaced teeth, which suggested a sign of benign process. Interestingly, some lesions were related pericoronally with teeth, similar to odontogenic cysts. Intact and visible expansion of the cortex noted in this study may be an indicator that the unicystic ameloblastoma is possibly a benign lesion. In conclusion, the various histopathological patterns are not closely related to any specific radiological features(s) in the jaws.

CONCLUSION

There does not seem to be any direct or obvious correlation between the histopathological pattern of the tumour and its appearance on the dental panoramic radiographs. In support of this fact, the diagnostician should not rely solely on radiographic findings when processing patient data in order to formulate a differential diagnosis.

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Psychological Impacts Of Dental Fluorosis Among Malaysian School Children

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ABSTRACT

The objectives were to assess the prevalence, severity, the psychological and social impacts of fluorosis among school children and their parents in the Kuala Pilah area, Negeri Sembilan, Malaysia. Methods: A convenience sample of 431 students aged 16-17 years old from 3 secondary schools in Kuala Pilah, Negeri Sembilan were selected. The students were assessed for presence of dental fluorosis using Dean's Index and to assess impacts. Questionnaires were administered to all the dental fluorosis students and selected matched students with no fluorosis. They constituted a control group for the case control study. Questionnaires were sent to the parents of dental fluorosis and control non fluorosis cases. Results: The prevalence of dental fluorosis was 27.8%; 82% of the fluorosis cases were questionable to mild and 18% moderate to severe fluorosis. 16.1% of students with dental fluorosis and 8.5% of non-fluorosis students had psychological impacts. 12.8% of the parents of children with fluorosis reported that their child had an impact. More girls with fluorosis (35.7%) had psychological impacts compared than boys (25.0%). In the 16.1% of fluorosis cases who had psychological impacts, difficulty smiling and showing teeth, affected 35.7% of girls and 25 % of boys. The percentage of students with dental fluorosis who had psychological impacts on carrying out school work was 2.7%, and 3.6% had impacts related to going out with friends. Conclusions: There were considerable psychological impacts on smiling and showing teeth among Malaysian teenagers with dental fluorosis and some of their parents were concerned about the fluorosis. But the impacts were mild and do not have a major impact on students' lives. Dental fluorosis is not aesthetically displeasing to most subjects but does have psychological and social impacts on a small percentage with fluorosis.

Key words

fluorosis, prevalence, children, psychosocial, impacts, dissatisfaction, tooth colour

INTRODUCTION

Seventy percent of Malaysians have access to optimally fluoridated water supplies (0.7 part per million) from 224 water treatment plants. Fluoridation has brought much dental health benefits, but as with most beneficial interventions there are unwanted side-effects, namely fluorosis. The extent of the social and psychological impact depends on how it is perceived by the children and their parents. A study on school children in a fluoridated area found that there was an increase in the prevalence of dental fluorosis since the water fluoridation programme began and 45% of the 12-13 year-old children had fluorosis.[1] In 1999, a study in a fluoridated and a non-fluoridated area in Malaysia reported the prevalence of dental fluorosis in the fluoridated area was 74.7% and 14.2% in the non-fluoridated area in children aged 16-17 years old. From the study 94 % of the fluorosis cases were questionable to mild. In the fluoridated area 25% had normal teeth compared than 85% in non-fluoridataed area. There are only a few studies in South East Asian countries that have evaluated the psychological impact of dental fluorosis.

The perceptions of public about tooth appearance is important in order to weigh up the benefits and

disadvantages of a whole population strategy, such as water fluoridation.[3] The level of fluorosis appears to be related to the levels of concern of the children and their parents about tooth aesthetics. In low endemic fluorosis areas with very mild forms of fluorosis, the impact was not significant in the children and their parents.[4] Where there was more severe fluorosis, there was increased levels of dissatisfaction, both among the parents and the children.[5] Most aesthetically unacceptable dental fluorosis can cause psychological distress to the affected individual; socio-dental measures indicated that the dental fluorosis affected their quality of life.[6] Because water fluoridation is so widespread in Malaysia and levels of fluorosis appear to be increasing, both in prevalence and severity, it was considered important to assess the impacts of fluorosis on the quality of life of schoolchildren.

The aim of this study was to assess the prevalence, severity and psychological impacts of dental fluorosis in children in Kuala Pilah area, Negeri Sembilan. The objectives were to assess the prevalence and severity and the psychological and social impacts of fluorosis among school children in Kuala Pilah area, as well as the concern among their parents.

MATERIALS AND METHODS

Study Population and Sampling

This study included students in a convenience sample of Forms 4 and 5 children aged 16 to 17 years old in 3 of the 20 secondary schools in the Kuala Pilah area. Selection of schools was based on proximity to the Kuala Pilah Dental Clinic. Most of the children had been resident in the Kuala Pilah area since birth. Exclusion cases were orthodontic patients with appliances and children who did not have anterior teeth, for example hypodontia; 5 orthodontic patients and 1 hypodontia patient were excluded from the study.

Examination method

Children were examined seated in a portable dental chair in a well-lit room under artificial light from an operating light, except in one school, Tunku Muhammad School that had a static clinic and their own dental chair and equipment and light. Teeth were not dried but excess plaque was removed with gauze for a clear view for Dean's Index coding. One dental officer, 1 DSA (Dental Surgeon Assistant) and 1 attendant carried out examinations and recordings. Subjects were screened using Dean's Index (WHO, 1997) using coloured photographs of Dean's Index grades to distinguish fluorosis from other types of enamel opacities.[7] The score was based on the 2 worst affected teeth in the mouth.

A re-examination on a different day of 10% of subjects was done to check for inter-examiner variability consistency between gold standard and examiner. Both percentages of agreement and Kappa score were calculated for Dean's index of fluorosis. Kappa score was 0.9 and percentage of agreement was 90.7% indicating an 'almost perfect agreement'. Intra-examiner variability could not be done due to time constraints because this study was done in Malaysia and the data collection should be completed by scheduled time and the analyses will be continued in United Kingdom.

To assess the differences in psychosocial impacts between children with and without enamel fluorosis a case-control study was carried out. The impacts relating to tooth aesthetics in children with and without fluorosis were examined. First the epidemiological study was done to identify children with and without fluorosis. Then children with fluorosis were matched, by sex, age and school with a non-fluorosis control. Questionnaires were administered to all the fluorosis subjects and selected non-fluorosis cases after oral examination for fluorosis and each of the charting forms was coded for fluorosis and non-fluorosis. The purpose of the coding was to make it easier for data collection, data searching and data analysis. Both fluorosis cases and selected non-fluorosis controls were asked about their problems related to the colour of their teeth and whether they were satisfied or not with the appearance of their teeth. They were also asked in detail whether they had any difficulty or psychological impacts relating to three types of problems, namely: 1. smiling and showing teeth; 2. carrying out school work and learning in class; 3. going out and having contact with people. Those questions are based on questions from the Child-OIDP socio-dental indicator.[8] All the questionnaires were completed by the students in the classroom. Those who had fluorosis and selected cases without fluorosis were asked to give questionnaires to their parents and to bring them back the next day. The forms were collected on the following day by the class teacher.

Statistical analysis was performed using SPSS (10.1) for the prevalence of dental fluorosis and to assess the relationship between students with dental fluorosis and their parents in terms of the psychological impact of fluorosis. Statistical analyses were also used to evaluate the fluorosis and non-fluorosis case (case-control studies) among the students.

RESULTS

The prevalence of dental fluorosis was 27.8 % in Kuala Pilah. There was no difference in the prevalence between boys and girls; 28.2% of girls and 27.1% of boys had fluorosis. Most of the fluorosis was questionable and very mild but 5.1% had moderate or severe fluorosis (Table 1).

Table 1: The Prevalence of Fluorosis in Kuala Pilah schoolchildren, using Dean's Index Codes

Fluorosis category	Dean's index code	Sex of student		Total Number (%)
		Girls	Boys	
Normal	0	193	118	311 (72.2%)
Questionable	1	31	17	48 (11.1%)
Very mild	2	21	9	30 (7.0%)
Mild	3	11	9	20 (4.6%)
Moderate	4	12	9	21 (4.9%)
Severe	5	1	0	1 (0.2%)
	a	269	162	431 (100%)

Table 2: Percentage of students dissatisfied with their teeth, by presence or absence of fluorosis

	Girls	Boys	Total Students	Total Questionnaires	Percentage Dissatisfied	Significance
With fluorosis	15.6%	7.4%	54	112	48.2%	Significance
No fluorosis	8.2%	2.6%	26	94	27.6%	Significance

Significant percentages of all children were dissatisfied with the colour of their teeth. 48.2% of fluorosis students and 27.6% of non fluorosis students were dissatisfied with the colour of their teeth. Even among the students without fluorosis many more girls than boys were dissatisfied with the colour of their teeth and in the students with dental fluorosis (Table 2).

Table 3: Dissatisfaction with tooth colour among students and concern among parents of children with fluorosis.

Variables	Children				Parents			
	Boy	%	Girl	%	Boy	%	Girl	%
Complaint of tooth colour	12	31.6	42	56.8	8	28.6	28	48.3
No complaint of tooth colour	26	68.4	32	43.2	20	71.4	30	51.7
Total students by sex	38	100	74	100	28	100	58	100
Total students	112				86			
% of children/parent not satisfied with tooth colour	48.2%				41.9%			

Not only were children dissatisfied about the colour of their teeth but many had other complaints too examples crooked teeth, decayed teeth or broken and chipped teeth. There was a marked differences between girls (56.8%) and boys (31.6%) regarding complaints about tooth colour (Table 3)

Of the 120 questionnaires administered to the children with fluorosis and sent to parents, 93.3% of children (112) and 71.6% of parents (86) satisfactorily completed the questionnaires. Less parents, about 28.6%, who had sons with dental fluorosis were dissatisfied with the colour of their son's teeth compared to 48.3 % who were dissatisfied with their daughter's tooth colour (Table 3). When comparing students' and parents' views, slightly more children were dissatisfied with their tooth colour compared to their parents; 48.2% of children compared to 41.9% of their parents.

Table 4: Psychological impact of fluorosis in students and parents

Criteria	Sex	Children		Parents	
		Total Student	%	Total Student	%
(i) Children with Dental fluorosis (ii) Complaint of tooth colour and (iii) Complaint of – Smiling - Carrying out work - Going out	Gilds Boys	15/112 3/112	13.4 2.7	9/86 2/86	10.5 2.3
Total		18	16.1	11	12.8

Of the 112 responses to questionnaires by children with fluorosis, **16.1%** of children had a psycho-social impact of the teeth on their daily lives. **12.8%** of the parents of such children mentioned psychological impacts on their child. Many more girls than boys with fluorosis had impacts related to their dental appearance; **13.4%** girls compared to **2.7%** of the boys. The percentage reporting impacts was slightly higher in the children than in the parents of the children. Of the **12.8%** of the parents who noted impacts related to fluorosis, more mentioned psychological impacts for daughters than sons; **10.5%** from parents of dental fluorosis girls and **2.3%** of boys' parents (Table 4).

Comparison between fluorosis and non- fluorosis students who had psychological impacts in relation to three problems concerning their tooth colour. A case control analysis

Table 5: Numbers and percentage of fluorosis cases and control students who reported being worried about appearance of their teeth

	Children worried about appearance			Total Questionnaires	% worried
	Girls	Boys	Total Students		
With fluorosis	15	3	18	112	16.1%
No fluorosis	7	1	8	94	8.5%
Total students	22	4	26	206	12.6%

Fluorosis and control cases were asked about their feelings, perceptions and reactions about the colour of their teeth. About twice as many fluorosis cases mentioned they were more worried about the appearance of their teeth than controls without fluorosis (Table 5)

Table 6: The distribution of psychological impacts of teeth on three aspects of daily life in students with and without fluorosis, by sex.

Type of problems	Fluorosis (54)					Non Fluorosis (26)				
	Girls (42)		Boys (12)		%	Girls (22)		Boys (4)		%
	Yes	%	Yes	%	Yes	Yes	%	Yes	%	Yes
Difficulty in smilling	15	35.7	3	25	16.1	7	31.8	1	25	8.5
Carry out school work	3	7.1	0	0	2.7	1	4.5	1	25	2.1
Going out with friends	4	9.5	0	0	3.6	2	9.1	1	25	3.2

More cases with fluorosis compared to non-fluorosis controls in the case control study had psychological impacts from three types of problems, namely 'smiling and showing teeth, carrying out school work and learning in class or, going out and difficulty to be in contact with people' (Table 6). 16.1% of dental fluorosis students had psychological impacts relating to difficulty smiling and showing teeth. 2.7% in carrying out work and 3.6% with going out with friends. In the controls without fluorosis, the prevalence of psychological impact on smiling and showing teeth was 8.5%. Only 2.1% of non-fluorosis children had difficulty in carrying out work and 3.2% had difficulty with going out with friends.

In both fluorosis and controls without fluorosis, girls were more likely to have at least one psychological impact than boys. This indicates they were more conscious of their tooth colour problem and it affected their quality of life. Overall, the percentage of children with fluorosis who had psychological impact was twice that of non-fluorosis cases; 16.1% compared to 8.5% (Table 5). Between fluorosis and non-fluorosis cases who complained about the colour of their teeth and had difficulty in smiling, there were more impacts in fluorosis cases. This indicated the impact of problems of dental fluorosis is serious. In control students without dental fluorosis but who complained of the colour of their teeth and psychological impacts, the impacts could be due to other dental problems. Many of those who complained, mentioned that their teeth were too yellowish (not from fluorosis).

Psychological impacts relating to difficulty in smiling were particularly common among those who complained about the colour of their teeth; more than one third of girls (35.7%) who complained about tooth colour were affected while only one quarter (25%) of boys were affected. About 10% of the girls who complained about tooth colour (4 out of 42 girls with fluorosis) felt their mouth affected their 'going out with friend' .(Table 6)

DISCUSSION

The prevalence of dental fluorosis in this study was 27.8% with a CFI value of 0.37 which is considered to be of low public health significance. The prevalence was lower than in previous study done in Malaysia in 1999, where the prevalence of dental fluorosis was 74.6 % (Dean's Index) with a CFI value of 0.95, a level considered as of slight public health significance.[2] The prevalence of dental fluorosis in this study was much lower than in other Malaysian studies.

This study shows that there was a considerable psychological impact of fluorosis among the children; **16.1%** in dental fluorosis students and **12.8 %** of parents of children with dental fluorosis considered that it affected the childrens' quality of life. Girls were more worried about their appearance. These 16 years old children have reached a phase in life where they are more critical about their appearance and having nice looking teeth. The mild forms of fluorosis is not considered of cosmetic significance; the more severe forms can cause considerable psychological distress to the affected individual [9].

A previous Malaysian study on fluorosis reported that there were psychological impacts relating to dental fluorosis (Sujak, 1997).10 Sujak reported dental fluorosis prevalence of 67.1%, using the DDE index. From the study, more than 35.6% of the students tried to cover their mouth when smiling because of consciousness about tooth colour, 50.2% expressed anxiety about the colour, 31.9% had no confidence in socializing and 18.4% felt a lack of confidence because of their teeth.[10] These findings suggest that tooth colour has psychological and behavioral impacts among Malaysian children.[10] The results of the present study indicate that the percentages with psychological impacts relating to their teeth was considerably lower than in Sujak's study. The psychological impact among dental fluorosis students related to smiling and showing teeth was 16.1%, 2.7% in carrying out work and 3.6% in going out with friends. Sujak's study was carried out in urban while this study was carried out in rural. In both studies, there were similarities in 2 out of 3 categories of problems. In Sujak's study, the psychological impacts were more general while in this study it was more specific than carrying our work and going out with friends, related to smiling and showing teeth, anxiety and lack of confidence.[10]

With regard to perception of dental fluorosis in Kuala Pilah area, socio-economic background of the family may contribute to perceptions of tooth colour. Most of the students live in rural areas and are not from well-off families. They have more problems in their life, for example, factors relating to finance, poor housing, income, family background, and these could take priority over their child's tooth colour problem.

There were psychological impacts 'on smiling and showing their teeth' among Malaysian teenagers with dental fluorosis. However the impacts were mild and do not have a major impact on students' lives. Dental fluorosis is not aesthetically displeasing to most subjects, but does have psychological and social impacts on a small percentage.

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Evaluation of Amorphous Calcium Phosphate (ACP) as an alternative liner- An in vivo study

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ABSTRACT

The present in vivo study was carried out to evaluate the potential use of amorphous calcium phosphate as an alternative cavity liner in 40 patients in the age group of 6-8 years, having bilateral initial occlusal carious lesions on the mandibular first permanent molars.

The experimental teeth (total 40) were restored with amalgam after the application of amorphous calcium phosphate liner in a conventional Class-I cavity preparation. Sensitivity evaluation was carried out using tactile stimulation (probe), thermal stimulation (air blast, water jet) and osmotic stimulation (glucose solution) and was recorded on a patient discomfort scale. The contra-lateral teeth (total 40) which were restored with amalgam placed over a glass ionomer cement liner (Type III- LC) served as control.

In the control group, the post-operative sensitivity after GIC liner placement, reduced from 65% teeth to 22.5% teeth for probing, from 97.5% to 55% for air blasting. Use of water jet and osmotic stimulation was not done after liner placement for the fear of dilution or chemical reaction with the liner material. No sensitivity was observed in almost all the teeth after amalgam restoration. A follow up of 1-month and 6 months showed almost all the control group teeth (40) were comfortable and vital without any sensitivity.

The data was analyzed using Wilcoxon's signed rank test (alternative to paired t-test) and Mann-Whitney test (alternative to unpaired t- test).

In the experimental group, the post-operative sensitivity after amorphous calcium phosphate (ACP) liner placement, reduced from 67.5% teeth to 22.5% for probing, from 100% teeth to 47.5% teeth for air blasting. Complete lack of sensitivity was seen in almost the teeth after amalgam restoration. A follow up period of 1-month and 6 months showed that almost all the experimental group teeth (40) were comfortable and vital, without any sensitivity.

It was concluded that amorphous calcium phosphate lining system can be used as a viable alternative to conventional cavity liners below amalgam restorations as the ACP system on clinical evaluation showed equally effective desensitizing and sealing property as compared to a GIC (Type III) liner.

INTRODUCTION

The aim of conservative treatment of vital teeth is to maintain them in a healthy and functional state. The primary requirement for an ideal restorative material is that, it should form a perfect union with the surrounding tooth structure to prevent the ingress of saliva, fluids and debris.

In spite of many advances in restorative materials, amalgam still remains the choice of material due to its advantages, which include good physical properties, dimensional stability, ease of manipulation, near insolubility in the oral cavity and cost effective.[1] Yet, post-operative sensitivity and susceptibility to fracture still remain its inherent disadvantages. Post-operative sensitivity may result from the inability of the restorative material to seal

off the dentinal tubules.[2]

A cavity liner or a base placed below a silver amalgam restoration acts as an insulator against the transmission of thermal stimuli to the pulp; customarily zinc phosphate or polycarboxylate, zinc oxide eugenol and GIC are used for this purpose. Various studies have shown that the deeper the cavity preparation, the greater the response of underlying pulps to the restorative materials and/or procedures.[3]

Glass ionomer liner have many desirable properties like chemical bonding with dental hard tissue, reducing the need for retentive cavity preparation, fluoride release over a long period of time preventing secondary caries and better compatibility with pulp tissue. But with all these advantages, it still needs a minimal cavity depth for its placement.[1]

Calcium phosphate minerals are the main inorganic constituents of dentin responsible for obstructing the tubule orifices in the physiologic process of dentinal sclerosis. Amongst the obtainable calcium phosphate compounds, amorphous calcium phosphate (ACP) has the highest rate of formation and dissolution under physiologic oral conditions. This compound undergoes rapid conversion into hydroxyapatite crystal in the lumen of open dentinal tubules, thereby leading to desensitization effect. Consequently, it is logical that ACP as a topical desensitizer might provide efficient treatment for hypersensitivity.[4]

This study was carried out with the following objectives:

1. To compare the desensitizing and sealing ability of amorphous calcium phosphate with a glass ionomer liner .
2. To evaluate clinically the potential use of amorphous calcium phosphate (ACP) as an alternative lining material.

MATERIALS AND METHODS

The present in vivo study was carried out in the Department of Pedodontics and Preventive Dentistry, Bapuji Dental College and Hospital, Davangere, Karnataka, India to investigate the potential use of amorphous calcium phosphate as an alternative cavity liner.

Methodology

Forty children aged between 6-8 years were randomly selected for the study from Davangere district. A general examination of all the children was done prior to the start of the study. An informed written consent was obtained from the parents of the patients, prior to the commencement of the study.

Patient selection criteria

1. The patient should be between 6-8 years of age.
2. Patient should have bilateral initial occlusal caries on the mandibular first permanent molars.
3. There should not be gross destruction of the cusps.
4. The patient should not be physically or mentally handicapped.
5. Patient should be free from systemic diseases.

A split mouth design was employed and in each patient, the mandibular first permanent molars were divided into two groups: (i) Control group (lined with glass ionomer cement) and, (ii) Treatment group (lined with ACP liner) respectively.

Clinical procedure

Isolation of the teeth during treatment was carried out using a rubber dam. Teeth were checked for preoperative sensitivity by using probing, [3,5] air blast[3,5] and water jet[3,5] (thermal), osmotic method [5].

a) Probing Method: It was carried out by passing a sharp dental probe with slight pressure over the carious lesion and on the exposed dentinal surface.
b) Thermal Methods:
   i) Air blast: Sensitivity was elicited by directing one–second blast of air from the air syringe of a dental unit into the cavity.
   ii) Water jet: A jet of water from a water syringe was directed towards the surface of the tooth.
c) Osmotic method: This method was accomplished by the use of a freshly prepared saturated glucose solution at room temperature. A cotton pellet saturated with the glucose solution was placed on the occlusal surface of the tooth for 10 seconds and the response recorded.

Each subject was asked to rate the tooth sensitivity based on the following subjective discomfort scale[3,6,7].

0= Normal / No sensation.
1= mild sensation.
2= moderate sensation.
3= severe sensation.

Conventional Class I cavities were prepared using round, straight fissure and inverted cone diamond tips. The greatest length, width and depth of the newly formed cavities were measured using a William's graduated periodontal probe.[8] The width of the Class I cavity was limited to $^1/_3$rd of the distance between the buccal and lingual cusps and the depth of the central area of the cavity was 0.5 mm into the dentine [9].

Glass ionomer liner (Vitrebond, 3M ESPE Dental USA) and ACP (Quell TM Desensitizer Plus, Pentron clinical technologies, LLC) were then placed in the respective conventional Class I cavities of control and experimental groups according to manufacturer's instructions. The glass ionomer powder and liquid were dispensed on a mixing pad and mixed according to the manufacturer's instructions. After mixing it was placed in the prepared cavity using plastic filling instrument. The excess cement was removed and then light cured.

ACP (Quell ™ Desensitizer Plus, Pentron clinical technologies, LLC) is available as a two liquid component system. During ACP placement, swabbing of part-A

solution was done over the pulpal floor of the prepared cavity using applicator tips. Part-B solution was applied over it similarly in quick succession. The procedure was repeated once again after a one minute gap.

All the cavities were restored with silver amalgam. During sensitivity assessment procedures using all the four stimuli, a separate examiner who was not aware of distribution of teeth into experimental and control groups assessed and marked the scores.

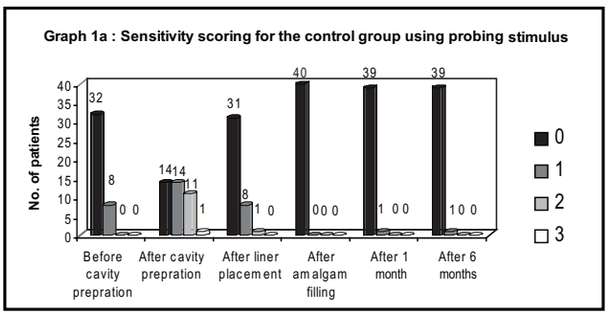
Immediate post operative sensitivity scoring using all the four stimuli were done immediately after cavity preparation, after the liner placement, following amalgam restoration. However, use of water jet and osmotic stimulation was not done after liner placement to avoid dilution or chemical reaction with the liner material.

All patients were evaluated at the end of 1 month and 6 months for postoperative sensitivity. However, patients were advised to come back for check-up, in the event of any pain or discomfort.

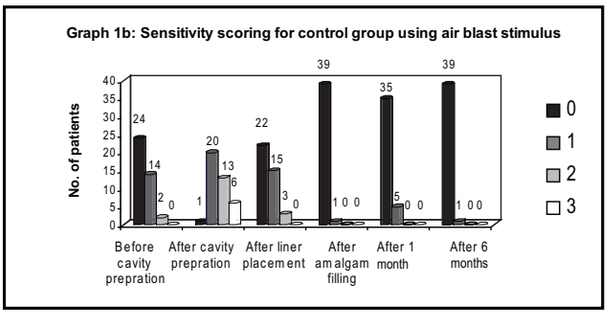
The collected data was subjected to statistical evaluation. The data was presented as number of samples with the corresponding sensitivity scores (grades). The scores were also expressed to ascertain the trend of reduction in sensitivity. Changes in the sensitivity at the different time of assessment were analyzed by Wilcoxon's signed rank test and inter-group comparisons by Mann-Whitney test.

RESULTS

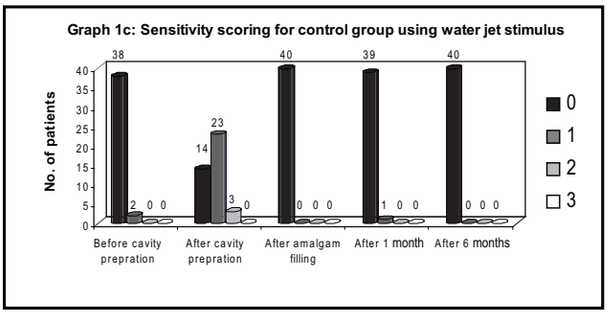
In the control group, for probing stimulus, before cavity preparation, 32 teeth (80%) showed sensitivity score of 0, while 8 teeth (20%) showed sensitivity score of 1. After cavity preparation, 14 teeth (35%) showed sensitivity score of 0, 14 teeth (35%) showed sensitivity score of 1 and 11 teeth (2.5%) showed sensitivity score of 2. After GIC liner placement 31 (77.5%) teeth showed sensitivity score of 0, 8 teeth (20%) showed sensitivity score of 1 and 1 tooth (2.5%) showed sensitivity score of 2 (Graph 1a).



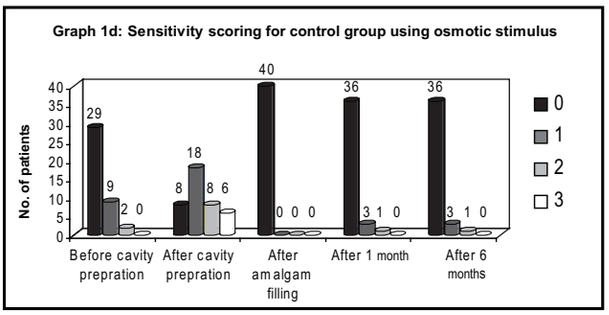
For air blasting, before cavity preparation, 24 teeth (60%) showed sensitivity score of 0, 14 teeth (35%) showed sensitivity score of 1 and 2 (5%) teeth showed sensitivity score of 2. After cavity preparation, 1 (2.5%) tooth showed sensitivity score of 0, 20 teeth (50%) showed sensitivity score of [1, 13] teeth (32.5%) showed sensitivity score of 2 and 6 teeth (15%) showed sensitivity score of 3. After GIC liner placement 22 teeth (55%) showed sensitivity score of 0 , 15 teeth (37.5%) showed sensitivity score of 1 and 3 teeth (7.5%) showed sensitivity score of 2 (Graph 1b).



For water jet stimulus, before cavity preparation, 38 teeth (95%) showed sensitivity score of 0, 2 teeth (5%) showed sensitivity score of 1. After cavity preparation, 14 teeth (35%) showed sensitivity score of 0, 23 teeth (57.5%) showed sensitivity score of 1 and 3 teeth (7.5%) showed sensitivity score of 2. After GIC liner placement all teeth showed sensitivity score of 0 (Graph 1c).

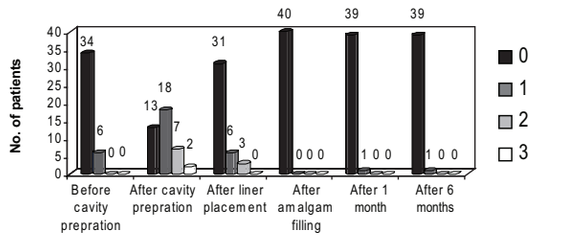


For osmotic stimulus, before cavity preparation, 29 teeth (72.5%) showed sensitivity score of 0, 9 teeth (22.5%) showed sensitivity score of 1 and 2 teeth (5%) showed sensitivity score of 2. After cavity preparation, 8 teeth (20%) showed sensitivity score of 0 , 18 teeth (45%) showed sensitivity score of 1 , 8 teeth (20%) showed sensitivity score of 2 and 6 teeth (15%) showed score of 3 . After GIC liner placement all teeth showed sensitivity score of 0 (Graph 1d).



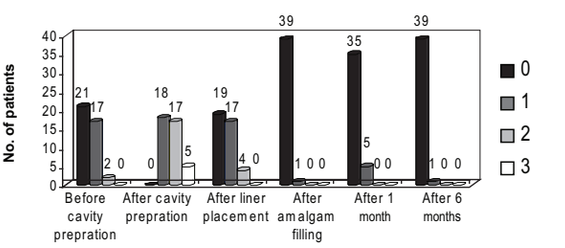
In the experimental group, for probing, before cavity preparation, 34 teeth (85%) showed sensitivity score of 0 and 6 teeth (15%) showed sensitivity score of 1. While after cavity preparation, 13 teeth (32.5%) showed sensitivity score of 0, 18 teeth (45%) showed sensitivity score of 1, 7 teeth (17.5%) showed sensitivity score of 2 and 2 teeth (5%) showed sensitivity score of 3. After ACP liner placement 31 teeth (77.5%) showed sensitivity score of 0, 6 teeth (15%) showed sensitivity score of 1 and 3 teeth (7.5%) showed sensitivity score of 2 (Graph 2a).

Graph 2a: Sensitivity scoring for experimental group using probing stimulus



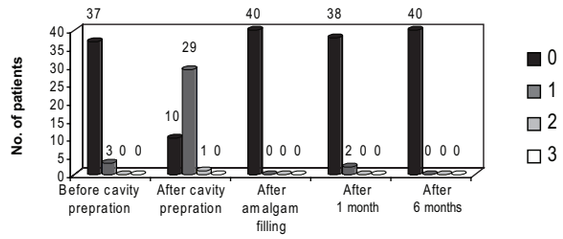
For air blasting, before cavity preparation, 21 teeth (52.5%) showed sensitivity score of 0 (mildly sensitive), 17 (42.5%) teeth showed sensitivity score of 1 and 2 teeth (5%) showed sensitivity score of 2 . After cavity preparation, 18 teeth (45%) showed sensitivity score of 1, 17 teeth (42.5%) showed sensitivity score of 2, 5 teeth (12.5%) showed sensitivity score of 3. After ACP liner placement 19 teeth (47.5%) showed sensitivity score of 0 , 17 teeth (42.5%) showed sensitivity score of 1 and 4 teeth (10%) showed sensitivity score of 2 (Graph 2b).

Graph 2b: Sensitivity scoring for experimental group using air blast stimulus



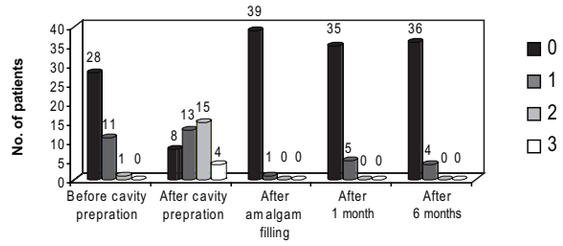
For water jet stimulus, before cavity preparation, 37 teeth (92.5%) showed sensitivity score of 0 and 3 teeth (7.5%) showed sensitivity score of 1. After cavity preparation, 10 teeth (25%) showed sensitivity score of 0, 29 teeth (72.5%) showed sensitivity score of 1 and 1 tooth (2.5%) showed sensitivity score of 2 . After ACP liner placement all teeth showed sensitivity score of 0 (Graph 2c).

Graph 2c: Sensitivity scoring for experimental group using water jet stimulus



For osmotic stimulus, before cavity preparation, 28 teeth (70%) showed sensitivity score of 0, 11 teeth (27.5%) showed sensitivity score of 1 and 1 tooth (2.5%) showed sensitivity score of 2. After cavity preparation, 8 teeth (20%) showed sensitivity score of 0, 13 teeth (32.5%) showed sensitivity score of 1 , 15 teeth (37.5%) showed sensitivity score of 2 . and 4 teeth (10%) showed score of 3 . After ACP liner placement 39 teeth showed sensitivity score of 0 and 1 tooth showed score of 1 (Graph 2d).

Graph 2d: Sensitivity scoring for experimental group using osmotic stimulus



Complete lack of sensitivity was seen in almost the teeth after amalgam restoration. A follow up period of 1-month and 6 months showed that almost all the experimental and control group teeth (40) were comfortable and vital, without any sensitivity.

DISCUSSION

The clinical use of cavity liners and varnishes under dental restorations has been commonly advocated for many years for prevention of postoperative sensitivity. Cavity lining materials when applied prior to the placement of restorations protect the pulp from noxious stimuli, provide thermal insulation and form a barrier against the penetration of bacteria and their products.[3]

The split mouth design was chosen so that the restorations on both control and experimental groups were exposed to an identical oral environment.[10,11,12] Conventional Class I cavities were prepared on the first permanent molars and to obtain a rough measurement of the prepared cavity, the greatest length, width and depth was measured with a William's graduated periodontal probe.8 The width of the Class I cavity was limited to 1/3 of the distance between the buccal and lingual cusps and the depth of the central area of the cavity was 0.5 mm into the dentine. This was based on the assumption that the thickness of tooth substance between the dental pulp and cavity floor/ wall must be at least 1mm in order

to minimize the adverse effects of cavity preparation and restorations on the dental pulp.[9]

The teeth in each patient were divided into 2 groups, control group, where a light activated GIC (Type III) was used and experimental group, where a coat of ACP liner was applied in the cavities.

GIC liners have many advantages including chemical bonding to tooth structure and fluoride release. One of the main advantages of visible light—activated glass ionomer is its improved resistance to acid solubility[13,14,15]. It also has good thermal insulation, antibacterial action, a command set and subsequently provides improved support to amalgam restorations [13,14,15]. Therefore in the present study, light activated GIC liner was used.

The main component of ACP system namely, calcium phosphate is also the main inorganic constituent of dentine. These mineral rich deposits are known to occlude dentinal tubules similar to the physiologic process of dentinal sclerosis. Amorphous calcium phosphate shows a high capability of rapid conversion into hydroxyapatite crystal under physiologic oral conditions, which can precipitate in the lumen of the open dentinal tubules [4,16]. Studies have shown that a serial application of calcium chloride followed by potassium phosphate, results in dentinal tubule occlusion by ACP formation leading to immediate relief from dentinal hypersensitivity[4]. In the experimental group, this ACP system was used as a cavity liner.

All the teeth in both the experimental and control groups were restored with silver amalgam. Preoperative, intraoperative and postoperative sensitivity assessments were done using probing (tactile), air blast, water jet and osmotic stimulation methods. Similar methods were used in the studies by Minkov et al[17], Kleinberg I.[5], Chawla H.S[3] and most recently Perdigao et al [18].

It was observed that the most common stimuli used in clinical studies were thermal and tactile stimulation [19].Since teeth may often show sensitivity to one but not to another stimulus, more than one method was required for checking the dentinal sensitivity.[5] Therefore in the present study, all the four stimuli were used for sensitivity assessment.

In the current study, the criterion for sensitivity assessment was subjective i.e., the subject was asked to rate the tooth sensitivity on 'The subjective discomfort scale'. A similar method of sensitivity rating was used by Tarbet W.G. et al, [7] Chawla H.S.[3] and Gillam D.G. and Newman H.N.[6] Green et al[20] stated that the results of experimentation using only the patient's subjective responses should be construed as having minimal significance. On the contrary Gillam D.G. and Newman H.N[6] stated that this simple descriptive sensitivity scale offers a precise choice of words, which represents the experience of pain by the patient. Hence this study successfully evaluated and categorized the patient perception of the quality of reduction of sensitivity using the various materials tested.

In the control group, the sensitivity scores on comparison before and after cavity preparation increased from 20% (not sensitive) teeth to 65% (mildly sensitive) teeth for probing, from 40% (35% -mildly sensitive and 5% moderately sensitive) teeth to 98.5% teeth for air blasting, from 5% (mildly sensitive) teeth to 65% (57.5%-mildly sensitive and 7.5%-moderately sensitive) teeth for water jet and from 27.5% (22.5% -mildly sensitive and 5%-moderately sensitive) teeth to 80% (45%-mildly sensitive, 20%-moderately sensitive and 15%-severely sensitive) teeth for osmotic stimulation

The reason for increased postoperative sensitivity as cited by Brannstrom[21] was that the dental drill removes fluid from the dentin, partly by frictional heat causing evaporation and partly, by mechanically pressing out fluid from the dentinal tubules leading to pain or sensitivity.

The postoperative sensitivity after GIC liner placement, reduced from 65% teeth to 22.5% teeth for probing, and from 97.5% to 55% for air blasting. Use of water jet and osmotic stimulation was not done after liner placement to avoid any dilution or chemical reaction of the water component with the liner material. These results suggest that there was a highly significant decrease in the sensitivity after the placement of GIC liner. The results were in conformity with the results obtained in a study by Gordon et al who reported that the sensitivity was reduced when GIC liner was used under amalgam restorations.[2]

The postoperative sensitivity after ACP liner placement, reduced from 67.5% teeth to 22.5% for probing and from 100% teeth to 47.5% teeth for air blasting. These results suggest that there was a highly significant decrease in the sensitivity after placement of ACP liner. Since there were no direct studies that evaluated ACP as a cavity liner under amalgam restoration, this study was compared to the study conducted by Geiger et al[4] who reported that application ACP to the exposed root surfaces, resulted in a rapid decrease in sensitivity to stimulation.

Almost all the teeth in the control and experimental groups showed no sensitivity to any stimulation immediately, after amalgam restoration, after one month and 6 months follow up evaluations. These results point out that no significant differences existed in both the control and experimental groups.

The duration of 6 months of evaluation of the postoperative sensitivity was in accordance with the guidelines given by Holland et al [22]. According to them, the duration should be sufficient to allow the expression of maximum efficacy of the active agent (experimental), while minimizing the magnitude of any placebo (control). They also recommended that the clinical trial design should recognize the time required to achieve maximum desensitizing effects that might vary between different products or agents [22].

CONCLUSIONS

The following conclusions were drawn from the results of this study:

1. Clinical evaluation on ACP system showed equal desensitizing effect and sealing property compared to a GIC (Type III) liner.
2. Amorphous calcium phosphate lining system can be used as a viable alternative to conventional cavity liners below amalgam restorations.

The use of ACP as a liner can be advantageous, in

that it provides adequate bulk to the restorative material even in shallow cavities thus preventing inadvertent sacrifice of sound tooth structure. The sealing ability of the material is definitely well proven; nonetheless, the effectiveness of the material in the deeper cavities and cost effectiveness of the material has to be considered before weighing it as a replacement to the more conventional modalities. We advocate further parallel objective studies to ascertain the efficiency of this material and its prospective clinical usefulness.

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The Expert Says….How to diagnose pulpal status?

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INTRODUCTION

The assessment of pulp vitality is a crucial diagnostic procedure in the practice of endodontics. Dentists should establish their treatment decisions based on good sound information and in the best interests of the patients. Therefore, a definite diagnosis must be established with comprehensive investigation and records before any treatment is carried out[1]. Since the dental pulp is enclosed in an opaque tooth, the assessment of tooth vitality is undertaken indirectly by: looking for clinical or radiological evidence of pulp necrosis or apical periodontitis; investigating nerve conduction; or examining the blood flow[1,2].

Currently, commonly used vitality testers assess the integrity of the Aδ nerve fibers in the dentine-pulp complex by means of brief application of stimulus to the outer surface of the tooth. If the Aδ nerve fibers are successfully stimulated, the patient will experience a brief sharp/tingling sensation from the tooth3,4,5,6. However, these tests only indicates that the nerve fibers are functioning but does not give any indication of blood flow in the pulp, or whether it is partially damaged. Pulp vitality is determined purely by the function of vasculature health. Thus this method of testing may not accurately diagnose the condition of the pulp[2, 7, 8]. Bhaskar and Rappaport[10] concluded in their study that the conventional vitality tests are actually sensitivity tests as they only tests the nerve conduction and have questionable predictive value of the vitality of pulp tissue.

Accurate information on the status of blood flow in the pulp is essential as the Aδ nerve fibers will cease to function when there is no oxygen supply[2]. However, there are instances following trauma, where there is blood flow in the pulp but the Aδ nerve fibers are not functioning or are injured[7, 9, 10]. Irritation of the pulp, by whatever stimulus, causes inflammation and with more severe inflammation pulpal tissue may be permanently damaged. At present, researchers are still trying to develop a device that is able to determine the status of pulpal circulation for instance using laser Doppler flowmetry, dual wavelength spectrophotometry, and pulse oximetry[7, 11, 12]. Although some of these methods has shown promising results and able to demonstrate the true vitality of the pulp, they are not yet ready to replace the presently available testers. In the meantime, these 'sensitivity tests' are only available to aid with the pulpal diagnosis. Despite its shortcomings, these tests are cheap, easy to use, useful when used in combination and are able to provide dentists with sufficient information to establish a diagnosis.

Based on the following clinical and radiographic examinations, diagnosis of reversible pulpitis, irreversible pulpitis, periapical periodontitis and acute apical abscess can be made clearly.

HISTORY

The following acronym could be used as a guide to ask the patients about some important information on the signs and symptoms related to pulpal disease. These are useful as a guide to clinical and radiological examinations, and appropriately related to the answers given by patients.

- **L** - Location of pain – upper arch, lower arch, left or right side
- **O** - Origin of pain – tooth/teeth involved
- **C** - Characteristic of the pain – sharp, dull, stabbing, throbbing, lingering pain
- **A** - Aggravating factors – hot or cold food/drink, cold air, spontaneous
- **T** - Timing of pain – daytime, at night, disturb sleep
- **E** - Alleviating factors – medications, avoiding cold/ hot drink/food etc.

THERMAL AND ELECTRIC PULP TESTING

Thermal testing is based upon applying heat or cold to a localized area of the tooth with intentions to stimulate the Aδ nerve fibers within the dental pulp. When the stimulus is applied to a healthy pulp it results in a transient sharp localized pain/tingling sensation, which lasts for a few seconds after removal of the stimulus (positive response). The normal use of thermal tests on teeth has been shown to be safe to healthy pulp tissue[4]. In contrast, a pulp response lasting more than half a minute after the removal of the stimulus (lingering sensation) is frequently interpreted as indicating an irreversibly inflamed pulp.

No response to the stimulation is normally regarded as an indication of a necrotic pulp (negative response).

Thermal tests can either be accomplished through cold or heat tests or both, having in mind that the diagnosis must not rely solely on the findings of a single test.

a) Cold test

It is believed that cold stimulus causes contraction of the dentinal fluid within the dentinal tubules resulting in rapid outward flow of fluid within the patent tubules[2]. The rapid movement of dentinal fluid results in 'hydrodynamic forces' acting on the Aδ nerve mechanoreceptors leading to a sharp sensation lasting for the duration of the test[3]. There are several methods that can be used for the cold tests such as using ice sticks, ethyl chloride, dichloro-difluoro-methane (DDM) (Endo-Frost®) or carbon dioxide (CO_2) snow.

b) Heat test

The most commonly used test is using a gutta-percha stick heated until soft and glistens before applying to the vaseline-coated surface of the tooth under investigation for no more than 5 seconds. Inadequate heating of the gutta-percha stick could result in the stimulus being too weak to elicit a response from the pulp. Other techniques that can be used are using a hot water carried in a syringe or application of frictional heat using rubber cup on the buccal aspect of the tooth.

c) Electric pulp testing

In addition to the hot and cold tests, electric pulp testing can also be used to assess the status of pulp. The objective of electric pulp testing is to stimulate intact Aδ nerves in the pulp-dentine complex by applying an electric current on the tooth surface. Electric pulp testers (EPT) function by producing a pulsating electrical stimulus starting from a very low intensity and it increases steadily at a pre-selected rate until the patient acknowledges a warm or tingling sensation. The reading on the digital display is then recorded and compared to the control tooth. However, this reading does not indicate to what extent the pulp is healthy/unhealthy as it only implies that the Aδ fibers are sufficiently healthy to function. The test can be repeated on different surfaces on multi-rooted teeth as it may be partially vital.

CLINICAL EXAMINATION

Clinical examination is carried out by means of visual inspection of the crown for presence of crack, caries and status of restoration, if any, and assessing the surrounding mucosa for signs of infection such as swelling, sinus tract or pus. Several investigations can be carried out to determine the source of pain or discomfort and also aid in the diagnosis such as probing around the tooth, percussion test, palpation of the surrounding mucosa, tooth mobility and checking the occlusion of the tooth.

A test cavity can be considered as a last resort when all the other tests were inconclusive[2]. This is achieved by drilling a minute cavity into the crown with plenty of water but without local anesthesia. Response to the drilling will give the clinician an indication of the pulp status

RADIOLOGICAL EXAMINATION

A periapical radiograph allows the clinician to assess the periodontal and periapical status of the tooth of interest. A systematic radiological assessment of the tooth begins from the crown apically to the root and lastly of the surrounding tissue. By doing so, it will allow clinicians to assess the anatomy and any pathology associated with the tooth. Other assessment include presence of caries, quality of present restoration, anatomy of the root and root canal(s), widening of periodontal ligament space, presence of radiolucency around the radiographic apex or furcation, root resorption, and status of root apex (mature/immature). Table 1 summarizes the finding of each test.

Table 1: Pulp Status with relation to Symptoms and Diagnostic Features

Pulp Status	Pain	Aggravating Factors	Thermal	EPT	Perc.	Palp.	Rad.	Test Cavity
Reversible Pulpitis	short sharp not spontaneous	cold, sweet, hot	+ve	+ve	-ve	-ve	various	+ve
Irreversible Pulpitis	diffuse, dull / throb spontaneous	hot (hot relieved by cold)	+ve Tends to be	+ve	+ve/ -ve	-ve	various	+ve
Necrotic (Partial)	No pain	None	+ve -ve	+ve/ -ve	+ve/ -ve	-ve	various	+ve/ -ve
Necrotic (Total)	No pain	None	-ve	-ve	-ve	-ve	slight ↑ in width	-ve

EPT = Electric Pulp Testing Perc = Percussion Palp=Palpation Rad.=Radiograph
+ve = positive response -ve = negative response ↑ = increased

CONCLUSIONS

The determination of pulp vitality requires a comprehensive investigation and its interpretation depends upon a combination of many factors. An understanding of both the usefulness and limitations of pulp testing methods is essential for its effective use in clinical dentistry.

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Effect Of Beverages And Food Source On Wear Resistance Of Composite Resins

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ABSTRACT

Certain beverages e.g. coffee, tea, soft drinks, fruit juices, alcoholic beverages, may affect the physical properties of composite resins. Objectives: The objectives of this study were to: (1) evaluate the effect of different beverages and chilli sauce on the wear resistance of composite resins, (2) evaluate effect of the duration of immersion in the beverages and chilli sauce on the wear resistance of composite resins. Materials and methods: Disc specimens were fabricated using two different types of composite resins: (i) Filtek Z350 (3M ESPE, USA, nano-filled composite, 40 specimens) and (ii) Solare P (GC Dental Products Corp, Japan, microhybrid composite, 40 specimens). After polymerization, all the specimens were polished using Enhance Polishing System (Dentsply International Inc.,USA). The specimens were air-dried before weighing using Sartorius BP 221S weighing balance (Sartorius AG, Goettingen, Germany). Ten specimens from each type of composite were immersed in distilled water (control group), Coca cola®, orange juice (Peel Fresh®) and chilli sauce (Maggi®) respectively. The duration of immersion was 6 hours and 1 week. A reciprocal compression-sliding system was used to evaluate the wear resistance of the specimens. The specimens were moved back and forth with a loaded counter-body (235g) against sand paper (P1000, 3M ESPE, USA) in running water. The weight of the specimens were measured after 6 hours of immersion and 20,000 wear cycles and also at 1 week of immersion with further 20,000 wear cycles. The wear resistances were tabulated as percentage of weight loss from the specimens. Results were statistically analyzed using one way ANOVA and post-hoc Tukey's test (p= 0.05). Results: The results showed that Solare P has significantly lower wear resistance compared to Filtek Z350. There was no significant difference in wear resistance for Filtek Z350 when immersed in chili sauce, Coca-cola® and orange juice in comparison with control group for 6 hours and 1 week. Similar findings were observed for Solare P. Conclusion: Within the limitations of this study, it was concluded that Solare P has poorer wear resistance than Filtek Z350. The soaking medium investigated and duration of immersion have no influence on the wear resistance of Solare P and Filtek Z350.

INTRODUCTION

Owing to aesthetic demand, the advantage of minimal invasive preparation1 and ability to strengthen the restored teeth[2], composite resin has gained popularity as a restorative material for posterior teeth. Concern for mercury toxicity is not an issue with composite resin in comparison with amalgam. It has therefore become an important substitute for amalgam. It is an excellent alternative to amalgam for small to medium cavities where minimal invasive preparation techniques1 can be applied, the ability to adhere to tooth structure via adhesive technique has ruled out the need to create undercut, thus preserving sound tooth structure.

Wear of a material involves various processes such as abrasion, erosion and fatigue; hence it is one of the least understood property[3,4]. Preliminary in vitro investigations for the physical properties of a material such as wear characteristics, bond strengths, flexural strengths and fatigue behavior is mandatory to screen the material prior to clinical usage[5].

Consumption of certain beverages, such as coffee, tea, soft drinks, fruit juices and alcoholic beverages may affect the aesthetics and physical properties of composite resins, hence affecting the clinical life span of the composite restorations[6,7,8,9]. Sarrett et al. has shown that owing to the low pH, ethanol has the potential to produce erosion and alter some mechanical properties of composite resins[9]. The wear resistance of composite resins decreased with the increase in the percentage of ethanol in the solution. The effects of beverages of the properties of composite were also related to the frequency and amount of its intake.

The objectives of this study include: (1) to evaluate the effect of different beverages and chilli sauce on the wear resistance of composite resins, and (2) to evaluate the duration of immersion in the beverages and chili sauce on the wear resistance of the composite resins. The null hypothesis put forth was the various beverages and chilli sauce have no effect on the wear resistance of composite resins.

MATERIALS AND METHODS

Two different types of composite resins were tested:

i) Filtek Z350 (nano-filled composite resin, 3M ESPE, USA)
ii) Solare P (micro-fine hybrid composite resin, GC Dental Products Corp, Japan).

Two beverages (Coca-cola® and orange juice) and chilli sauce were investigated in this study. Distilled water was used as the control. The main ingredients of the beverages and chilli sauce investigated were listed in Table 1.

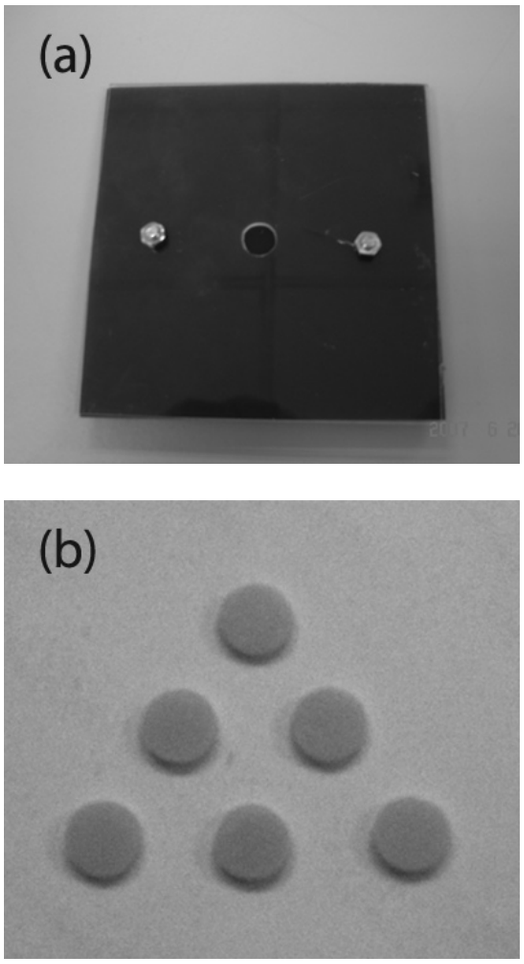
Table 1: Main ingredients in the beverages and chilli sauce

	Main ingredients	pH
Coca-cola®	Carbonated water, sugar, caramel, food conditioner and permitted flavorings (with caffeine)	2.5
Orange juice (Peel Fresh®)	Pure orange juice, ascorbic acid, permitted flavorings and preservative	4.4
Chili sauce (Maggi®)	Sugar, chilies, vinegar, tomato paste, salt, garlic, permitted modified edible starch and natural flavorings	3.9

Preparation of specimens and immersion cycle:

Forty specimens were fabricated from each type of composite resin investigated, divided into 10 specimens in each test groups (chlli sauce, Coca-cola® and orange juice) and control group. The composite resin materials were placed in the round recess (10mm diameter x 2 mm depth) of a customized acrylic mould (Fig. 1) lined with cellulose strips (matrix strips) to produce disc specimens. A glass slide was then placed over the material and pressure was applied to extrude the excess material. The composites were light-polymerized for 40 seconds through the glass slide. After removing the disc from the mould, the surface contacting the cellulose strips was light-cured for 40 seconds to ensure complete polymerization of the specimens. All the specimens were then polished with Enhance Polishing system (Dentsply International Inc.,USA) and stored in distilled water at 37°C for 24 hours. Subsequently, specimens were allowed to dry for 24 hours prior to weighing. After weighing, the specimens were immersed in Coca-cola®, orange juice, chilli sauce and distilled water respectively for 6 hours prior to wear testing. After first round of wear testing and weighing, the specimens were subjected to a further cycle of 1 week of immersion and wear testing.

Fig. 1 The mould for fabricating the specimens(a) and the disc specimens(b)

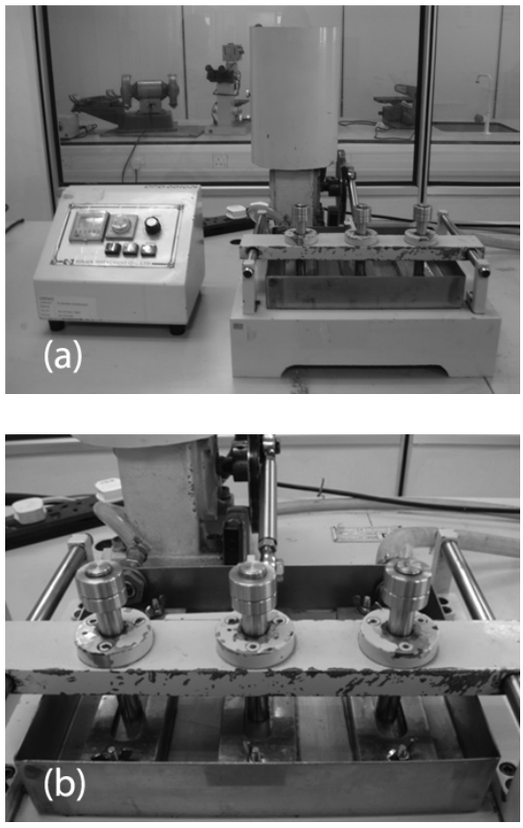


Wear testing:

The wear apparatus used in this study was a reciprocating compression-sliding system in which the specimens were moved back and forth against a loaded counter body (235g) against sand paper (P1000, 3M ESPE, USA) in running water (Fig. 2).

The specimens were weighed (dry weight) before and after wear testing using Sartorius BP 221S weighing balance (Sartorius AG, Goettingen, Germany). The specimens were subjected to 20 000 cycles of wear test, simulating the amount of wear which occurred in approximately 24 months of in vivo service[10, 11]. The weight of the specimens were measured after 6 hours of immersion in the test beverages and chilli sauce and 20,000 wear cycles and also at further 1 week of immersion with 20,000 wear cycles. The wear resistance was tabulated as percentage of weight loss from the specimens. The data was analyzed using one way ANOVA and post-hoc Tukey's multi comparison test ($P< 0.05$).

Fig. 2 The wear apparatus (a) and close-up view of the loaded counter body (b)



RESULTS

Figs 3 and 4 showed the mean weight loss for Z350 and Solare P after 6 hours and 1 week of immersion in distilled water (control), chilli sauce and the respective beverages. Filtek Z350 showed 5.06%, 5.66% and 5.48% of weight loss respectively when immersed 6 hours in chilli sauce, Coca-cola® and orange juice while Solare P demonstrated weight loss of 15.53%, 14.26% and 13.93% respectively. Further immersion in the chilli sauce, Coca-cola® and orange juice for 1 week saw that Filtek Z350 demonstrated further 5.85%, 5.68% and 5.51% of weight loss respectively. Solare P showed greater weight loss of 15.29%, 15.27% and 17.79% after immersed for 1 week in the chilli sauce, Coca-cola® and orange juice. Tables 2 and 3 showed the comparison of weight loss for Filtek Z350 and Solare P after immersion in chilli sauce, Coca-cola® and orange juice for 6 hours and 1 week respectively. Table 2 demonstrated that for all the immersion medium investigated i.e. chilli sauce, Coca-cola® and orange juice, there is no statistical significant difference between the control group and the immersion medium after 6 hours of immersion for both type of composite resins investigated (Filtek Z350 and Solare). Filtek Z350 demonstrated significantly lower weight loss in comparison to Solare P for all the immersion medium investigated ($P<0.05$). Table 3 showed similar trend of findings as in Table 2. Paired-wise comparison of the immersion duration showed that there was no significant difference between 6 hours and 1 week of immersion period.

Fig 3 Mean weight loss of composite resins after 6 hours of immersion

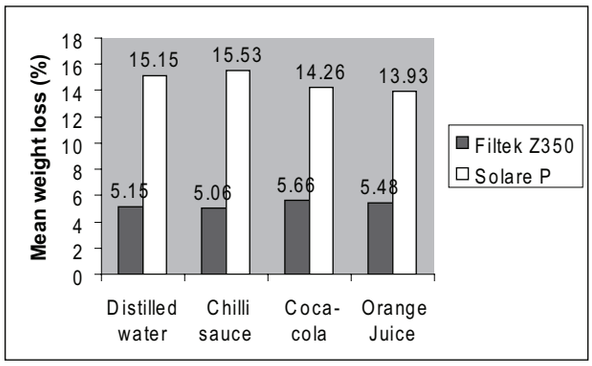
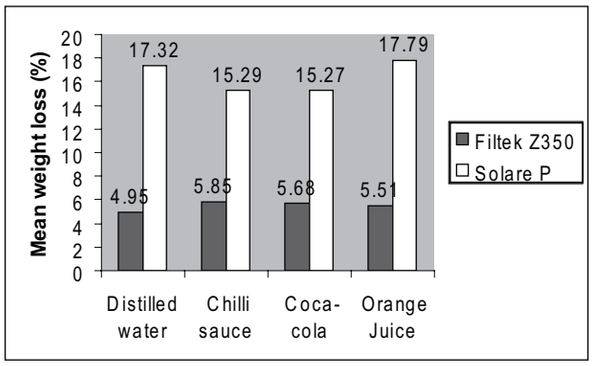


Fig 4 Mean weight loss of composite resins after 1 week of immersion



DISCUSSION

In the present study, a simulated occlusal wear mode model was used to investigate the wear resistance of composite resins. A two-body wear machine was used to simulate the direct contact of human teeth. Besides direct opposing tooth contact during bruxism, direct tooth contact may also occur during mastication[12]. The machine was designed to wear specimens in a reciprocal compression-sliding pattern. The composite resin discs specimens in this study were worn under simulated tooth contact condition with a loaded counted-body of 235g against fine grid sand paper under running water. According to Condon and Ferracane[10], 20 000 cycles of wear test in oral wear simulator approximately simulating the amount of wear which occurred in 24 months of in vivo service[10]. Wonglamsam et al [11] found that in one meal, the total number of occlusal cycles varied widely from about 40 cycles-500 cycles depending on type of meal (breakfast, lunch, dinner), type of food and its amount. The wear resistances were tabulated as percentages of weight loss from the specimens.

Two types of composite resins were chosen in the present study i.e. Filtek Z350 (3M ESPE, USA) and Solare P (GC Dental Products Corp, Japan). Filtek Z350 is a visible light-activated nano-filled composite which consists of a combination of (i) aggregated zirconia-silica

Table 2: Comparison of weight loss after 6 hours of immersion

		Filtek Z350				Solare P			
	Beverage	**Control**	**Chili sauce**	**Coca-cola**	**Orange juice**	**Control**	**Chili sauce**	**Coca-cola**	**Orange juice**
Filtek Z350	**Control**	-	NS	NS	NS	S	S	S	S
	Chili sauce	NS	-	NS	NS	S	S	S	S
	Coca-cola	NS	NS	-	NS	S	S	S	S
	Orange juice	NS	NS	NS	-	S	S	S	S
Solare P	**Control**	S	S	S	S	-	NS	NS	NS
	Chili sauce	S	S	S	S	NS	-	NS	NS
	Coca-cola	S	S	S	S	NS	NS	-	NS
	Orange juice	S	S	S	S	NS	NS	NS	-

Key: NS- no statistical significant difference P<0.05
S - statistical significant difference

Table 3: Comparison of weight loss after 1 week of immersion

		Filtek Z350				Solare P			
	Beverage	**Control**	**Chili sauce**	**Coca-cola**	**Orange juice**	**Control**	**Chili sauce**	**Coca-cola**	**Orange juice**
Filtek Z350	**Control**	-	NS	NS	NS	S	S	S	S
	Chili sauce	NS	-	NS	NS	S	S	S	S
	Coca-cola	NS	NS	-	NS	S	S	S	S
	Orange juice	NS	NS	NS	-	S	S	S	S
Solare P	**Control**	S	S	S	S	-	NS	NS	NS
	Chili sauce	S	S	S	S	NS	-	NS	NS
	Coca-cola	S	S	S	S	NS	NS	-	NS
	Orange juice	S	S	S	S	NS	NS	NS	-

Key: NS- no statistical significant difference P<0.05
S - statistical significant difference

clusters of filler with an average cluster particle size of 0.6 to 1.4 microns with primary particle size of 5 to 20 nm and, (ii) individual, non-aggregated silica fillers with particle size approximately 20 nm. The inorganic filler loading is about 78.5% by wt (59.5% by volume). Solare P is a visible light-activated micro-fine hybrid composite resin for the restoration posterior teeth. According to the manufacturer, Solare P consists of small inorganic filler particles (nm in size) with irregular shape and large organic filler particles.

The immersion medium chosen for this study include chilli sauce (pH 3.9), Coca-cola (pH 2.5) and orange juice (pH 4.4). Beverages with low pH have been shown to affect the wear resistance of composites[9, 21]. Chilli sauce contains a high amount of organic acids and potentially may affect the wear resistance of composite resins. The beverages chosen and chilli sauce are essential part of daily diet in Malaysia.

Wear of composite resins in the oral cavity is a complex phenomenon. It is affected by several factors which include size and shape of filler particles, filler load, hardness of filler particles, percentage of surface area occupied by the filler particles, filler-matrix interface and degree of polymerizations[13, 14]. The wear resistance of composite is greatly influenced by the size and shape of filler particles. During the process of mastication, energy is generated and transmitted through the filler particles into the surrounding resin matrix of the composite restoration. Wherever the particle is angulated, the stresses become concentrated. Subsequently, small cracks followed and the fillers dislodged under the masticatory force and eventually resulted in localized area of composite wear[14, 15]. Thus, the greater the size of filler particles, the greater the amount of material would be lost i.e. greater wear. In the present study, Solare P appeared to wear more than Filtek Z350 for all the immersion medium investigated i.e chilli sauce, Coca-cola® and orange juice. Filtek Z350

is a nano-filled composite with filler particles smaller than Solare P. The filler particles in Solare P is irregular in size, therefore more susceptible to stress concentration and crack propagation, leading to the fillers being plucked out by occlusal wear. Similar observation with regards to the low wear rate of nano-filled composite in was also observed in other in vitro studies[16, 17].

Surface quality of composite resin may affect the wear resistance of the restorations. A relatively smooth surface that is void of surface protrusion has the ability to lower the friction force and subsequently lower wear loss[18]. After polishing, composites with larger filler particles tend to produce a polished surface with higher surface roughness than those with smaller filler particles[19, 20]. It has been shown that composite resin with nano-fillers was able to produce superior surface finishing[16]. This may explain the finding where Filtek Z350, a nano-filled composite shows significantly lower wear loss than Solare P, a microhybrid composites where the filler particles were larger.

An earlier study demonstrated that organic acids caused a decrease in the hardness of resin composite[21]. It may then be speculated that acidic medium would have an effect on the wear resistance of composite resins. It is, therefore, the aim of the present study to evaluate the effect of acidic beverages and food on composite resins. The present study has shown that chilli sauce, Coca-cola and orange juice did not have significant effect on the wear resistance of the two types of composite resins investigated. Draughn and Harrison[22] have shown that there was no direct correlation between abrasive wear and hardness, the mechanisms involve for these two test modes is different.

One explanation for this finding was that the observed reduction in surface hardness is confined to the outer exposed superficial surface of the specimens. During the wear test, the softened superficial surface is removed quickly, and a fresh, relatively hard surface is then exposed, which would take a longer time to wear off. This would not adversely affect the overall wear factor to a great noticeable extent if the weight loss due to the softened surface layer was only a small proportion[23]. Therefore, though the acidic medium affects the surface hardness, once the surface is being worn off, the wear of inner hard layer was not affected to a significant extent. This may also explain that the duration of immersion of 6 hours and 1 week has no significant effect on the wear resistance of the composites investigated in the present study.

Although the effect of acidic beverages and food is not significant in the present in vitro wear testing, it may have effect when a cyclical test model is employed i.e to simulate in the in vivo condition where the composite restorations will be constantly subjected to vicious cycle of being exposed to acidic beverages/food and occlusal wear forces. Once the superficial layer becomes softened, it is more susceptible to abrasion and upon its removal, a fresh surface becomes exposed. This may then be subjected to the same softening process in the oral environment. The overall effect would be manifest as a progressive loss of substance of the restoration.

CONCLUSIONS

Within the limitations of the present study, it can be concluded that Solare P wears significantly more than Filtek Z350. The immersion medium investigated in the present study i.e. chilli sauce, Coca-cola® and orange juice has no significant effect on the wear resistance of Solare P and Filtek Z350. The duration of immersion does not adversely affect the wear resistance of Solare P and Filtek Z350. Posterior restorations are subjected to substantial occlusal load and occlusal wear, care must be executed in case selection, material selection and proper technique to ensure long term clinical success for the restorations.

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MALAYSIAN DENTAL JOURNAL

Essentials of Clinical Periodontology and Periodontics.

Author : Shantipriya Reddy
Publisher : Jaypee Brothers Medical Publishers (P) Ltd., New Delhi
Year of publication : 2006

Essential of Clinical Periodontology and Periodontics, written by Professor Shantipriya Reddy, gives the reader excellent fundamental knowledge in periodontology. With more than a decade experience in academics, Professor Reddy knew exactly what scholars in this field require from a textbook.

The book with 421 pages covered broad topics from the normal anatomy of the periodontium, periodontal diseases and finally to the treatment of periodontal diseases. The book began with a prolog on the history of periodontology in the early civilization until present. Part I of the book introduced the periodontal structures anatomically and physiologically, Part II discussed the classification systems and epidemiology of periodontal diseases. As the content increased, it discussed further into the subject of the aetiopathology (Part III), periodontal pathology (Part IV) and treatment of periodontal disease (Part V). The last part of the book was neatly divided into two sections; Section 1: Diagnosis, Prognosis and Treatment Plan and Section 2: Periodontal Therapy (Non-surgical and Surgical Therapy).

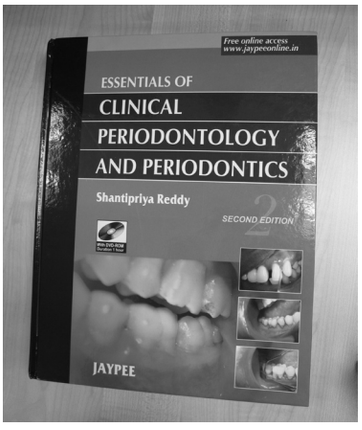
The reader will appreciate the way this book was written and organised. Diagrams and tables are included systematically according to the relevant topics. Illustrations were made easy to understand, with labels to help summarized the text. This book contains many clinical photos but perhaps could be more appropriate and enhancing if neatly cropped to focus on certain relevant areas only. Nevertheless, the arrangement of these photos was indeed helpful to show step-by-step procedures.

At the end of each chapter, the author cleverly included some review questions for the reader to self-assessed their reading for that particular topics. Bibliography of key references ended each chapter and will assist the reader to seek more information on the topics, if needed.

The reviewer congratulates Professor Reddy and the publisher for this excellent book and recommends it to be included in dental practitioners' booklist. Although this book does not provide exhaustive coverage of current knowledge in periodontology, it can still be recommended for use of dental undergraduates as well as dental nurses for its simplicity.

Special features: an overview

- 421 pages of text and photos
- 5 essential parts with 50 relevant chapters
- a special chapter on Questionnaire for clinical case discussion
- Fonts are big, clear and organised to hearten reading
- Key Points To Note in some chapters to highlight important issues in the topics
- clinical photos and illustrations to enhance further understanding of the text
- Index for quick search on particular topics
- comes with a photo CDROM



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Malaysian Dental Journal (2008) 29(1) 41-45

MALAYSIAN DENTAL JOURNAL

Relationship between patients' perceptions and clinical indications for dental extraction in Mukah Division, Sarawak

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ABSTRACT

The general aim of this study was to examine the patients' perception of dental extractions. The specific objectives were to understand the purpose of extractions from the patients' point of view, to find out the relationship between age and type of teeth extracted and to compare the patients' perceptions with clinical indications for dental extraction. The survey was done using self administered, structured questionnaires to collect information. From the survey we found that toothache (33%) and the presence of cavities (34%) were the main reasons for extraction from the patients' point of view. Besides that, the number of patients requiring extractions decreased with age. The main clinical indication for tooth extraction was caries (73%) and of these, 29% of restorable teeth were extracted.

INTRODUCTION

Tooth extraction was one of the most common procedures carried out in the two government dental clinics in Mukah Division, Sarawak; Mukah Dental Clinic and Dalat Dental Clinic. Of the patients who visited these dental clinics in May 2006, 59.4% had tooth extractions [1]. In a study among Malaysian adults by Razak IA, 41% of the subjects preferred extractions when experiencing toothache [2]. According to the National Oral Health Survey of Adults (NOHSA) 2000, 35.8% of the Malaysian population was assessed as requiring extractions [3].Of the teeth indicated for extraction, the majority (93.8%) were due to caries [5].

The general objective of our study was to examine the patient's perception on dental extraction. The specific objectives were to understand the reasons for extraction from the patient's point of view, to find out the relationship between age and type of teeth extracted. Lastly, to compare the patients' perceptions with the clinical indications for dental extractions.

Patients and methods

The survey was done using a self administered, structured questionnaire. The survey was carried out simultaneously in both the government dental clinics in May 2006. The questionnaire was tested in a pilot study in Mukah Dental Clinic in October 2005. The questionnaire was written in the Malay language. A total of 236 patients took part in this study. The survey was carried out on all patients who were 15 years old and above who requested for extraction of permanent teeth. Demographic data were recorded (age, gender, race and education level). The patients were asked to answer three questions regarding their reasons for dental extraction. The dental officers were asked to record the tooth extracted, whether the tooth was restorable and the clinical indication for dental extraction. The same extraction criteria were used and these are shown in Table 1. Both the examiners were calibrated.

Table 1: Inclusion for simple restorative treatment

No	Criteria
1	• Pain of very short duration • Pain does not linger after the stimulus has been removed • Pain is difficult to localize
2	• Tooth is not tender to percussion • Caries does not involve the pulp
3	• Tooth is vital • No sign of irreversible pulpitis
4	• No periapical pathology
5	• Restorative treatment in this study exclude root canal treatment

Table 2 : Criteria for extraction

No	Extraction reason	Criteria
1	Caries	• Unrestorable caries • Recurrent caries • Retained root/roots • Failed root canal treatment
2	Periodontal disease	• Deep pocketing ≥ 4 mm • Mobility grade II and III
3	Caries and periodontal disease	• Both the criteria (1 and 2)
4	Trauma	• Luxation • Fracture involving the pulp
5	Pericoronitis	• Persistent inflammation around third molars
6	Orthodontics	• To prevent or correct malocclusion • Extraction of supernumerary tooth
7	Pre-prosthetics	• To facilitates a better prosthetic restoration
8	Others	• Other causes that are not stated above

RESULTS

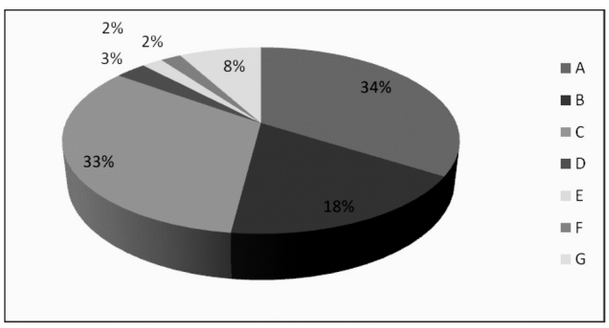
A total of 236 survey forms were issued. 215 survey forms were completed and 21 survey forms rejected due to insufficient data eg. incomplete demographic data, incomplete patient's perceptions. Therefore the response rate for this study was 91.1%. The demographic data of the patients were summarized in Table 3.

Table 3: Demographic data

No	Demographic data	Number of patients	Percentage of patients (%)
1	**Age (years old)**		
	15 - 24	44	20.5
	25 – 34	44	20.5
	35 – 44	41	19.1
	45 – 54	41	19.2
	55 – 64	23	10.7
	≥65	22	9.8
	Total	**215**	**100.0**
2	**Sex**		
	Male	88	41
	Female	127	59
	Total	**215**	**100.0**
3	**Ethnics**		
	Malay	7	3.3
	Chinese	14	6.5
	Iban	25	11.6
	Melanau	166	77.2
	Others	3	1.4
	Total	**215**	**100.0**
4	**Education level**		
	University	7	3.3
	Secondary school	107	49.8
	Primary school	42	19.5
	No formal education	59	27.4
	Total	**215**	**100.0**

A total of 238 teeth were extracted from 215 patients (mean 1.1 extractions per patient). The responses indicated that 34% of the patients came for dental extraction because of toothache, 33% of the patients complained of the presence of dental cavities and 4% of the patients complained of both the symptoms (Figure 1).

Figure 1: Reasons for extraction from the patients' point of view



	Criteria		Criteria
A	Toothache	E	Tooth is not painful now but it may be painful in the future
B	Mobile tooth	F	Tooth is useless
C	Cavity	G	Others
D	Want to make denture		

Figure 2: If the tooth is restorable, would you want the tooth to be restored?

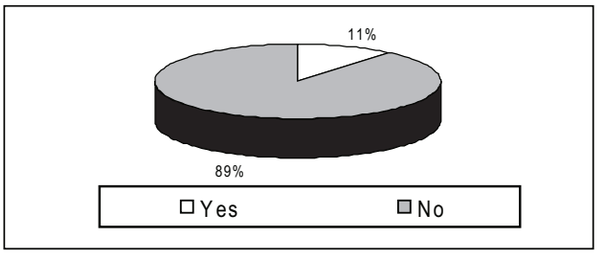
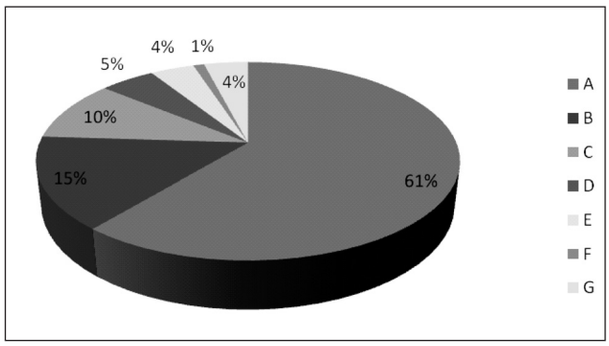


Figure 3: Why would you refuse restorative treatment?



	Reason	Percentage
A	Extraction will solve all my dental problems	61%
B	Restored teeth may be painful in later days	15%
C	Old age	10%
D	Lived far away from clinic	5%
E	Too busy	4%
F	Bad previous restorative experience	1%
G	Others	4%

89% of the patients refused restorative treatment (Figure 2). 61% of the responses refused restorative treatment because they had a misconception that extraction would solve all their dental problems (Figure 3).

Table 4 showed that number of teeth extracted declined as age increased. 58% of the teeth extracted from the patients below age of 45 were upper and lower molars. None of the lower anterior teeth were extracted from patients below 35 years of age.

Table 4: Age distribution of extraction for all tooth types

	Age (years old)					
Tooth type	15-24	25-34	35-44	45-54	55-64	≥65
Upper anterior	9	7	7	8	2	2
Upper premolars	5	3	9	5	4	5
Upper molars	11	10	9	8	7	7
Lower anterior	0	0	8	7	6	7
Lower premolars	4	6	3	11	3	5
Lower molars	14	22	13	9	4	2
Total	43	48	49	48	26	28

Figure 4 shows that 29% of the teeth extracted were restorable. According to Figure 5, caries (72.6%) was the main clinical indication for dental extraction.

Figure 4: Is the tooth restorable from the professional point of view?

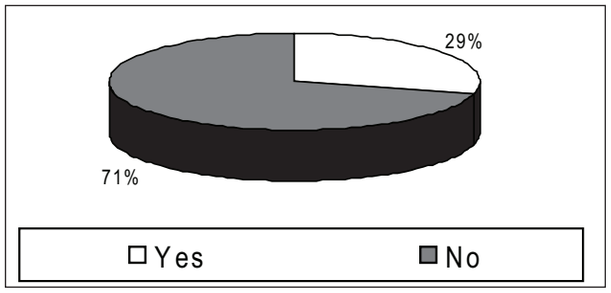
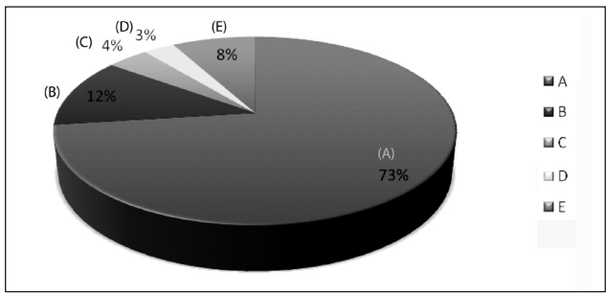


Figure 5: Professionals' indication for extraction.



	Reason
A	Caries
B	Periodontal problem
C	Caries and periodontal problem
D	Part of prosthetics treatment plan
E	Indicated by patient

DISCUSSION

Certain features of study design have been found to improve response rate and these were included where possible [4] i.e. a clear and brief questionnaire, explanation of the questionnaire at every session and clarification of every enquiry. These factors contributed to the relatively high response rate.

The number of patients requiring extractions decreased with age, ranging from 20.6% in age group 15-24 years to 9.8% at age 65 and above. 79.5% of patients requiring extractions were 55 years old and below. This may be due to the fact that older population was mostly edentulous. According to NOHSA 2000, proportions of population requiring extractions increased with age, ranging from 14.8% in age group 15-19 years to 69.2% among those above 75 of age [3]. Care must be taken, however, when interpreting the results, because this study only involved patients who attended dental main clinic where as in NOHSA 2000, it involved the whole population.

Majority of the patients involved in this study were female (59%). This does not correspond with the data from Jabatan Perangkaan Malaysia, which stated that 45.7% of Mukah populations were females.[5] This may be due to the fact that, females were more dental health conscious comparing to males. 77% of the patients involved in this study were Melanau. This corresponds with the data from Jabatan Perangkaan Malaysia, which stated that 82% of the population consists of Melanau.[5]

From the patients' perspective, the main reasons for tooth extraction were toothache and the presence of cavities. Most of the patients refused restorative treatment because they had a misconception that extraction could solve all their dental problems. Dental health education that promoted teeth for life did not seem to reach the entire population because 27.4% of the patients who did not undergo formal education. On the other hand, despite being exposed to regular oral healthcare throughout their school years, a sizeable proportion (26.7%) of 16 year olds in Sibu, reported that they would choose to have their teeth extracted if they had decayed or painful teeth.[6]

Surprisingly, high percentages of molar teeth were extracted in patients below age of 45 years old. Reich E concluded that the third molar was the most frequently extracted tooth type[7] and Corbet EF, concluded that the most commonly extracted tooth type was the first molar and lower incisiors.[8] None of the lower anterior teeth in this study were extracted from patients below 35 years of age perhaps because the flushing effect of saliva from the orifice of submandiubular duct made these teeth more resistant to caries.

Caries (73%) was the main clinical indication for tooth extraction. In NOHSA 2000, of the teeth indicated for extraction, the majority (93.8%) was due to caries.[3] By comparison to developed nation, the proportion of extractions due to caries was higher than the 50% reported by Kay and Blinkhorn in Scotland9 and 48% reported by Agerholm and Sidi in England and Wales [10].

The high percentage of extractions of restorable teeth (29%) showed that the patients were convinced that extractions would solve all their dental problems (61.7%) and the patients felt that restored teeth may be painful in the future (14.8%).Other reasons include old age (9.7%), living far away from the dental clinic (5.1%) and being too busy for restorative treatment (4.1%). Extraction of restorable teeth was just one facet of an increasing problem of increasing demand for denture. According to NOHSA 2000, the Ibans had the highest prosthetic need (50.1%).[11]

None of the extractions in this study were due to orthodontic reasons. This was because orthodontic procedures were financially and technically demanding. Furthermore, there was no orthodontists in Mukah Division. In Scotland, however, Chestnutt found that more orthodontic extractions and fewer extractions due to caries were carried out in 1997 for patients under 21 years of age[12].

CONCLUSIONS

In conclusion, from this study, we found that the number of patients requiring extractions decreased with age. Besides that, molar teeth were the most commonly extracted teeth among patients below the age of 45 years old. From the patients' perspective, the main reasons for tooth extraction were toothache and the presence of cavities. Clinically, caries (73%) was still the main clinical indication for tooth extraction, and we found that 29% of restorable teeth were extracted.

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Case Series Analysis of Oral Cancer and Their Risk Factors

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ABSTRACT

Cancer causes approximately 12% of all deaths throughout the world and is the third leading cause of death in developing countries. In Malaysia, Indians have the highest incidence of mouth cancer compared to other races, and females are more affected compared to males. Objective: The main objective of this study was to analyze the cases of oral cancer treated in the dental department of Penang hospital, Malaysia and to determine the risk factors associated with oral cancer. Methodology: We reviewed the medical reports of all the patients with oral cancer treated in the dental department of Penang General Hospital from 1994 to 2004. Results: There were 46 cases of oral cancer treated by the dental department of Penang General Hospital during this time period. 22 were males and 24 females. The mean age of the patients was 61.2 years old. Indians comprised the majority of the cases (n=23; 50%) followed by Malays (n=12; 26.1%) and Chinese (n=11; 23.9%). Of these cases, 54.3% (n=25) had used quid, 39.1% (n=18) smoked cigarettes and 32.6% (n=15) consumed alcohol. Indians made up 76% (n=19) of all quid users (p=<0.05). 56% (n=14) of all quid users used the combination of betel leaves, areca nut and lime (p=<0.05). Females made up 81% (n=17) of the quid users and smokers were solely males (p=<0.05). Chinese were the highest among the races to smoke (n=6; 54.5%) and consume alcohol (n=6; 54.5%). The most common presentation of the tumours was swelling, pain and bleeding (n=16; 34.8%). Oral mucosa was the commonest site of the tumours with 67.4% (n=31) followed by tongue (n=9; 19.6%) and jaw (n=6; 13%). Histopathological examination revealed 91.3% (n=42) of the cases were squamous cell carcinoma. Conclusion: This study though with its limitations, has shown the risk of cancer due to tobacco and betel quid use. There is a need to develop focused promotion programmes such as prevention of betel chewing among Indian women and reduction of smoking among Chinese. Further analytical studies such as case control and qualitative studies are needed to determine other influencing factors.

Key words

Prevalence, Oral cancer, Penang General Hospital

INTRODUCTION

Cancer causes approximately 12% of all deaths throughout the world, and in the developed countries it is the second leading cause of death whereas in the developing countries it is the third leading cause of death making up 9.8% of all deaths. In 1996, 7.1 million deaths were attributed to cancer world wide.[1]

Cancer of the mouth and pharynx was the 6th leading cause of death in men in 1996. The incidence of cancer of the mouth and pharynx was 96 per 1000 among males and 32 per 1000 among females in developed countries. In the developing countries incidence of the mouth and pharynx was 288 per 1000 among males and 160 among females. The mortality for the cancer of the mouth and pharynx for 1996 was 207 per 1000 for males and 117 per 1000 for females. In South East Asia the majority of cancers are of oral cavity and uterine cervix. [1]

According to the report from the national cancer registry of Malaysia, cancer of the gum and mouth is the 6th most common cancer among Indian men and cancer of the tongue, 9th most frequent. Among Indian females

cancer of the mouth is the 3rd common and carcinoma of the tongue the 9th most common. In Malaysia, Indians have the highest incidence of mouth cancer compared with other races and females are more affected than men. The age specific incidence of oral cancer per population increases as the age increases beyond 40 years of age and peaks at 60 years and above.[2]

Most malignant oral neoplasms are squamous cell carcinoma. Uncommonly found are malignant salivary gland tumours, melanoma, lymphomas, neoplasms of bone and connective tissues, odontogenic tumours, metastatic neoplasms, Langerhans cell histiocytosis and Kaposi's sarcoma.[3]

The aetiological factors include use of tobacco, betel use, alcohol consumption, diet poor in fresh fruits and vegetables, infective agents, immune deficiency and exposure to sunlight. Rare causes of oral cancer include tertiary syphilis, discoid lupus erythematosus, congenital dyskeratosis and Plummer - Vinson syndrome. Many patients with oral cancer present late with advanced disease and lymph node metastases.[3]

Betel nut are seeds of areca catechu, betel nuts are chewed solely, but also in combination with lime and betel leaves or even smoked. Areca nuts have a mild stimulant effect and it is the fourth most common psychoactive substance in the world.[4]

Quid is defined as "a substance or mixture of substances, placed in the mouth or chewed and remaining in contact with the mucosa, usually containing one or both of the two basic ingredients, tobacco and / or areca nut, in raw or any manufactured or processed form". Betel quid refers to any quid wrapped in betel leaf and is therefore a specific variety of quid.[5]

The habit of chewing betel quid is widespread in regions where there are people of Indian origin in the world and in the South East Asia and South Pacific islands. Areca nut is an important cash crop in Taiwan and it is the second largest agricultural crop in that country. Areca nut has been linked to oral cancer, cardiovascular disease, diabetes and asthma.[5]

Tobacco is a silent killer and a principal factor for lung cancer. Chewing tobacco is common in many parts of the world and has been associated with oral cancer. Most people use tobacco during adolescence and its usage is higher among less educated, illiterate, poor and margin groups. Products for smoking include cigarettes and rolled preparations. Smokeless tobacco includes chewing tobacco, sucking tobacco and products for oral applications. Scientific evidence has linked tobacco use with development of more than 25 diseases.[6]

A case control study was conducted in Taiwan and betel quid chewing was found to be a significant independent risk factor in cancers of the pharynx and larynx.[7] Some suggest that adding tobacco is a confounder in many studies but in Taiwan where tobacco is not added, oral cancer among those who chew areca only, the incidence of oral cancer is high.[8]

The main objective of this study was to describe the cases of oral cancer treated in the dental department of Penang hospital, Malaysia and to determine the risk factors associated with oral cancer.

MATERIALS AND METHODS

This study was conducted in the dental department of Penang General Hospital which is the largest hospital in Penang, Malaysia. The dental department is headed by a maxillofacial surgeon. This department receives referrals from all over Penang state, both from the government as well as the private sector.

The sample included all cases of oral cancer treated in the dental department of Penang General Hospital from 1994 to 2004. Medical records of all of oral cancer cases from 1994 to 2004 were reviewed, and the variables identified. The dependent variable was oral cancer and the independent variables were smoking, alcohol and quid use in addition to the person descriptive variables like age, gender and race.

A standardized questionnaire for data collection was used. The variables looked at were age, sex, race, risk factors associated with oral cancer, lesions, location of the tumours, staging of these cancer patients, treatment and the referral mechanisms. Participants were given a unique identifier number which was used in handling all data. Patient identifiers were omitted, thereby ensuring the confidentiality of these patients.

The data were analysed using SPSS program. Results were tabulated and suitable statistical analysis was performed.

RESULTS

There were 46 cases of oral cancer treated by the dental department from the year 1994 to 2004. Of these, 22 (47.8%) cases were males and 24 (52.2%) females as shown in Table 1. The youngest case was 32 and the oldest 82 years old, the mean age was 61.22. Majority of the cases were between the ages of 60 – 69, comprising 37% (n=17) of the total cases. The Indians comprised the majority of the cases (n=23; 50%), followed by the Malays (n=12; 26.1%) and Chinese (n=11; 23.9%).

41.3% (n=19) of the cases were referred from the out patient departments of Penang state, followed by 32.6% (n=15) from general hospital and 21.7% (n=10) from district hospitals. The remaining 4.3% (n=2) were referred from private hospitals.

Table 2 shows the risk habits associated with race. 25 cases (54.3%) used quid, 18 (39.1%) smoked cigarettes and 15 (32.6%) consumed alcohol. 82.6% (n=19) of the Indian cases used quid, making up 76% among all quid users ($p=<0.05$). Smoking was found to be highest among the Chinese (n=6; 54.5%) and lowest among Indians (n=7; 30.4%). 75% of the Indians used both quid and smoking. 54.5% (n=6) of the Chinese consumed alcohol. 56% (n=14) among the all quid users use combination of betel

leaves, areca nut and lime (p=<0.05). Females made up 81% (n=17) of those who used quid whereas smokers were solely males alone (p=<0.05).

Table 1: characteristic of cases

Characteristic of cases	Distribution	
	n	%
Gender		
Male	22	47.8%
Female	24	52.2%
Ethnicity		
Indians	23	50%
Malays	12	26.1%
Chinese	11	23.9%
Age group		
Less than 40	2	4.3%
40 – 49	5	10.9%
50 – 59	11	23.9%
60 – 69	17	37%
70 – 79	8	17.4%
more than 80	3	6.5%

Table 2: Risk factor habits by race

Type of addiction	Malay n=12	Indian n=23	Chinese n-11	Total 46
Alcohol n=15	0% n=0	60% n=9	40% n=6	100% 15
	Within race 0%	Within race 39.1%	Within race 54.5%	
Smoking n=18	27.8% n=5	38.9% n=7	33.3% n=6	100% 18
	Within race 41.7%	Within race 30.4%	Within race 54.5%	
Quid n=25	20% n=5	76% n=19	4% n=1	100% 25
	Within race 41.7%	Within race 82.6%	Within race 9.1%	

Table 3 shows the clinical presentation. Data was only available for 45 cases. Sixteen cases (34.8%) presented with swelling, pain and bleeding, another 16 cases (34.8%) presented with ulcers, and 8 (17.4%) presented with fungating growth. 47.4% of the cases presented at stage III of cancer.

Table 4 shows the site, clinical presentation and common histopathological presentation by habit type. 40% (n=10) of the quid users presented with swelling, pain and bleeding. 46.7% (n=7) of those who consumed alcohol presented with ulcer type lesions. Among the smokers 44.4% (n=8) presented with ulcer type lesion.

Table 3: clinical presentation

Lesion Type	n	Percentage
Swelling, pain and bleeding	16	34.8%
Ulcer	16	34.8%
Fungating	8	17.4%
White Patches	5	10.9%
Missing data	1	2.2%

Table 4: Site, clinical presentation and common histopathological presentation by habit

Type of addiction	Most Common Presenting Lesion	Site Oral mucosa n=31	Site Tongue n=9	Site Jaw Bone n=6	Most Common HPE
Alcohol n=15	Ulcer type lesion n=7 (46.7%)	73.3% n=11	20% n=3	6.7% n=1	Squamous cell ca. n=14 (93.3%)
Smoking n=18	Ulcer type lesion n=8 (44.4%)	66.7% n=12	22.2% n=4	11.1% n=2	Squamous cell ca. n=17 (94.4%)
Quid n=25	Swelling, pain and bleeding n=10 (40%)	72% n=18	8% n=2	20% n=5	Squamous cell ca. n=23 (92%)

Oral mucosa was the commonest site of the tumours with 31 cases (67.4%) followed by tongue 9 cases (19.6%) and jaw bone 6 cases (13%). Oral mucosa is also the commonest site of the tumours among quid users (n=18; 72%), alcohol consumers (n=11; 73.3%) and smokers (n=12; 66.7%) (Table 4).

Table 5 shows the histopathological results. The histopathological examination showed 42 (91.3%) cases were squamous cell carcinoma, 2 cases (4.3%) of mucoepidermoid carcinoma, 1 case (2.2%) of malignant lymphoma and 1 case (2.2%) of angiosarcoma.

Table 5: histopathology

	n	Percentage
Squamous cell carcinoma	42	91.3%
Mucoepidermoid carcinoma	2	4.3%
Malignant lymphoma	1	2.2%
Angiosarcoma	1	2.2%

Among those who used quid 92% (n=23) developed squamous cell carcinoma and 8% (n=2) developed mucoepidermoid carcinoma. Among the consumers of alcohol 93.3% (n=14) developed squamous cell carcinoma and 6.7% (n=1) developed mucoepidermoid carcinoma and

among the smokers 94.4% (n=17) developed squamous cell carcinoma.

Unfortunately most data on the type of treatment was missing (n=19). From the data available (n=27), 17 had undergone radiotherapy, 4 surgery, 3 a combination of surgery, radiotherapy and chemotherapy, 1 chemotherapy alone, 1 combination of chemotherapy and radiotherapy and 1 combination of surgery and radiotherapy.

DISCUSSION

A majority of the cases in this series were within the age group of between 60-69 years old comprising 37% of all cases. This finding is consistent with cancer occurrence which takes many years of repeated exposure to the risk factor before developing. Indians made the majority of the cases. These results show similarity with the findings of an epidemiological survey conducted by a group of researchers from the University of Malaya where they found that the prevalence of oral mucosal lesion was high among the Indians and the least among the Chinese.[9]. Similarly in another survey, findings showed that the prevalence of oral precancer was highest among Indians and the indigenous people of Sabah and Sarawak while the lowest amongst the Chinese.[10]

There are strong indications for an association of habit of betel quid chewing with cancer of the mouth, oropharyngeal cavity and upper parts of the digestive tract.[11] Incidence for oral cancer in India is among the highest in world and it has been associated with diet, weight and lifestyle factors especially chewing betel quid[12]. Similarly we found users of quid comprised the majority of the cases with 54.3% of the patients diagnosed with oral cancers. The majority of the quid users were Indians comprising 82.6%. 81% of these quid users are females. The most common combination of quid users comprising 56% was betel leaves, areca nut and lime. 40% of these quid users presented with swelling, pain and bleeding.

36.6% of the cases consumed alcohol. The majority of alcohol consumers were Chinese (54.5%) while none were Malay, probably because alcohol is forbidden in Islam and most Malays are Muslims. Most of the alcohol consumers presented with ulcer type of lesions. Studies have linked the occurrence of oral cancer with alcohol usage [7, 13, 14]. Some authors have indicated a synergistic increase of oral cancer among people who consume alcohol, smoke and chew quid.15 It is interesting to note that the most common type of cancer for all three habits was squamous cell carcinoma and the most common presentation for alcohol and smoking habits were ulcer type lesions whereas for quid was swelling, pain and bleeding.

Smokers comprised 39.1% of all the oral cancer cases. Chinese made the majority of the smokers and the smokers comprised solely of males. Most of the smokers presented with ulcer type of lesions (44.4%). Mixtures of tobacco products increases the like hood of developing oral cancer, and duration and frequency increases the risk further[4,8, 11, 12, 14]. Similar studies have showed independent risks of smoking to laryngeal cancer[7]. This is not surprising as most chewers of quid are also smokers and consume alcohol drinks as shown by a study conducted in Taiwan[16].

Because of the small number of cases, the site of the tumour was grouped into three categories oral mucosa, tongue and jaw bone. Under the category of oral mucosa included palate, buccal mucosa, retromolar, floor of mouth and lip. The jaw bone included the mandible and maxilla. This case series analysis showed that the oral mucosa was the most common site of the tumour with 67.4% followed by the tongue 19.6%, and jaw bone 13%. Oral mucosa was the most common site of tumour among the users of quid, alcohol and smokers. This finding contrasts with the findings from Scotland, where the most common site of the cancer is the tongue followed by the floor of the mouth[13]. Similarly in another study in Seychelles, the most common site for oral cancer was also the tongue followed by floor of mouth, pharyngeal wall, lips and palate[17]. Whereas in a study done in the United States of America found that the most common site for oral cancer was floor of mouth, tongue followed by the gingival.[18]

91.3% of all the histopathological examination reported squamous cell carcinoma. Squamous cell carcinoma was the most common presentation among those who used quid, consumed alcohol and smoked. This finding is in line with the present knowledge that most malignant oral neoplasms are squamous cell carcinoma[3].

Since this is a retrospective analysis of the records, the information available is limited. No comparative control group could be made hence risk factor analysis could not be done.

CONCLUSIONS

Like many other earlier studies, this study though with its limitations, has shown that the risk of cancer due to tobacco and betel quid use is real. It demonstrates the different risky habit pattern among different races. This information will be useful for developing focused promotion programmes such as prevention of betel chewing among Indian women, reduction of smoking among Chinese. There is need to carry out focused case control and qualitative studies to determine other influencing factors.

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An Indirect Immunofluorescence Study in Different Grades of Oral Squamous Cell Carcinoma

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ABSTRACT

It is well known that malignant cells may exhibit profound alteration on their cell surface proteins, which can be localized by employing certain markers either by immunofluorescence or by immunohistochemistry. These markers are of great value in establishing the diagnosis and predicting the true biological potential more accurately than conventional histology. Objective: In the present study an attempt has been made to demonstrate the expression of pemphigus vulgaris antigen (PVA) in different histological grades of oral squamous cell carcinoma. Materials and methods: Tissue sections from twenty five clinically and histo-pathologically diagnosed oral squamous cell carcinoma and five normal buccal mucosa as controls were stained with pemphigus serum collected from untreated cases of pemphigus vulgaris. These were subsequently stained with fluorescein-labeled rabbit anti human IgG. Results: Deposition of IgG was evident in different grades of Oral Squamour Cell Cascinoma (OSCC) in varying intensities at inter cellular adhesion junctions. Statistical evaluation of data by using $\chi 2$ test- Yates correction for continuity revealed very highly significant ($p < 0.001$; $\chi 2 = 28.355$ test-Yates correction for continuity) relationship in the expression of this antigen and histo-pathological grades of OSCC. The control specimens in the study demonstrated the retention of PV antigen at intercellular spaces. Conclusions: The results of the study showed a significant reduction in PVA expression at invasive sites more so in poorly differentiated carcinoma. Thus an altered expression (retention or absence) in the cell surface antigen suggest a basis to develop an approach in early diagnosis of primary OSCC. Also it can be viewed that antigen deletion may be an important factor in local invasion by malignant cells.

Key words

Indirect immunofluorescence study, oral squamos cell carcinoma

INTRODUCTION

Detachment of cells from the primary site is an essential step in the metastatic spread of malignant tumors. The cells of certain types of tumors may be more readily detached from each other, than the cells of normal tissues. [1] Therefore altered cell to cell adhesion may make an important contribution to the initiation of invasive and metastatic spread of tumors.

Desmosomes are cell to cell adhesion junctions that are found in epithelia.[2] These junctions have two basic functions in addition to mediating cell to cell coupling; they provide an anchorage for intermediate filaments via their cytoplasmic plaque and therefore function as organizational centers for part of cytoskeleton. Biologically, cell adhesion by desmosomes is mediated by two major desmosomal cadherins, demogleins and desmocollins.[3, 4] Represent small families of type-1 transmembrane glycoproteins. These show a tissue and cell type – specific expression pattern. [5, 6, 7]

In stratified squamous epithelia, however, all three desmoglein and desmocollin isoforms are present, although the expressions of some of these proteins are restricted to certain strata. Human skin express desmoglein-1 in supra basal cell layers, desmoglein-2 in basal cell layers only and desmoglein-3 in basal as well as immediate supra basal cell layers.[5, 6] Studies have shown desmoglein-3 is antigenic in Pemphigus vulgaris individuals, and therefore this inter cellular glycoprotein has also been referred to as Pemphigus vulgaris antigen (PVA). [6, 8, 9]

In this study an attempt has been made to examine the expression of PVA in squamous cell carcinoma (SCC) of the oral cavity by indirect immunofluorescence method by using monoclonal antibody to PVA. This study has been designed to determine a correlation between loss of PVA with cellular anaplasia in different histological grades of OSCC.

MATERIALS AND METHODS

The study is based on the histological and immuno-fluorescence examination of 25 biopsies from oral SCC. These biopsies were obtained from the department of oral maxillofacial surgery.

The specimens were embedded in OCT compound and frozen upon a pre cooled chuck at -25 degrees centigrade. Sections were cut at 4 microns thickness and stored at -30 degree centigrade, indirect immunofluorescence was carried out with high titer of pemphigus serum [10] (1:640) as an indicator to localize the inter cellular glycoprotein and then labeled with rabbit anti-sera to human IgG (Dako A/S products) with propidium-iodide 0.01% as a counter stain. Immediate microscopic study was performed. Five biopsy specimens from control subjects were obtained from normal buccal mucosa and processed as described above.

An arbitrary scale of 0 to 2 was selected to grade the intensity of immuno fluorescence in each specimen to facilitate the comparison of fluorescence between and within the grades of OSCC. A score of 2 was recorded for bright fluorescence within the sections, score of 1 for weak fluorescence within the sections and 0 for almost negative. All sections were scored by two independent observers (Figs. 1 & 2)

The grading of tumor cells was based upon Broder's system on the proportions of differentiated cells to anaplastic cells. Statistical analysis of data was carried out for comparing the defined groups by using Yates correction for continuity and significance was then drawn by using $\chi 2$ test to compare the immunofluorescence scoring in different histological grades of OSCC. Results were recorded and p value < 0.05 was considered to be significant (Table 1 & 2)

Fig I: Photomicrograph shows weak fluorescence (score-1) at intercellular spaces by IIF in moderately differentiated squamous cell carcinoma (40x)

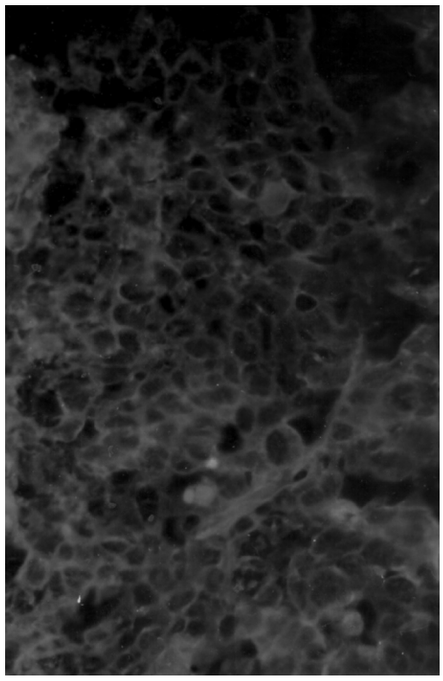
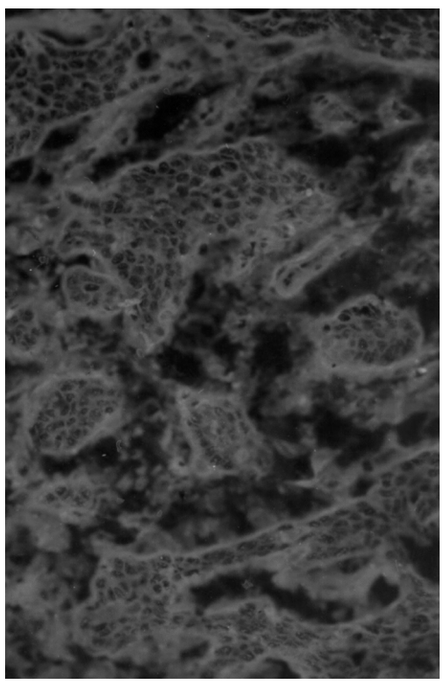


Fig 2: Photomicrograph shows bright fluorescence (score-2) at intercellular spaces by IIF in well differentiated squamous cell carcinoma (20x)



RESULTS

All control specimens (5 controls) demonstrated a bright uniform immuno-fluorescence staining at intercellular spaces reflecting the retention of PV antigen. Tables 1 & 2 summarizes the immuno-pathologic findings in different grades of SCC of the oral cavity. Statistical analysis of these results revealed very highly significant difference in the expression of intercellular substance antigen between different grades of OSCC.

Table 1: Immunofluorescence scoring in different grades of oral SCC

H/P Grades	No. of cases in each grades	Indirect immunoflurescence scoring		
		0-Almost negative	1-Weak fluorescence	2-Bright fluorescence
Grade-I Well differentiated	4 cases	-	-	4 uniform
Grade-II moderately differentiated	14 cases	-	13 uniform	1 patchy
Grade-III poorly differentiated	7 cases	5 cases	2 patchy	-

Table 1: Immunofluorescence scoring in different grades of oral SCC

Comparison groups	Test of significance $\chi 2$ test	p value
Grade I v/s Grade II	4.122	< 0.001 VHS
Grade II v/s Grade III	6.205	< 0.001 VHS
Grade I v/s Grade III	12.128	< 0.001 VHS

VHS = Very highly significant; $\chi 2$ = 28.355 (test-Yates correction for continuity)

DISCUSSION

A number of changes occur in neoplastic cells as they progress towards a greater degree of malignancy. These alterations include genetic, epigenetic changes, surface alterations and alterations in intercellular interactions. In some instance these changes are contributing factors to the degree of pathology noted, whilst the others are resultant, in many situations the relationship between these changes and progression towards neoplasia is not understood. Nevertheless it seems probable that these changes are ultimately involved in driving the cells further along the path to neoplastic transformation.

In the present study majority of the cases showed very weak, absent or focal expression of pemphigus vulgaris antigen especially in moderately and poorly differentiated SCC indicating a partial or complete loss of normally existing cell membrane components bearing antigenic property. These results seems to be consistent with the study of Hiraki et al. in their immuno histo-chemical study in oral OSCC, suggesting weekend intercellular adhesion might lead to an easy detachment of tumor cells from primary site, initiating metastasis.[11] Furthermore in the present study in few cases of poorly differentiated SCC certain individual cells that underwent keratinisation showed positive fluorescence, majority of spindle cells and bizarre cell forms were devoid of expression of PVA. These observations in the present study are in accordance with reports of Harada *et al*., Tada *et al*. [12] in their studies on expression pattern of adhesion molecules by SCC cells, both in vivo and in culture, showing an abnormal expression of desmosomal antigens including desmoglein, desmoplakin, and plakoglobin in cell lines, and the lack of molecule was related to dedifferentiated keratinocytes. Also western-blot study on SCC cell lines demonstrated abnormal sizes of desmoglein isoforms. The observation made in the present study probably supports the views of afore mentioned authors, in particular with moderately and poorly differentiated (20 cases) carcinomas showing an irregular expression of PVA which could be due to lack of differentiation in keratinocytes an initial event in carcinoma cells, and in continum may lead to various changes in biological properties like diminished or an abnormal expression of cell adhesion molecules.

Loss of epithelial differentiation in carcinomas, accompanied by higher mobility and invasiveness of tumors often involves disturbances in integrity of inter cellular junctions. Schipper *et al*.[13] conducted studies on expression of E-Cadherin to which desmogleins belong in head and neck SCC and they reported that E-Cadherin expression was inversely correlated with both tumor differentiation and nodal metastasis. In the present study though the expression of PVA, varied from area to area within the individual tumor in moderately and poorly differentiated SCC, in well differentiated, a good retention of PVA was evident justifying the fact that neoplastic transformation is not uniform and simultaneous, thus substantiating the study of Schipper *et al*.

The biological significance of reduced expression of PVA may simply indicate masking of the epitope for the monoclonal antibody. In the present study frozen sections were employed, and the reduced or lack of PVA in moderately and poorly differentiated carcinoma is a genuine down-regulation of adhesion component. This suggests that reduced adhesion in tumor cells may give rise to metastasis.

Although the ability of SCC to metastasize seemed to relate in general to weak expression of PVA, the extent of retention of labeled antigen varied from area to area within individual tumor in the present study. This observation concurs with several reports in which no correlation was found between integrity of intercellular junctions and invasion or metastasis. Such observations raise the possibility that adhesion molecules in invasive and metastatic carcinomas may be functionally impaired, compared to those in normal tissues.

Further in the present study most of the patients had the habit of chewing and smoking tobacco. Several

authors have suggested that the plant derived poly phenols can alter the metabolic pathways, cellular proliferation, maturation, also changes in cell surface glycosylation and acquisition of neoantigens.[14] which might be responsible for the disruption of cell to cell junctions.

The current study demonstrates a correlation between the degree of anaplasia and absence of PVA ($p < 0.001$; $\chi 2 = 28.355$) confirming the fact that PV auto antibodies cause loss of cell adhesion by directly interfering with adhesive junctions of Desmoglein-3, and may promote invasion and metastasis.

CONCLUSIONS

Loss of inter cellular antigen (PVA) reflects the progress of the disease although the present study did not show any correlation between absence of PVA and metastasis, such an observation raise the possibility of an abnormal expression of desmoglein isoforms.

This might be related to the cell detachment from primary tumors, with subsequent invasion of cells. Further studies are necessary to determine the function of desmoglein proteins which may be an important area for further investigation.

However the results of the present study is a preliminary observation since only small number of diseased were analyzed, further, longitudinal studies are required to asses the significance of this antigen PVA in OSCC.

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Collaborative Learning: A Peer Group Teaching In Oral Hygiene Instructions Activity

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ABSTRACT

Introduction: The objectives of this survey were to investigate whether an oral health education activity through collaborative learning and peer group teaching by students would give a positive impact and to evaluate its effectiveness, sufficiency and relevancy of the activity content. Methods: Three third year dental students in each group were assigned to demonstrate to their group mates the myriad of oral hygiene device for plaque removal and how they are used. Fifteen students were appointed each as a 'toothbrushing specialist', 'flossing specialist' and interdental toothbrush specialist' respectively. The others acted as participants in the group. The students then teach each other in the group on how to use these oral hygiene measures. A self-administered questionnaire assessing the activity outcome was given to fifty-two third year dental students who attended the demonstration. The data were entered in the computer using the SPSS version 12.0 for analysis. Results: Overall response rate was 100%. Slightly more than half of the students felt confident to teach their patients effective toothbrushing and flossing and able to indicate the usage of interdental toothbrush. Most of the students preferred a small group teaching rather than a larger one. The result shows that student's knowledge, attitudes and practices on effective oral hygiene has gained. Conclusion: Collaborative learning in the clinical environment appears to give positive impact on the dental student's ability to impart oral health education to their patients.

Key words

Collaborative learning, dental students, oral hygiene, small group, peer group teaching.

INTRODUCTION

In a collaborative learning environment, participants are brought together to simultaneously work on a task to learn from this task work and teamwork. [1] Collaborative learning is an umbrella term for a variety of educational approaches involving joint intellectual effort by students, or students and teachers together. [4] Collaborative learning center on student's exploration or application of the course material, not simply the teacher's presentation of it.[4] Collaboration is defined as the process of building and maintaining a shared conception of a problem or task, distributing responsibility across members of the group, sharing expertise, and mutually constructing and negotiating cognition.[2]

The oral hygiene instructions demonstration activity for the 3rd year dental students in the Faculty of Dentistry, National University of Malaysia (UKM) previously was conducted in a large group with total teaching was done by the lecturer. Unfortunately, there are many drawbacks when students learn in a large group environment. It is too easy for students to become passive observers rather than active participants. Groups larger than six might lessen their opportunity to speak frequently and lessen their responsibility towards their duty in the learning process.[3] Collaborative learning represents a significant shift away from the typical teacher-centred or lecture-centred milieu in classrooms .[4]

The objectives of this survey were to investigate whether an oral health education activity through collaborative learning and peer group teaching by students would give a positive impact. The rationale of this survey is to acknowledge that collaborative learning and peer group teaching can be applied successfully in any academic subject especially in dentistry.

MATERIALS AND METHODS

The population of this study consisted of third year dental undergraduate students of the Faculty of Dentistry, National University of Malaysia (UKM) attending a demonstration on oral hygiene instructions for their Introduction to Clinical Dentistry Module.

During this demonstration, the same lecturer conducted the demonstration on six different groups to six different sessions. Each group comprises of eight to ten students, dividing themselves again into three smaller groups. The lecturer selected three students from each group to be a 'tooth brushing specialist', 'flossing specialist' and an 'interdental toothbrush specialist' respectively. The remaining student in the group would act as the participant. A lecturer would teach and demonstrate each 'specialist' how to use the oral hygiene device for plaque removal using a set of toothbrushing models (Typodent Kit), charts and diagrams. 'The specialists' will teach each members of the group regarding the oral hygiene device which were demonstrated to them earlier using the same teaching materials. 'The specialist' answered any questions regarding the subject matter with the supervision by the lecturer. Next, each student brushed and flossed or used the interdental brush using the correct techniques learned during the demonstration according to their needs after disclosing plaque on their teeth with a disclosing tablet. Later, they assessed the effectiveness of the technique used by checking their plaque score.

After the demonstration, we conducted a survey to evaluate the impact of the small group and peer group teaching among the students. A self-administered questionnaire assessing the activity was given to all 52 3rd year dental undergraduate students involved in the demonstration. We assured the participants' confidentiality before distributing the questionnaire.

The questionnaire was derived after reviewing several literatures. It comprises of seven items. The first item asked on the role they played for the oral hygiene instructions activity. The skills they have learned or improved due to the activity were asked in the second item. The third item asked their preferred method of teaching. The appropriateness of the time devoted to the oral hygiene instructions activity was next. The relevancy and sufficiency of the content of the oral hygiene instructions activity was the fifth and sixth item respectively. The last item was regarding the organisation of the oral hygiene instructions activity. For the first and second item, dichotomous scale of yes or no for the choice of answer was used. For items three until seven a five-point Likert scale for the choice of answers was used, which are strongly disagree, disagree, not agree nor disagree, agree and strongly agree.

Data entry and analysis was done using Statistical package for Social Sciences (SPSS) version 12. Means and standard deviations were calculated for continuous variables, and frequency and percentages for categorical variables.

RESULTS

The overall response rate was 100%. Fifteen students were appointed each as a 'tooth brushing specialist', 'flossing specialist' and 'interdental toothbrush specialist' respectively. The others acted as participants in their group. The results were tabulated.

Table I reported the skills the students learned after conducting the oral hygiene instructions activity. 98.1% and 82.7% of them are able to effectively brush and floss their teeth respectively. More than half of the students found themselves able to teach effective tooth brushing and flossing to their patients. 63.4% claim that they are able to indicate the usage of interdental toothbrush to their patient. Forty-four students out of fifty-two understood the need to show good example to patients by having good oral hygiene. After conducting the activity, 71.2% agreed that their interpersonal skills improved.

Table I: Skills learned after conducting the oral hygiene instructions activity.

Skills learned	Number	Percentage
Able to brush effectively	51	98.1
Able to floss teeth effectively	43	82.7
Able to teach effective tooth brushing	34	65.4
Able to teach effective flossing	36	69.2
Able to indicate the usage of interdental toothbrushes	33	63.4
Understand the need to show good example to patients e.g. by having good oral hygiene	44	84.6
Improved interpersonal skills e.g. group dynamics	37	71.2

Table II shows the teaching method preferred by the dental students. Only four students think that a large group demonstration would benefit them. Meanwhile, 86.6% of them prefer small group demonstration instead. Although 61.5% of the students prefer student to student teaching method, 71.2% still would like their lecturers to teach them.

Table II: Preferred teaching method.

Method	Agreed responses	
	Number	Percentage
Large group demonstration	4	7.8
Small group demonstration	45	86.6
Student to student teaching	32	61.5
Lecturer to student teaching	37	71.2

Table III describes the results on the impact of the oral hygiene instructions activity. 84.6% agreed that the time spent for the small group demonstration was appropriate. They also agreed that the overall design of the activity was well balanced (75%). The students also agreed that the activity was done in logical order (88.4%), well organized (84.6%) and have clear objectives (86.6%).

Table III: Appropriateness of the oral hygiene instructions activity.

	Agreed(strongly agreed and agreed) responses Percentage
Time allocated for small group demonstration teaching was appropriate	84.6
Overall design of activity was balanced	75.0
Activity delivered in logical order	88.4
Activity was well organized	84.6
Objectives were clear	86.6

The responses for the relevancy and sufficiency of the oral hygiene instructions activity content is reported in table IV. 92.3% and 86.5% of the students agreed the activity content were relevant during the small group demonstration and discussion respectively. The students also claim that the small group demonstration (77%) and discussion (76.9%) were sufficient as well.

Table IV: Relevancy and sufficiency of the activity content.

	Agreed(strongly agreed and agreed) responses Percentage
Relevancy:	
Small group demonstration	92.3
Small group discussion	86.5
Sufficiency:	
Small group demonstration	77.0
Small group discussion	76.9

DISCUSSION

It does not mean that if you are a dental student, one should know automatically the proper technique of oral hygiene practices. Personal oral hygiene is the maintenance of oral cleanliness for the preservation of oral health, whereby microbial plaque is removed and prevented from accumulating on teeth and gingivae. [4] The knowledge they received from the curriculum were not mainly for the application on their patients but also on themselves. It is not appropriate that a dental student do not possess a good oral hygiene but at the same time teach their patients on the good practices of having one. From this survey, a very high percentage of students are able to brush and floss their teeth effectively (Table I). Even though no assessment on the students' attitudes and practices was done before conducting the activity, the results shows that student's knowledge, attitudes and practices on effective

oral hygiene has gained. This is comparable with the study by Rong WS et al, where there was a significant increase in the number of year five dental students who used a more thorough brushing technique and have more positive attitude to oral health .[5]

During the conducting of the Introduction to Clinical Dentistry module, the students were not in contact with any patients yet. This is the stage of preparing the students on the clinical environment and revising some clinical procedures that they have learned theoretically in the past two years. Thus, this explained that only slightly more than half of the students felt confident to teach their patients effective toothbrushing and flossing and able to indicate the usage of interdental toothbrush (Table I).

A high percentage of students claimed that they have actually improved their interpersonal skills after the activity (Table I). This suggests that, the informal setting of collaborative learning facilitated discussion and interaction. This group interaction helped the students to learn from each other's, skills and experiences .[6] Collaboration does not just happen because individuals co-present; individuals must make a conscious, continued effort to coordinate their language and activity with respect to shared knowledge. Students learn best when they are actively involved in the process.[7] From this survey, most of the students preferred a small group teaching rather than a larger one (Table II). Moreover, most of them also agreed that the oral hygiene instructions activity was a well organized, delivered in logical order, balanced design and have clear objectives (Table III). This is concurrent with reports from researchers that, regardless of the subject matter, students working in small groups tend to learn more of what is taught and retain it longer than when the same content is presented in other instructional formats.[3]

Collaborative learning in a classroom has its challenges and dilemmas. Shown from the survey were a high percentage of students preferring their lecturer to teach rather than their peers (Table II). Challenges at the classroom level are compounded by the traditional structures and culture of the academy, which continue to perpetuate the teacher-centred, transmission-of-information model of teaching and learning .[4] Teaching in collaborative settings puts front and centre the tension between the process of student learning and content coverage. It is difficult to ensure students are learning and mastering key skills in the activity while at the same time addressing all the material of the course. However, from this survey, the students reported that the activity content during the small group demonstration teaching and the small group discussion was relevant and sufficient (Table IV).

CONCLUSIONS

Dental students were able to practice effective oral hygiene behaviours and were confident enough to teach their patients in practicing good oral hygiene. The rationale of this survey is to acknowledge that collaborative learning and peer group teaching can be applied successfully in any academic subject especially in dentistry. The students understood well that they should be good role models to their patients. This reflects that collaborative learning and peer group teaching motivate the students by getting them more actively engaged and succeeded in their learning abilities to gain knowledge and skills.

RECOMMENDATIONS

From this survey, many students still prefer their teachers/ lecturers to do the teaching rather than their peers. This was probably due to the lack of trust towards their peers in teaching them. In addition, peer group teaching might not be their norms in most of the dental curricular activity. Therefore, collaborative learning should be introduced and used more often into the dental curricular to enhance a better achievement in knowledge and skills among dental students specifically, in the next millennium.

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ABSTRACTS OF SCIENTIFIC PAPERS PRESENTED AT THE 15TH FDI/MDA SCIENTIFIC CONVENTION AND TRADE EXHIBITION, 25th - 27th JANUARY 2008

A 6 YEARS CLINICAL REVIEW OF TRAUMA TO YOUNG PERMANENT TEETH (2000-2006) IN DEPARTMENT OF PAEDIATRIC DENTISTRY HOSPITAL SULTANAH BAHIYAH, ALOR STAR, KEDAH.

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Objectives: To evaluate the prevalence, treatment modalities and clinical outcomes of dental trauma in young permanent teeth in the Department of Paediatric Dentistry, Hospital Alor Star from the year 2000-2006.

Materials and Methods: A retrospective review was conducted of all dental record of children registered in the dental paediatric clinic under category of trauma cases (labeled green). During the period of Jan 2000-November 2006; a total of 82 patients presented with 200 traumatized permanent teeth. The data regarding demographic characteristic, prevalence off dental trauma, treatment modalities and clinical outcome were analyzed.

Results: The study revealed a total of 82 patients with 200 traumatized permanent teeth presented during the 6 years interval. The age of patients ranged from 6 to 16 years old. Male experienced more dental trauma in 3:2 ratio. The majority ethnic affected was Malay (84 %) followed by Chinese and Indian. The major cause of dental trauma was fall (55%) followed by MVA and alleged hit. Maxillary incisors were the most affected (84%). The most common dental injury was avulsion (24%) and the least was extrusion (8%). 149 out of 200 teeth were successfully managed with various approaches depending on types and severity of trauma. There were 51 cases of defaulted treatment. 11 cases of complications were recorded.

Conclusion: 149 out of 200 traumatized teeth were successfully managed with various approaches. Immediate proper treatment followed by subsequent review visit ensures a good long-term prognosis of treatment provided. Unfortunately there was incidence of patient or parent defaulted treatment. Hence, preventive, educational program and periodic check up should be instituted among the public and schoolchildren.

Keywords: young permanent teeth, trauma, children,

HOW TO REPAIR A FRACTURED FISSURE SEALANT?

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Summary: The aim of this study was to investigate whether differences in the technique of repair, influence a seal of a repaired nano-filled resin based sealant, placed on occlusal surfaces of permanent molar teeth *in-vitro*.

Sample and methods: 112 human extracted molars were randomly allocated to one of four groups, of 28 teeth each. A nano filled resin sealant (Filtek Z350) was placed on their occlusal surface following cleaning by prophylaxis and acid etching. Duplication of sealant failure was carried out. The teeth were then subjected to four different methods of repair: Group 1: With a slow speed prophylaxis brush followed by acid etching; Group 2: Prophylaxis brush, acid etching and application of bonding agent; Group 3: Light curing for 5s; and Group 4: Light curing for 20s. Then, they were stored for one week in artificial saliva, painted with two layers of varnish: their apices were sealed with wax, and the teeth were immersed in 1% methylene blue. The teeth were then sectioned to achieve three cuts. A total

of 648 sections from 112 teeth were scored for microleakage.

Results: Statistical analysis using chi-squared did not demonstrate any one single method of repair to be superior to the control method for reapplication of the sealant.

Conclusion: Group no. 1, seems to be the most appropriate, as this method is likely to be agreeable to most children because of its time saving nature.

Keywords: Repair, sealant, resin based sealant

MAXIMIZING THE VALUE OF MICROSOFT ACCESS DATABASE IN MANAGING SURGICAL WAITING LIST

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We presents the use of Microsoft Access as a standard Microsoft Office program as a simple, stand-alone database in managing a waiting list for our third molar surgical patients. Readily available in all machines running on Windows platform, the database can be built to collect, analyze and monitor all patients scheduled for surgical removal. The novelty of this record keeping system not only lies in its simplicity to build and use, but to its cost effectiveness, security and can be used to collect standardized demographic and clinical data compared to conventional paper or book waiting list. The data stored can be quickly viewed or even shared over the network if configured. Appointment booking and monitoring can be done effectively avoiding patient drop-outs. Although not utilizes the web, it allow back-up and copying to the off-the-shelf thumbdrive by doctors that they can have access to the list at any time.

Keywords: Waiting list, Microsoft Access, Microsoft Office

DEVELOPMENT OF ELECTROPALATOGRAPH (EPG) ARTIFICIAL PALATE FOR SPEECH THERAPY OF CLEFT LIP AND PALATE CHILDREN.

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Objective: To determine the speech characteristics focusing on the parameters of articulation between normal and cleft lip and/or palate subjects.

Materials and methods: Normal and cleft lip and/or palate subjects were selected according to the criteria. Impression of the upper arch was taken and EPG was constructed for each subjects. The EPG artificial palate was validated and speech assessment was done. EPG data was collected from spontaneous response after naming the pictures on selected target sounds. Data was analyzed for the error pattern of the cleft-type characteristics (CTC) and also the idea of tongue-palate contact during the error production of sounds was achieved.

Results: There is a difference in the tongue palate contact between the normal and cleft lip and/or palate subjects.

Conclusions: EPG can be used as a tool to improve the error pattern of the cleft-type characteristics (CTCs) among cleft lip and/or palate patients and suggested to be used by other subjects with articulation problems.

The study was supported by eScience Fund Grant from MOSTI (305/PPSG/6113101)

Keywords: speech, cleft-type characteristics, speech assessment

SOFT TISSUE RECONSTRUCTION OF RIDGE DEFORMITIES: MODIFIED ONLAY-INTERPOSITIONAL CONNECTIVE TISSUE GRAFT COMBINED WITH LABIALLY POSITIONED FLAP AND TEMPORARY REMOVAL PARTIAL DENTURES. A CASE SERIES.

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Aims: The purpose of this paper is to describe the new modified onlay-interpositional connective tissue graft (CTG) technique combined with labially positioned flap, to demonstrate whether the removal partial dentures (RPD) is able to support the healing stage and to evaluate the clinical results post surgery.

Materials and methods: Four stabilized chronic and generalised aggressive periodontitis patients from Periodontal Clinic with severe aesthetical prosthesis problem and ridge deformities of Siebert class III morphology on the anterior maxilla were selected. A removable partial denture (RPD) was specially designed prior surgery. The new modified technique is described in detail. The bridge-works constructed at six to eight weeks post surgery. The clinical assessment in terms of degree of the ridge deformities, texture, colour, scar tissue, papilla classification and gingival line were recorded at baseline, six weeks and 6 months.

Results: All patients showed a similar pattern of uncomplicated healing, clinically using the RPD. At six weeks post surgery, all bucco-lingual and apico-coronal ridge deformities were corrected. At six months, the ridge deformities corrected were excellently maintained; inter-dental papilla reconstruction was appreciable, aesthetic quality of texture and color of tissues without scarring noted. The gingival line was symmetrical.

Conclusion: The specially designed RPD managed to assist the healing of the new modified technique of the CTG inserted in the labially positioned flap. Clinical results showed that the ridge deformities have been corrected with improvement in papilla level and gingival line.

Keywords: soft tissue reconstruction, connective tissue graft, partial denture

THE CLINICAL REVIEW ON DENTAL AVULSION AMONGS CHILDREN IN HOSPITAL SULTANAH BAHIYAH 2001-2006.

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Introduction: Dental trauma occurs in childhood and adolescence with consequences in time and cost for both patient and family. For some individuals, dental trauma will result in long, time consuming and costly treatments in childhood which will continue into adulthood. Tooth avulsion is defined as total displacement of the tooth out of its alveolar socket. It accounts for 0.5 % to 16% of traumatic injuries in the permanent dentition. Avulsion of permanent teeth occurs most often in children 7 to 9 years old, an age when the relatively resilient alveolar bone provides only minimal resistance to extrusive forces.

Objectives: 1)To identify the causes of tooth avulsion 2)To determine the age range, gender, and race of the patient with tooth avulsion 3)To determine the period elapsed between avulsion and time seeking dental care 4)To identify sources of referral 5)To identify the treatment provided to the patient.

Methodology: Retrospective study of the cases treated in Department of Paediatric Dentistry, Hospital Sultanah Bahiyah from year 2001-2006.

Results: From the data collected, 30 avulsions identified involving either 1 tooth or more than one tooth. Causes of tooth avulsion identified are alleged Motor vehicle accident (57%), alleged fall (40%) and alleged hit by object (3%). Out of 30 avulsion identified, 70% were male while 30% were female From the data collected, 80 % of avulsion cases involving Malays while 20% of cases involving Chinese, none of other races. From 30 cases of avulsion, 87% of cases referred by Casualty Hospital Alor Setar, 3% of cases referred from other dental clinic and 10% are from other resources. Other resources include Periodontic Clinic, Casualty Hospital Sik and Surgical Department Hospital Alor Setar.

Conclusion: The result of this study reveals that parents/patient are not aware that the avulsed teeth can be replanted. In addition there is a delay in seeking treatment more than 24 hours. The percentage of patients attended for treatment immediately was very low when compared with other studies. Preventive Educational Program should be instituted in state of Kedah, which should be directed to parents, teachers and other health care personal. Successful management of the avulsed tooth begins at the site of accident.

Keywords: dental avulsion, children, accident

THE RELATIONSHIP BETWEEN GENDER, AGE, JOB RANK, MARITAL STATUS AND LEVEL OF MENTAL HEALTH AMONGST GOVERNMENT DENTISTS.

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Objective: The aim of this study was to determine whether gender, age, job rank and marital status were associated with the level of mental health of Malaysian's government dentists.

Method: A self-administered questionnaire survey was conducted on all dentists with at least one year working experience in government agencies. In all, 682 survey forms from a total of 864 forms distributed were returned (81% response rate). The study explored eight mental health domains namely; vitality, somatic experience, behavior, cognitive symptoms, emotions, sense of coherence, interpersonal relationship and sense of accomplishment experienced by respondents measured by structured statements on a five point Likert Scale.

Results: Although none reported extreme negative conditions, 18.9% and 75.9% respondents were reported to have poor or moderate level of mental health respectively. Only 5.2 % reported excellent status. Gender, age and job rank were found to be significantly associated with level of mental health at $p < 0.05$ but marital status was not ($p > 0.05$). Increasing age and higher job rank were significantly related to better mental health experience ($p < 0.05$) regardless of location of practice and practice types. The most important finding of the study was that most dentists (95%) experience mental stress and that about one in every five (18.9%) was serious.

Clinical Implications: Persistent mental stress is harmful to the dentists' overall mental health and may raise issues of work quality and productivity. Work policy, training opportunities and supportive environment should be looked into to help dentists cope with work and life more productively.

Conclusion: The survey concluded that dentists are prone to mental stress. The selected variables studied contribute significantly to a better understanding of how their level of mental health was affected by them.

Keywords: Government dentist, age, marital status, job rank, mental health.

ORAL AND PERIORAL TRAUMA IN CHILDREN ATTENDING THE PAEDIATRIC DENTAL DEPARTMENT IN MELAKA GENERAL HOSPITAL.

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The Paediatric Dental Department in Hospital Melaka started its operation in January 2007 and is the referral centre for paediatric oral management for the state of Melaka and adjacent areas of Johor and Negeri Sembilan.

The response has been very encouraging: until November 2007 the attendance of patients had reached 2172 with 736 new cases referred. In this first year alone, 137 patients were seen for management of traumatic oral and perioral injuries to child patients, up to the age of 16. The data on the types of traumatic events, types of dental and bony injury sustained by the patients has been analysed. A large number (61%) of injuries were sustained due to falls, followed by injuries due to motor vehicle accidents (30%).

Though peak incidence are said to occur at 2-4 years and 8-10 years of age (Welbury, 1997), our findings showed no such predilection to any age groups. The main injuries sustained were found to be soft tissue injuries followed by luxative dental injuries. Some children also presented with bony fractures.

This study serves to show the pattern and types of trauma cases seen at this department.

Keywords: oral trauma, children, perioral trauma, referral

THE CORONAL SEALING ABILITY OF A NOVEL NANO HYDROXYAPATITE - FILLED ENDODODNTIC SEALER.

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Objectives: To evaluate the sealing ability of a novel nano hydroxyapatite (HA)-containing endodontic sealer in preventing coronal leakage before and after post preparation and to compare it with the commercial AH26 sealant.

Materials and Methods: A total of 152 extracted human single-rooted teeth were instrumented using NiTi files and the crowns were then amputated. After cleaning and shaping procedure were completed using step back technique, samples were randomly divided into two groups. The two groups were obturated with either gutta percha and AH 26 sealer or gutta percha with the nano HA-containing sealer. All teeth were then stored at 37° C for 7 days to allow the sealer to set. Each group was then further sub divided into two groups where one of them were prepared for post using para-post drill and the other group was left intact. The resulting 4 study groups contained 38 samples per group (n = 38). The teeth were then thermal cycled at 5°C and 55°C in water baths at dwell time of 30 seconds for a total of 500 cycles. External surfaces of the roots were coated with two layers of nail varnish that did not cover the coronal opening. Specimens were then submerged in 2% methylene blue dye for 24 hours. Each root was sectioned vertically into two halves, and microleakage was measured under microscope (x36) by taking the maximum linear dye penetration corono-apically. Micro leakage readings were analyzed by the independent t test (α=0.05).

Results: The result showed that there was no statistically significant difference in the coronal sealing ability between the two sealers, before and after preparation for post. The experimental nanoHA-containing and AH26 sealers with post space preparation showed significantly more leakage compared to sealers with no post space preparation.

Conclusions: Preparation for post caused a significant decrease in the coronal sealing ability of both sealers. The preparation for post did not create any difference between the performances of the two sealers. The novel nanoHA-containing sealer tested had a comparable coronal sealing ability with the commercial AH26 sealer.

Keywords: coronal seal, sealer, post preparation

TRADITIONAL MALAYSIAN AND ORIENTAL HERB EXTRACTS AS ANTI-PLAQUE AGENT: IN VITRO STUDY.

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The effectiveness of antimicrobial agents in mouthwashes to control bacterial plaque both in vitro and in vivo has been proven by several considerable amount of research. Synthetic drugs produce many side effects compared to the majority of natural remedies that are devoid of such serious side effects even as they provide therapeutic benefit.

Objective: To evaluate the antibacterial activity of aqueous and ethanol extracts of Malaysian herbs: 1-Cinnamomum zeylanicum, 2-Syzygium aromaticum, 3-Illicium verum, 4-Syzygium aromaticum in combination with Illicium verum, 5-Mangifera indica, and Oriental herbs: 1-salvadora persica (miswak), 2-mytrus communis , 3-cappris spinosa, 4-Qureucus infectoria on dental plaque and compeer it with chlorhexidine mouth wash which used as positive control and sterilized distell water as negative control.

Methods: A pool samples of dental plaque was collected and incubated aerobically and anaerobically, disc diffusion test was used to assess the antibacterial effects of all the extracts.

Results: Demonstrate promising antibacterial effect of all the herbal extracts; ethanol extracts represent a higher antibacterial effect than aqueous extracts but lower than chlorhexidine mouth wash.

Keywords: antimicrobial agents, mouthwash, traditional, herb extracts

SKINPLAST FOR MOUTH ULCERS AND WOUNDS.

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Some Malaysian villagers have been using for ages the bark of ZX plant to treat oral recurrent aphthous ulcerations (RAU) and skin wounds. RAU affects about 25% of the world population. RAU causes pain, difficulty in eating, swallowing, speaking and in performing other oral functions. It's serious form, called Bechet's Syndrome may cause blindness, genital ulceration, and neurological, dermal, joint and gut disorders. There is no satisfactory treatment for RAU at the moment. Many drugs that are in current use (e.g. steroids) to treat RAU are not satisfactory in relieving pains from RAU and skin wounds, and killing it for a reasonably long period. They are not easy to use and often cause devastating side-effects. A herbal product called SKINPLAST have been developed to treat RAU. The active ingredient of SKINPLAST is an extract from the bark of the plant ZX. It is the first topical anaesthetic agent to be produced in the form of a film. Clinical trials have shown that SKINPLAST is beneficial for the treatment of RAU and for external skin wounds. It relieved pain within three minutes of application, produced long pain-free period (4-5 hours), promoted healing, shortened the number of ulcer days (from the usual 14 days, reduced to 8 days), caused no side-effects, cheap and easy to use. Investigations showed that the plant extract ZX possessed anti-inflammatory, anti-ulcerogenic and anaesthetic properties. It also hastened healing-time and did not promote tumour development. The ED50 for wound healing is 350mg/kg while LD50 is 1198mg/kg.

Keywords: skinplast, ulcer, wound healing

SATISFACTION AND DENTURE USAGE AMONG DENTURE WEARERS.

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A study to explore full denture usage and satisfaction was conducted among patients of age 60 and above in the District of Rembau, Negeri Sembilan. Subjects were interviewed via telephone using questionnaires which were developed and pretested by the researcher.

Findings: The study revealed that 56 % of respondents reported using dentures that were issued in the year 2004. Dissatisfaction was reported among all the 14 patients who did not use dentures and 2 who were still using the dentures made by dental technicians in 3 dental clinics in the District of Rembau.. The factors cited for dissatisfaction were related to function, aesthetics, speech and others with function being the highest dissatisfaction factor. Analysis using Fisher Exact Test to investigate the difference between dissatisfaction and denture usage revealed that there exist a significant difference between the two variables (p = 0.001; 95% C.I). Significant differences also exist between dissatisfaction and factors such as function, aesthetics and speech (p= 0.000; 95% C.I). It was also found that 50 % of respondents who faced problems with dentures, had difficulty in going back to the dental clinics to seek corrective actions. Among factors cited were problems with transportation, time and location of clinic on the upper floor.

Conclusion: The key to a successful denture construction lies in good communication with patients which encompasses understanding patients' needs, managing expectations and overseeing challenges whilst maximizing available resources. .Patients should be encouraged to come for follow-up treatment after issue of dentures so that problems faced could be resolved. Furthermore, to strengthen the services new technologies should be incorporated in the government dental services and operators should be updated so as to ensure that the dentures produced are of high quality and fulfill patients' satisfactions.

Keywords: satisfaction, denture usage, function, aesthetic, speech

EFFECT OF WHITENING TOOTHPASTES ON STAIN REMOVAL AND SURFACE ROUGHNESS OF COMPOSITE RESINS.

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Objectives: To assess i) the staining susceptibility of composite resins. ii) the ability of whitening toothpastes in removing stains from composite resins. iii) the effect of whitening toothpastes on the surface roughness of composite resins.

Materials and Methods: Thirty specimens from each composite resins: Filtek Z350 (3M ESPE), Filtek Z250 (3M ESPE) and Beautifil (Shofu Inc.) were fabricated. After polishing, specimens were immersed in coffee for 3 days. Specimens were then brushed twice a day for 1 week using Colgate Total (Colgate-Palmolive, control group), Colgate Advanced Whitening (Colgate-Palmolive, test group) and Darlie All Shiny White (Hawley & Hazel Chemical Co., test group). Colour changes (ΔE^*) were measured using Spectrophotometer at baseline, after coffee immersion and after brushing. The surface roughness before and after brushing was evaluated using Profilometer. Results were statistically analyzed using one way ANOVA and Tukey's test.

Results: There was significant difference in terms of colour changes for Filtek Z350, Filtek Z250 and Beautifil after coffee immersion ($P<0.05$). There was no significant difference in the ability to remove stains amongst the toothpastes investigated ($P>0.05$). The Darlie All Shiny White group exhibited significantly higher surface roughness compared to the control group ($P<0.05$).

Conclusions: Filtek Z350 was able to resist staining by coffee better than Filtek Z250 and Beautifil. The whitening toothpaste does not offer added advantage in terms of ability to remove stains compared to ordinary toothpaste. Darlie All Shiny White is more abrasive than Colgate Total.

Keywords: whitening toothpaste, stain, removal, surface, roughness

VARIATION IN PERIODONTAL MANAGEMENT AMONG GENERAL DENTAL PRACTITIONERS (GDPs) IN KUALA LUMPUR.

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Objective: To investigate the trends on the management of periodontal patients by general dental practitioners in Kuala Lumpur.

Methodology: A questionnaire was sent to all general dental practitioners in Kuala Lumpur. This questionnaire investigated the management of periodontal disease in general dental service which also included diagnosis and provision of periodontal treatment.

Results: Out of 420 questionnaires posted, 240 usable returns were achieved which gave a response rate 57 %. Majority of the respondents used visualisation (81.1%) as method of diagnosing periodontal disease and basic periodontal examination (BPE) was only performed by 68.5% of the respondents. 85.5% of the GDPs surveyed, were confident in managing periodontal cases which was mostly in the form of non-surgical treatment (95.5% scaling and polishing and 71.5 % root debridement). Surgical treatment was also performed by the GDPs (45.6 %). Patient refusal to treatment (55.2.%) was seen as the major barrier to disease management. 81.7% of the GDPs referred cases to mostly private specialist clinic (68.8%) and only 60% of GDPs maintained their periodontal patients after completion of treatment.

Conclusion: Variation in periodontal management exists among GDPs in Kuala Lumpur where visualisation and non-surgical treatment are the most common diagnosing method and treatment provided respectively. Routine usage of (BPE) should be emphasized in identifying the disease and assessing complexity of cases for better management of patients in general practices.

Keywords: periodontal, management, dental practitioners

PRIORITY POINTS AND WAITING PERIOD IN LOWER THIRD MOLAR SURGERY.

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The objective of this study was twofold, namely to evaluate the adherence to clinical practice guideline on lower third molar management to the (i) referral indications and (ii) knowledge of a dentist to a specific factors that have priority in the waiting list. The study included 120 consecutive patient referred for surgical removal of lower third molar under local anesthesia. Patients were categorized at acceptance of cases based on the indication for surgical removal. Priority scoring system based on demographic, seriousness of indication and disease progression were used to see the whether this has effect to the dentist decision on surgical waiting time. Waiting period for surgery was calculated and compared to the indication and priority point of each case.

Keywords: Priority points, waiting period, lower third molar

CLINICAL PARAMETERS OF PERIODONTAL ABSCESS: A CASE SERIES OF 14 ABSCESSES.

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According to the Consensus report (1999), periodontal abscess could be defined as a localised purulent infection within the tissue adjacent to the periodontal pocket that may lead to the destruction of periodontal ligaments and alveolar bone. The prevalence of periodontal abscesses in emergency dental clinics was found to be between 8%-14%.

Methods: The purpose of this study was to study the clinical features of periodontal abscesses seen in a specialist periodontal unit. The period of the study was from November 2006 to November 2007.

Results: There were 14 patients with equal distribution of gender. The mean age was 39.6 years. Twelve upper teeth (85.7%) were found to be involved as compared to two lower teeth (14.3%). There were more posterior teeth involved, a total of nine teeth (64.3%) as compared to five anterior teeth (35.7%). The mean pocket depth associated with the abscesses was found to be 7.4mm. There were ten buccal sites (71.4%) as compared to four palatal sites (28.6%). Average temperature of patients was 36.9° C. Only one patient was found to have cervical lymphadenopathy (7%). The teeth involved were found to be mostly mobile with mobility of grade I to III (71%). The mean Plaque Index was found to be 1.0 and the Gingival Index was found to be 0.9.

Conclusion: Posterior, upper teeth and buccal sites were found to be more affected by periodontal abscesses. The abscesses were found to be associated with deep pockets of more than 6 mm. Most of the patient were found to be afebrile and without any cervical lymphadenopathy.

Keywords: clinical, parameters, periodontal abcess

PREVALENCE OF HYPODONTIA IN REPAIRED CLEFT LIP AND PALATE PATIENTS IN KELANTAN.

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Purpose of the study: To determine the prevalence of hypodontia in repaired cleft lip and palate patients in Kelantan in the late mixed and early permanent dentition.

Materials and Methods: Forty-eight orthopanthomograms (OPG) of repaired cleft lip and palate patients at the age range of 7-14 and 48 OPGs of control group at the same age range were recruited from the Kelantan Combined Cleft Lip and Palate and Craniofacial Deformities Clinic (KCCCDC), and Hospital Universiti Malaysia (HUSM). All subjects of the study were children who had their lip and palate repaired. Syndromic cases of cleft lip and palate were excluded. Eruption pattern and dentition status of the involved subjects were assessed to determine the

incidence of hypodontia in both groups and set significant differences among them. Third molars were excluded from the assessment.

Results: Prevalence of congenitally absent teeth in the cleft group was found in 23 cases (47.9%), while in control group was found only in 2 cases (4.2%). The difference between both groups was statistically significant (P<0.001). Within the cleft group, the congenital absence of 2 teeth was found in 26.1% of cases, 3 teeth in 13% of cases, 4 teeth in 8.7% of cases, 5 teeth or more in 4.3% of cases.

Conclusion: Higher prevalence of congenitally absent teeth in the cleft group compared to the control group. Lack of tissues continuity is the major factor in hypodontia in cleft lip and palate patients.

Keywords: hypodontia, cleft lip and palate, prevalence

TOOTH WEAR: THE INFLUENCE OF DIETARY INTAKE AMONG 16-YEAR-OLD SCHOOL CHILDREN

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Introduction: Tooth wear describes the non-carious pathological loss of tooth tissue, which results from attrition, erosion and abrasion that occurs singly or in combination.

Objectives: To investigate dietary intake patterns in relation to tooth wear and to determine the relationship between tooth wear and dietary intake.

Methods: This case-control study involved 576 randomly selected 16-year-old school children from a secondary school in Kota Bharu town. The Smith and Knight tooth wear index (1984) was used. Data were analyzed using a simplified software program (Naing, 2004) based on the index to quantify pathological tooth wear. Controls were subjects with no pathological tooth wear indicated by zero scores on all tooth surfaces. Cases were subjects with pathological tooth wear having at least one surface scoring 1 for tooth wear. Data on the rate and frequency of consumption of drinks, foods and fruits were obtained from food frequency questions in the self-administered questionnaires.

Results: Over 95% of the children consumed carbonated drinks. Less than 5% of the children consumed it twice per day. The method of drinking was not significantly related to tooth wear but the duration of intake of carbonated drinks, orange juices, consumption of certain sport and carbonated drinks and intake of dairy products were significantly associated with tooth wear (simple logistic regression analysis with p value< 0.05).

Conclusion: Most children consumed carbonated drinks daily but at low frequency. There were significant relationship between particular drinks and fruits with the amount tooth wear. Further investigation of the erosive potential of these drinks and fruit is required.

Keywords: tooth wear, dietary patterns, schoold children, Smith and Knight index

EXPLOITATION ON THE USE OF POLYVINYL SILOXANE IMPRESSION MATERIAL: AN INVESTIGATION AMONG DENTAL STUDENT

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Aim of The Study: To asses the manipulation of polyvinyl siloxane impression material among dental student that may affect the result of the impression.

Materials and Methods: This study evaluated randomly selected dental student during the manipulation of polyvinyl siloxane impression material. Students were observed using self-evaluation assessment form that was designed to

evaluate the manipulation of PVS impression material among UKM dental students. Data collected were presented with SPSS analysis.

Results: A total of 86 students were evaluated during manipulation polyvinyl siloxane impression materials. 11 (12.79%) were taken by year 4, 55(63.95 %) by year 5 and 20(23.26%) by semester 3 student. From out of 86 impression surfaces that had been assessed, no perfect impression surface were found. 36 (41.86%) were unacceptable and have to be repeated. 32 (37.21%) were acceptable with minor error at non critical area. 14 (16.28%) were acceptable with minor error at critical area and 4 (4.65%) had major error at non critical area.

Conclusion: Overall, we had achieved the aim of the study to obtain better understanding of the reason that can lead to failure of the impression. Failure of the impression can happened in any of these stages starting from tray construction, mouth preparation, tray loading and removal of the polyvinyl siloxane impression material.

Keywords: polyvinyl siloxane impression material, exploitation, dental students, assessment

DENTAL SCREENING OF UNDERGRADUATES OF USIM

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Introduction: Dental screening is proven effective in diagnosing and reducing dental caries. A dental screening was organised in conjunction with the 5th Convocation Festival of USIM on 28th till 30th July 2007.

Objective: The aim of this screening programme was to determine the prevalence, severity and dental treatment needs for dental caries. Methods: A total of 118 undergraduate students of USIM (73 female and 45 male) aged between 18-24 years old were examined using disposable mouth mirrors and probes under portable dental light. Dental caries status was evaluated using the DMFX(T) Index.

Results: The prevalence of dental caries among the subjects was 79.5%. The mean DMFX(T) Index for this group of subjects was 3.3 with a mean of 1.7 decayed untreated teeth (DT),1.25 filled teeth (FT) and a mean of 0.3 missing and teeth indicated for extraction (M+X)T.

Conclusion: The data indicated that the prevalence of dental caries was relatively high. The study provides valuable information on the need for establishment of the student dental clinic at USIM.

Keywords: dental screening, undergraduate, dental caries, prevalence

THE SEM VIEW OF THE EROSION BY ACIDIC SOLUTIONS ON TOOTH-COLOURED DENTAL MATERIALS

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Objectives: Not many study been done to assess the effect of erosion on dental materials. This in vitro study was to assess the surface damage of tooth-coloured dental restorative materials by erosive acids.

Methods: Sixty eight anterior tooth crowns were restored with four types of restoration materials which are conventional GIC (Fuji IX and Ketac Fil +) , RMGIC (Fuji II LC) and composite resin (Z100). They were painted with nail varnish to leave a 2 mm border around the restorations before exposed to 0.113% HCl, 5.0% citric acid, 0.02% orthophosphoric acids or DDW for 2, 4, 8 and 16 hours. Half of the surfaces of sixteen porcelain sample (Ducera, Germany) were painted before similar acids exposure, weekly up to a month. The surface effect of erosion was analysed using Scanning Electron Microscope (SEM).

Results: The conventional GICs sustained severe erosion by the HCl and citric acid solutions. Minor effect seen on Fuji II and Z100 showed very stable. They are less affected by the phosphoric acids at the concentration tested. No effect seen on dental porcelain even after one month.

Conclusions: The conventional GIC materials could sustain severe damage if tooth exposed to high acidic environment or erosion. Composite resin and porcelain could survive better in this sort of environment. This study could help dentist to choose material for patient with erosion problems.

Keywords: SEM view, erosion, acidic solutions, tooth-coloured restorative materials

THE FLEXURAL STRENGHTS OF FIVE COMMERCIALLY AVAILABLE TOOTH-COLOURED RESTORATIVE MATERIALS

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Objective: To evaluate the flexural strengths of five commercially available tooth-coloured restorative materials : Alpha-Dent (composite resin, Dental Technologies Inc.), Solare Anterior (composite resin, GC), F2000 (polyacid-modified composite resin, 3M), Beautifil (giomer, Shofu) and Fuji II LC (resin-modified glass ionomer cement, GC] using the ISO 4049 specifications.

Materials and Method: Ten specimens of (25±0.2)mm x (2±0.1)mm x (2±0.1)mm from each material were prepared using a customized metal mould. After light polymerization, the specimens were stored in distilled water at 37ºC for 24 hours. The specimens were then subjected to flexural testing using an Instron Universal Testing Machine with a crosshead speed of 0.5mm min^{-1}. The flexural strengths were calculated from the maximum load exerted on the specimens. Data were analysed using one-way ANOVA and scheffe's post-hoc multiple comparison tests at a significance level of 0.05.

Results: The results showed that the mean flexural strengths of Beautifil, Solare Anterior and Alpha-Dent were above 80 MPa and those of F2000 and Fuji II LC were below 80 MPa. The results of one-way ANOVA and Scheffe's post-host tests demonstrated that Beautifil had significantly higher mean flexural strength compared to Fuji II LC, F2000 and Alpha-Dent ($P<0.05$). Both Solare Anterior and Alpha-Dent showed significantly higher mean flexural strengths than Fuji II LC and F2000 ($P<0.05$).

Conclusions: Under the experimental conditions, Beautifil (BF) showed significantly higher mean flexural strength compared to Fuji II LC (FL), F2000 (F2) and Alpha-Dent (AD) (BF>FL, F2, AD). The mean flexural strengths of Beautifil, Solare Anterior and Alpha-Dent were above the minimum requirement of ISO 4049 for occlusal fillings (80 MPa), therefore can be used in stress-bearing areas.

Keywords: flexural strengths, tooth-coloured restorative materials, stress-bearing areas

TOBACCO CESSATION PROGRAM: A BETTER OUTCOME IN PERIODONTAL THERAPY

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Objective: To critically review the significant of tobacco use cessation as part of initial treatment in treating periodontal disease or placing implants in patients who use tobacco.

Methods: Searches for eligible literature written in English or translated in English were performed via electronic databases such as Medline through HUKM library website. Keywords or phrases used were tobacco cessation, periodontal disease.

Results: There is a significant need also to address the issue of tobacco use cessation in the management of periodontitis. Approximately half of periodontitis cases have been attributed to either current or former smoking. Both cigar and cigarette smokers have significantly greater loss of bone height than nonsmokers, and there is a trend for pipe smokers to have more bone loss than nonsmokers. Refractory periodontitis has been shown to occur almost exclusively among current smokers and tobacco use cessation is recommended prior to periodontal treatment. Smoking may alter the quality of the flora. The oxygen tension in the periodontal pocket is lower in smokers, which may favor anaerobic species. Smokers were 3.1 times more likely to exhibit Actinobacillus actinomycetemcomitans

infection and 2.3 times more likely to be infected with Bacteroides forsythus than former or never smokers. There is strong evidence that smoking affects the innate and immune host response. Smoking impairs gingival blood flow, revascularisation of bone and soft tissues, which could have a major impact on wound healing, particularly as it relates to regenerative and periodontal and implants therapies.

Conclusion: Data from epidemiological, cross-sectional and case-control studies strongly suggest that tobacco use cessation is beneficial to patients following periodontal treatments for a better outcome.

Keywords: tobacco cessation, periodontal disease, implants

SELF-REPORTED KNOWLEDGE AND AWARENESS OF PERIODONTAL HEALTH AMONG PREGNANT WOMEN

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Introduction: Certain condition may have an effect of gingival status and may aggravate pre-existing disease especially in person with poor oral hygiene. Pregnancy is one of these conditions.

Objective: To assess the knowledge of pregnant women with regard to periodontal disease and its effect on pregnancy.

Materials and Method: A cross-sectional study was done. A self administered close ended questionnaire with an introductory letter of the study was distributed to 45 pregnant women at Obstetrics and Gynaecology Clinic, Hospital Kuala Lumpur. Data were entered and analyze using the SPSS version 12.0. Frequency and percentages were calculated for categorical variables. Results: Only 26.7% (n=12) know what plaque is, while only 40% (n=18) know the effect of plaque. Only 31.1% (n=14) know the causes of periodontal disease among pregnant women.

Conclusions: Majority of the pregnant women have limited knowledge and awareness about periodontal disease.

Keywords: periodontal health, pregnant, knowledge, awareness

JOB STRESS AMONG DENTAL SURGERY ASSISTANT IN FACULTY OF DENTISTRY, UNIVERSITI KEBANGSAAN MALAYSIA

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Introduction: Job stress is one of the public health problems and can have an impact on the quality of life. Objective: To study the prevalence of job stress among dental surgery assistants in Faculty of Dentistry, UKM and to determine the contributing risk factors.

Materials and Method: A cross-sectional study in sixty-three dental surgery assistants was conducted between May and June 2007. A self-administered Malay version of the validated Karasek's Job Content questionnaire with an introductory letter of the study was distributed. Data entry and analysis was done using the SPSS version 12.0. Means and standard deviations were calculated for continuous variables, frequency and percentages for categorical variables. Independent t-test was used to compare mean differences and chi-square test for categorical data between two groups (high strain and non-high strain) with the level of significance set at 0.05.

Results: A response rate of 79.4 percent consented for the study. The prevalence of high job strain in dental surgery assistant in Universiti Kebangsaan Malaysia was 26 percent (n=13). Active group was 30 percent (n=15), passive group was 8 percent (n=4) and low strain 34 percent (n=17).

Conclusions: A high proportion of dental surgery assistants in faculty of dentistry, Universiti Kebangsaan Malaysia experienced low job strain and job insecurity in the workplace posed significant risks of job strain in these workers.

Keywords: job stress, dental surgery assistant, quality of life

SUBMARINER'S EXPECTATION OF THE MALAYSIA ARMED FORCES DENTAL SERVICE

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Objective: To investigate the submariner's expectation of Malaysia Armed Forces Dental Service (MAFDS) in supporting their oral health.

Method: Eighty six Royal Malaysia Navy submariners training in France, who had undergone underwater training, were selected to participate in a qualitative study. Eight 'officers' and eight 'other rank' were then conveniently selected from those who had undergone two cycles (24 days) of underwater training to form an 'officer' and an 'other rank' group. Group discussions using the nominal group technique (NGT) were conducted to collect qualitative data to achieve the aim of the study.

Results: The officers prioritized "provision of quality services" while the 'other rank' felt that the "number of dental officers and other staff in the dental clinic" was most important. Both groups frequently mentioned that "regular check-ups are important" and "it is important to have a dental check-up before going underwater".

Conclusion: It is concluded that submariners have high expectations of the MAFDS in supporting their oral health. This is important when planning oral health services for submariners as it reflects a positive attitude towards the service.

Keywords: submariner, dental service, oral health, nominal group technique

WHAT DENTAL STUDENTS THINK ABOUT FIXED PROSTHODONTICS e-LEARNING

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Introduction: Nowadays, there is a worldwide trend in universities to utilize the benefits of the e-learning as a mechanism to facilitate improvements with respect to the quality of learning. This technology is becoming more stable and mature. However, there is still debate about the effectiveness of usage of e-learning technology in the universities.

Objective: The aim of this study is to evaluate the relative effectiveness of Fixed Prosthodontics e-Learning or FPeL. Materials and Methods: This was a retrospective analysis of questionnaire data, collected from fourth and fifth year dental undergraduates of Faculty of Dentistry UKM. For fixed prosthodontics (FP), all students had received a series of traditional classroom lectures, seminars, video demonstration, preclinical and Fixed Prosthodontics e-Learning or FPeL in semester 1 and 2 during 4th year. The questionnaire of 4 sections is administered after students completed fixed prosthodontics course.

Results: Questionnaires were returned by 136 students (80.9% response rate). Unfortunately, the response rate dropped 12.4% when only 115 students accessed and used the FPeL (68.5%). Majority of FPeL users felt PFeL beneficial to their learning process of FP. PFeL users recommend printable version with detailed explanations, illustrated with more photos and with addition of references.

Conclusion: PFeL assisted users in learning process of fixed prosthodontics.

Keywords: e-learning, fixed prosthodontics, quality of learning

ZINC OXIDE EUGENOL IMPRESSION MATERIAL AND ITS EXPLOITATION

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Introduction: Impression making is an area of restorative dentistry where much material abuse occurs. Many dental prostheses are constructed in the laboratory using casts produced from dental impressions. The fit of the prostheses depend on how well the cast replicates the oral tissues. While the accuracy of the dental cast depends on the accuracy of the impression in which it was cast.

Objective: Our purpose is to study the manipulation of zinc oxide eugenol impression material among UKM dental undergraduates. Methods: The participants comprised of UKM dental undergraduates (Year 3, 4 and 5) of 2007/2008 academic year. The selection of impression tray, variation of the mixing proportion of zinc oxide eugenol impression pastes and the manipulation during impression making using this material were evaluated. A standardized clinical evaluation guideline was prepared to ease the clinical observation.

Results: Only 37 students out of 239 students participated in this study resulting in a low response rate of 15.58%. Out of 37 students being evaluated, 24 (65%) students were not satisfied with their final impression. Most of the impressions were unacceptable [25 (68%)]. However, 12 (32%) students were able to get an acceptable final impression during the first attempt even though minor errors occurred in critical areas and non critical areas.

Conclusion: In UKM dental polyclinics, dental students experience a repeated impression making for each patient daily which is maybe due to lack of knowledge and skills resulting to incorrect clinical manipulation.

Keywords: zinc oxide eugenol, exploitation, impression making, dental undergraduates

UNDERSTANDING THE USAGE OF INDEX OF ORTHODONTIC TREATMENT NEED (IOTN) AMONG GENERAL DENTAL PRACTITIONERS (GDPS)

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Objectives: To assess the understanding and usage of Index of Orthodontic Treatment Need (IOTN) among general dental practitioners (GDPs) in Kuala Lumpur.

Methods: Sixty (N=60) GDPs from the government sector (41.7%, n=25), private sector (40%; n=24) and universities (18.3%; n=11) around Kuala Lumpur participated in this study. The study involved completing questionnaires survey form and analysis of four pairs of casts (W, X, Y, Z). The participants analysed the casts and recorded the IOTN grades for the dental health component (grade 1-5). Following that, they indicated whether the case should be referred for specialist care.

Result: Majority of the GDPs (80%; n=48) use IOTN to make treatment decision, in which 53.3% (n=32) of them indicated time constrain, difficulty in remembering the criteria of indices and/or application of the usage in clinical practice as the barriers to the usage in their practices. The percentage of agreement for the casts and IOTN index were W: IOTN 2 (63.3%; n= 38), X: IOTN 2 (48.3%; n=29), Y: IOTN 4 (65%; n=39) and Z: IOTN 5 (60%; n=36). However in nine instances, the GDPs indicated for specialist care when it is unnecessarily to.

Conclusions: Majority of the GDPs surveyed understood the usage of IOTN but there was variation in the application of usage in clinical practice.

Keywords: IOTN, GDP, survey

HANDLING AND MANIPULATION OF ALGINATE IMPRESSION MATERIAL

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Objective: To compare student's manipulation of alginate impression material with the gold standard based from literature review as retrieved from the literature review.

Materials and Methods: Handling and manipulation of alginate impression material during impression making by dental undergraduates (3rd, 4th and 5th year) was assessed and examined. Each step and stage of the impression making was recorded based on an evaluation form designed. Exclusion and inclusion criteria were formulated. Written consent was obtained from all the students prior to clinical evaluation.

Results: 73 alginate impression making were evaluated. Alginate adhesive was not used in 39 of the samples, while 47% of the impressions were made with exposed alginate powder. All 5th year student mixed powder to water, in contrast with all 3rd year students. Majority of the mixture outcome was creamy and grainy and in pink colour. Only some of the impressions were made based on the manufacturer's instructions. Most of the impressions were acceptable in 3rd and 5th year, while most impressions made by 4th year students were unacceptable.

Conclusions: Most of the alginate impressions were acceptable even if they did not follow the gold standard in manipulation of the alginate or manufacturer's instruction. Dental students have knowledge of the properties of the impression materials before their clinical sessions. This knowledge will help in the handling and manipulation of the material and subsequently, with practice leads to development of good clinical skills.

Keywords: alginate, impression making, handling, manipulation

CONDYLAR FRACTURES IN KOTA BHARU, KELANTAN: PATTERNS AND TREATMENT OUTCOMES

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Objectives: To evaluate the pattern of condylar fractures of the mandible, the management and factors that affects the treatment outcome in Kota Bharu, Kelantan.

Methods: This is a retrospective analysis of the records of 39 patients involved with condylar fracture of the mandible registered at Raja Perempuan Zainab II Hospital in Kelantan from year 2004 to 2006. We analyzed the age group, sex type and the aetiology of the fracture. We also investigate the characteristics of the condylar fracture using patients' Orthopantomography (laterality, location, types of fracture and associated fractures). The evaluations were mouth opening, occlusion and jaw deviation, which was 6 weeks after reduction.

Results: Condylar fracture of the mandible commonly involved the young males (67% in group age 11-20 and males comprised of 77%). The most common aetiology was motor vehicle accident (87%) followed by falls (10%). The pattern of condylar fractures showed that most patient had unilateral fracture (85%), 42% had fracture at subcondylar level followed by at neck level (34%). 85% of the patients had displacement / deviation/ dislocation and 5% showed no displacement at all. The popular management carried out was closed reduction with intermaxillary fixation (72%) followed by conservative treatment (26%). After 6 weeks review, there is no significant difference ($p>0.05$) in the treatment outcome between patients with good mandibular functions (51%) and patients with some mandibular dysfunctions (49%). Mandibular dysfunctions was frequently observed in female and patients with unilateral condylar fracture ($p<0.05$). The age, location, type of fracture, presence of associated fracture and treatment method did not affect the outcome.

Conclusions: Condylar fractures commonly involved the young males and the aetiology was mostly motor-vehicle-accidents. Most patients showed unilateral involvement, displacement fracture and at subcondylar level. Preferred management was closed reduction with intermaxillary fixation. At 6 weeks post treatment, there is no significant difference in the percentage of patients with good mandibular function and those with some mandibular dysfunctions. However, gender and laterality were important factors that affect the treatment outcomes.

Keywods: condylar fractures, pattern, management, treatment outcome

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MALAYSIAN DENTAL JOURNAL

CONTINUING PROFESSIONAL DEVELOPMENT QUIZ (CPD POINTS= 2)

Dear Colleagues,

In this issue of the *MDJ*, we continue with column of Continuing Professional Development Quiz whereby you will get two (2) CPD points by just trying out the quizzes. This is a self-administered test and is designed to help colleagues accumulate CPD points. Your feedback is greatly appreciated. These quiz questions were kindly provided by Prof AR Prabhakar, Prof Prabhakaran Nambiar, Dr. Maznah Mohd Nor, Prof Abdul Rashid Khan and Assoc. Prof. Seow Liang Lin.
Thank you.

Assoc. Prof. Seow Liang Lin,
Editor, Malaysian Dental Journal.

1. The composition of saliva secreted depends on:

   A. Duration and nature of stimulus
   B. Neurological control
   C. Differential gland contribution
   D. All of the above

2. Saliva saturated with calcium and phosphate inhibits caries by:

   A. Inhibiting carcinogenic bacteria
   B. In such environment remineralisation overrides demineralization
   C. Increasing fluoride content of saliva
   D. Decreasing plaque and calculus formation.

3. Alpha amylase catabolizes:

   A. Starch and glucose
   B. Sugars and proteins
   C. Starch and glycogen
   D. Glycogen and glucose

4. Calcium content is more in:

   A. Parotid saliva
   B. Submandibular saliva
   C. Mixed saliva
   D. Serous saliva

5. A multilocular lesion is a:

   A. Lesion containing tooth-like material
   B. Radiolucent lesion containing septa (Answer)
   C. Radiolucent lesion without septa
   D. Lesion without a sclerotic margin

6. Multilocular pattern of destruction can be associated with the following, except:

   A. Definitely a malignant lesion (Answer)
   B. Locally aggressive benign lesion
   C. May cause cortical expansion
   D. May present as soap bubble, honeycomb or tennis racket pattern

7. Main composition of ACP contains:

   A. Calcium chloride and Potassium phosphate.
   B. Potassium chloride and Calcium phosphate.
   C. Calcium carbinate and Potassium phosphate.
   D. Calcium hydroxide and Calcium phosphate.

8. Mechanism of action of ACP for desensitization effect is,

   A. Surface layer formation.
   B. Nerve desensitization.
   C. Dentinal tubule occlusion.
   D. Iontophoresis.

9. In the study on the evaluation of amorphous calcium phosphate (ACP) as an alternative liner, the depth of the cavity was extended to,

   A. 0.5 mm into the dentin.
   B. 1 mm into the dentin.
   C. 1 mm into the enamel.
   D. Dentinoenamel junction.

10. In the article on the psychological impacts of dental fluorosis, the students were asked about psychological impacts such as

    A. Anxiety
    B. Lack of confidence
    C. Their quality of life
    D. The difficulty of smiling and showing out their teeth

11. Which one from these statements is correct

    A. In both fluorosis and controls without fluorosis , about equal percentage of girls and boys dissatisfied with their teeth colour
    B. 16.1% of dental fluorosis children had psychological impact compared than 12.8% of non fluorosis students
    C. 16.1% of dental fluorosis students compared than 8.5% of their parents
    D. About twice as many fluorosis cases mentioned they were more worried about the appearance of their teeth than controls without fluorosis

12. The following factor contributes to the invasion and metastasis of carcinoma:

    A. changes in the characteristics of tumour cells
    B. extra-cellular stimulation
    C. altered cell to cell adhesion
    D. nature of carcinogens

13. In the case series analysis of oral cancer, what is the sequence of risk factors ranging from the highest to lowest:

    A. Cigarette smoking, alcohol consumption, betel quid chewing
    B. Cigarette smoking, betel quid chewing, alcohol consumption
    C. Betel quid chewing, cigarette smoking, alcohol consumption
    D. Alcohol consumption, betel quid chewing, cigarette smoking

14. Which pairing of type of composite is accurate?

    A. Filtek Z350- micro-fine hybrid composite resin, Solare P- micro-fine hybrid composite resin
    B. Filtek Z350- nano-filled composite resin, Solare P- micro-fine hybrid composite resin
    C. Filtek Z350- nano-filled composite resin, Solare P- nano-filled composite resin
    D. Filtek Z350- micro-fine hybrid composite resin, Solare P- nano-filled composite resin

15. The desirable physical properties of composite resins as posterior restorative materials include:

    (i) high flexural strength
    (ii) high luster
    (iii) high wear resistance
    (iv) high surface roughness

    A. i & ii
    B. i & iii
    C. i & iv
    D. i, ii & iii

ANSWERS:

1. D	2. B	3. C	4. B	5. B	6. A	7. A	8. C
9. A	10. D	11. D	12. C	13. C	14. B	15. B	

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MALAYSIAN DENTAL JOURNAL

Aim And Scope

The Malaysian Dental Journal covers all aspects of work in Dentistry and supporting aspects of Medicine. Interaction with other disciplines is encouraged. The contents of the journal will include invited editorials, original scientific articles, case reports, technical innovations. A section on back to the basics which will contain articles covering basic sciences, book reviews, product review from time to time, letter to the editors and calendar of events. The mission is to promote and elevate the quality of patient care and to promote the advancement of practice, education and scientific research in Malaysia.

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