

TRAUMATISED ANTERIOR TEETH IN A SAMPLE OF 12-13 YEAR-OLD MALAYSIAN SCHOOLCHILDREN.

Esa R, Razak IA. Traumatized anterior teeth in a sample of 12-13 year-old Malaysia Schoolchildren. *Annals Dent Univ Malaya* 1996; 3: 5-9

ABSTRACT

In Malaysia the School Dental Service (SDS) provides comprehensive dental treatment with the aim of rendering the child dentally fit before leaving primary school at 12 years. Hence the purpose of this study was to investigate 1) the prevalence and treatment needs of traumatised permanent incisors and 2) to assess their relationship to the degree of incisor overjet amongst 12-13 year-old schoolchildren. The sample comprised of 1519 schoolchildren attending 20 secondary government and government-aided schools in Klang district. There were 772 boys and 747 girls. The sampling procedure involved a multistage, clustered and stratified random sampling. The prevalence of traumatic injuries in permanent incisors was 2.6% which confirmed the results of a previous local study. Boys suffered more trauma than girls with a ratio of about 1.5:1. A majority (77.5%) of the children had one tooth affected. The most commonly affected teeth were the upper central incisors (91.8%) followed by the lower central incisors (4.1%). A high percentage (57.5%) of children with traumatised anterior teeth had increased overjet (>3mm). Almost all cases (93.9%) required two or more surface fillings. However the majority of affected children (56%) were satisfied with their appearance. It is concluded that traumatic dental injuries should be incorporated as part of the treatment plan for the SDS and appropriately managed soon after occurrence or not later than 12 years after which they leave the SDS. Future epidemiological studies should also give due emphasis to the relative importance of traumatised teeth in children.

Key Words: School dental service, traumatised teeth, overjet.

Introduction

The School Dental Service in Malaysia provides systematic and comprehensive preventive and curative services with the aim of rendering the child dentally fit before leaving primary school at 12 years. Children up to the age of 17 years are treated by the the New Zealand type dental nurses (1). However the scope of treatment is limited generally to dental health education, prophylaxis and simple fillings. Treatment for anterior tooth fractures which is beyond the scope of the dental nurse is referred to the government or private practitioners for further management.

Over the last two decades there had been a dramatic decline in caries prevalence in the developed countries. As a consequence of this, the problem of traumatised teeth has gain relative importance. There are numerous studies that have reported on the prevalence of traumatic injuries to permanent incisors in children which varies with age, sex and the population sample. They have also shown that the proportion of children with trauma ranges from 3-23% for children aged between 5-14 years (2-6). It was also reported that the prevalence reaches a peak at the age of 12 years (3). Furthermore, boys were found to suffer more traumatic injuries compared to girls (2,3,4,7). A number of studies also supported the existence of a relationship between increased maxillary

overjet and trauma to teeth (2,3,7). However in Malaysia limited studies have been conducted regarding this problem. Rusmah (4) reported that the prevalence of traumatised permanent anterior teeth was low (3.9%) for a highly selected population in the the age group of 7-12 years. Futhermore in the follow-up study done after 2 years, she highlighted that delayed treatment and management resulted in poorer prognosis for the traumatised tooth (8).

A series of epidemiological surveys to assess the oral health status of children have been conducted in Peninsular Malaysia (9-13). These survey data indicated that the target declared by World Health Organisation for Year 2000 concerning dental caries level (DMFT<3 at 12 years of age) will probably be achieved. However the prevalence and impact of trauma to permanent teeth have not been featured in these studies. Therefore there is an urgent need to address this issue in view of the decline in caries prevalence in schoolchildren and its implication on the School Dental Service.

Hence the purpose of this cross-sectional study was to investigate 1) the prevalence and treatment needs of traumatised permanent incisors and 2) to assess their relationship to the degree of incisor overjet amongst 12-13 year-old schoolchildren.

Rashidah Esa. BDS, DDPHRCS, MSc.
Ishak Abdul Razak. BDS, DDPHRCS, MSc,
PhD.

Department of Community Dentistry,
Faculty of Dentistry
University of Malaya
Kuala Lumpur
Malaysia.

Address for correspondence:
Dr. Rashidah Esa
Department of Community Dentistry
Faculty of Dentistry
University of Malaya
50603 Kuala Lumpur
Malaysia.

This study was supported by University of
Malaya, Grant No. PJP 226/90

Materials and method

This survey is part of a larger cross-sectional study conducted to assess the dental health status and oral health behaviours of schoolchildren. The sample comprised of 1519 schoolchildren (772 boys and 747 girls) aged between 12-13 years randomly selected from both urban and rural areas in Klang district. Both these areas and populations have been exposed to more than 10 years of water fluoridation and served by a well established school dental service providing curative, preventive and health education programmes. World Health Organization (WHO) clinical criteria and standardized clinical examination procedures employed for the Second International Collaborative study (ICS II) were applied (14).

The sampling procedure involved a multistage, clustered and stratified sampling. Twenty schools were selected from both areas according to geographic location and type of school. Eligible children were selected randomly from a list obtained from school records. Age eligibility requires that the subjects fall into the appropriate age domain at the time of sampling.

The examination procedure had included the use of a dental mouth mirror, a graded probe and all the children were examined by the main author under natural lighting. Any traumatic injuries to the tooth was defined as follows : A permanent tooth should be recorded 'trauma' if part of its substance is missing for reasons other than developmental defects or treated and untreated caries, provided the caries conditions are not present. Injuries recorded were limited to those in which clinical evidence of damage was evident. Any doubtful minimal incisal enamel loss were excluded on confirmation with the subjects. The treatment needs were recorded immediately after recording the tooth status. They were classified as no treatment need, one surface filling and two or more surface fillings.

The incisor overjet was measured using the graded probe from the labial surface of the most prominent maxillary incisor to the corresponding point of the mandibular incisor with the teeth in centric occlusion. Overjet was scored "normal" if it was less or equal to 3mm and "increased" if it was greater than 3mm.

Calibration exercises to assess intra-examiner reliability were conducted for tooth status and treatment needs prior to the survey and also during the survey. The total number of children re-examined was 75 which was 5% of the total sample. The percentage agreement for both exercises were found to be about 98%.

In addition to the clinical examination, a self-administered questionnaire survey was also conducted to elicit information regarding satisfaction with appearance of their teeth amongst the children with fractured anterior teeth.

The statistical analysis was done using the Epi-Info programme introduced by the WHO. The statistical differences for prevalence by sex and the prevalence of injury related to the degree of overjet was assessed by means of the chi-square test.

Results

Figure 1 shows that of the 1519 children examined, 40 (about 3%) had evidence of traumatic dental injury. Boys suffered more trauma than girls with a ratio of about 1.5:1 (Figure 2). However the difference was not statistically significant. Table 1 shows the distribution of children by the number of traumatised teeth. A high proportion (77.5%) of the children had one tooth affected by trauma. The rest had two teeth affected and none of the children had more than two traumatised teeth. The distribution of traumatised teeth is shown in Table 2. The most commonly affected teeth were the upper central incisors (91.8%) followed by the lower central incisors and lastly the upper and lower lateral incisors.

Table 3 shows the relationship between the prevalence of traumatic injury and the degree of incisor overjet. Of the 40 children with traumatised anterior teeth, 57.5% had increased overjet and 42.5% had normal incisal relationship. This difference was statistically significant ($p < 0.05$). Furthermore, children with increased overjet were 1.9 times or 90 per cent more prone to dental injury compared to children with normal incisor overjet (Odds ratio = 1.9).

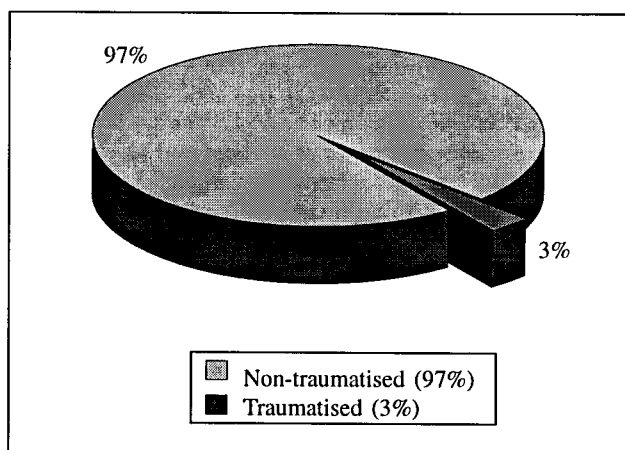


Figure 1: Prevalence of traumatised

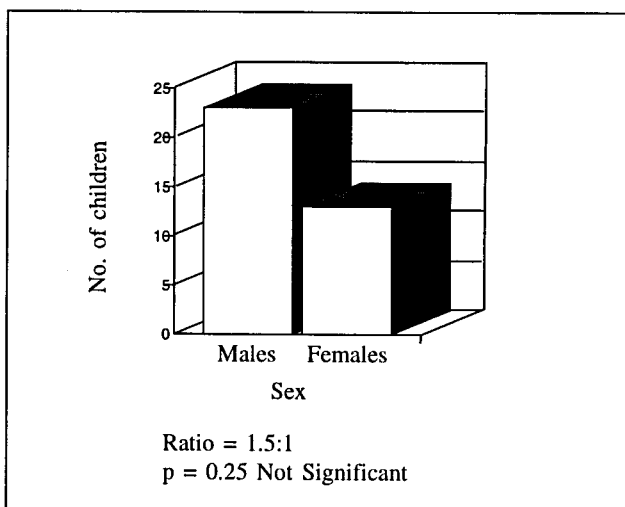


Figure 2: Distribution of children with traumatised anterior teeth according to sex

Table 1. Distribution of children by number of traumatised teeth

No. of traumatised teeth/child	One	Two
No. of children	31	9
Percentage	77.5	22.5

Table 2. Distribution of traumatised teeth

Teeth	11, 21	12, 22	31, 41	32, 42	Total
Number	45	1	2	1	49
Percentage	91.8	2.1	4.1	2.1	100

Table 3 . Distribution of children with and without dental injury according to incisor overjet.

	No. (%) with injury	No. (%) without injury
Normal incisor overjet	17 (42.5%)	869 (58.8%)
Increased incisor overjet (>3mm)	23 (57.5%)	610 (41.2%)
Total	40 (100%)	1479 (100%)

Chi-squared test, $p < 0.05$ - Significant

Table 4. Distribution of traumatised teeth according to treatment needs.

Treatment required	N	%
No treatment	2	4.1
Treatment need 1	1	2.0
Treatment need 2	46	93.9

* Treatment need 1 = One surface filling

* Treatment need 2 = Two or more surface fillings

The treatment needs for restoring the traumatised teeth are presented in Table 4. The majority of the cases (93.9%) required two or more surface fillings. This involves the repair of damage due to fracture involving loss of tissue. Only 4% of the teeth do not require any restoration.

Table 5 shows responses concerning satisfaction of the sample with their teeth. Of the children with anterior tooth fractures about 56% expressed satisfaction with the appearance of their teeth. About 36% indicated that they were not satisfied and only about 8% were not at all sat-

isfied with their teeth.

Discussion

The data reported from the earlier local study(4) must be interpreted with caution. Although a low prevalence was recorded as compared to other studies (Table 6), the sample was only selected from one school with age ranging from 7-12 years. Hence, the sample was not representative of the total children population. Furthermore, the element of bias had also been introduced as a result of it being an urban school. However, the present study

which employed a sampling procedure which truly reflected the whole population had confirmed the low prevalence as compared to studies done in other populations (Table 6).

It should be noted however that direct comparison with other studies cannot be made in view of the stringent clinical classification criteria used to assess fractured teeth. The present study had applied the criteria used for the Second International Collaborative study (ICS II). As any minimal questionable chipping of enamel was disregarded on confirmation with the subject, this would have resulted in underscoring of the percentage prevalence in the present study. However in the local study done by Rusmah (4) despite employing a histological classification she still recorded a lower prevalence compared to other studies using similar criteria.

The results of this study indicates that the majority of the children had only one tooth affected by trauma, a finding which is supported by other studies (4,15). Boys were found to be more prone to more anterior tooth fracture compared to girls. However the difference in prevalence between the boys and girls were not statistically significant in this study. Several other studies (2,3,4,7) have significantly found higher prevalence in boys. In contrast Garcia-Gordoy (5) and Garcia-Gordoy

Table 5. Percentage responses concerning satisfaction with their teeth.

Response	Number of children with fractured teeth	Percentage
Very much	6	15.4
They look okay	16	41.0
Not much	14	35.9
Not at all	3	7.7
Total	39	100

* 1 subject did not respond to this question.

Table 6: Comparison of studies of anterior tooth fracture

Study	Sample size	Age (years)	Trauma		Incisor overjet
			Prevalence(%)	Male:Female	
Gordoy (1981)	596	7-14	18.1	0.9 : 1	
Todd et. al. (1983)	971	12	23	1.8 :1	✓
Gordoy (1984)	1633	5 -14	10.0	1 : 1	
Rusmah (1986)	1175	7 -12	3.9	1.4 : 1	
Holland et. al (1988)	2340	12	16.4	1.7 : 1	✓
Otuyemi (1994)	1016	12	10.9	1.6 :1	✓
Present study	1519	12-13	2.6	1.5 :1	✓

et al (6) reported similar incidence between boys and girls.

A high proportion(92%) of the traumatised teeth involved the upper maxillary central incisors. Stockwell (15) in a study on trauma in Australian schoolchildren also found that 88% of all traumatised teeth were central incisors. Similarly, Garcia-Gordoy et al (6) and Ravn (16) contended that the teeth most commonly injured were the maxillary central incisors. The maxillary central incisors are often associated with increased overjet. This study also confirmed that significantly increased overjet is related to an increase incidence of trauma. This result is further strengthened by the high odds ratio obtained. This finding is consistent with other studies(2,3,7).

In spite of the low prevalence of traumatised anterior teeth encountered, the present study had shown that the nature of the problem is serious because almost all (94%) of the traumatised teeth required two or more surface fillings. Furthermore these fractures were left untreated

after leaving the primary school and are aesthetically unsatisfactory. It was also revealed that most children with fractured teeth are not bothered with their appearance. Since schools have been the traditional focus for community-based oral health education, it is timely that health education messages should be targeted towards personal grooming in terms of appearance in addition to cleanliness. An awareness in improving appearance would nurture schoolchildren into adolescent with higher self-esteem. Delayed treatment of affected teeth can also affect prognosis especially if the injury had damaged the pulp (8). This has an implication on the cost of treatment and also early tooth loss if restoration is not the easier choice.

With the advent of new restorative materials and techniques namely composite and acid-etch restorations the treatment of traumatised teeth in children becomes less complex especially those not involving the pulp.

Perhaps the Dental Division should widen the scope of treatment for the dental nurses by giving post-basic training in treating trauma in children's teeth. This would allow early intervention and subsequent follow-up. Difficult cases should still be referred to the dentists for further management. In this way not only is delay avoided but it is also more cost-effective for the nurses to treat simpler cases rather than referring to the dentist who is already heavily burdened with other duties. In addition traumatic dental injuries should be part of the treatment plan for the school dental service and treated appropriately by the proper personnel soon after occurrence or not later than 12 years after which they leave the primary school and when treatment coverage is not as comprehensive.

It is also recommended that future epidemiological surveys on schoolchildren should incorporate prevalence, predisposing causes and impact of trauma in view of the relative importance of the problem. If the etiological factors can be identified, proper preventive measures can be instituted.

Acknowledgement

The authors wished to express their gratitude to all the school principals and children who had participated in this study. The authors would also like to acknowledge the financial support from a research grant (PJP 226/90) provided by the University of Malaya.

REFERENCES

1. Dental Division, Ministry of Health Malaysia. Dental Services. Min. of Health 1991.
2. Otuyemi OD. Traumatic anterior dental injuries related to incisor overjet and lip competence in 12-year-old Nigerian children. *Int J of Paediatric Dent* 1994; 4:81-5.
3. Holland T, O'Mullane D, Clarkson J, O'Hickey S, Whelton H. Trauma to permanent teeth of children, aged 8, 12 and 15 years, in Ireland. *J of Paediatric Dentistry* 1988;4:13-6.
4. Rusmah M. Traumatized anterior teeth in children. A 24-month follow-up study. *Aust Dent J.* 1990;35(5):430-3.
5. Garcia-Godoy FM. Prevalence and distribution of traumatic injuries to the permanent teeth of Dominican children from private schools. *Community Dent Oral Epidemiol* 1984; 12:136-9.
6. Garcia-Godoy F, Sanchez R, Sanchez JR. Traumatic dental injuries in a sample of Dominican schoolchildren. *Community Dent Oral Epidemiol* 1981;9:193-7.
7. Todd JE, Dodd T. Children's dental Health in the U.K. 1983. Her Majesty's Stationery Office, London 1985:98-102.
8. Rusmah M. A study of traumatised permanent anterior teeth in a school population. *Sing Dent J* 1986;11(1):19-21.
9. Dental Division, Min. Of Health. Dental epidemiological survey of schoolchildren in West Malaysia 1970-71. *Dent. Div. Min. Of Health* 1972.
10. Dental Division, Min. Of Health. Dental epidemiological survey of schoolchildren in Sarawak 1980-81. *Dent. Div. Min. Of Health* 1982.
11. Dental Division, Min. Of Health. Dental epidemiological survey of schoolchildren in Sabah 1985. *Dent. Div. Min. Of Health* 1986.
12. Razak IA. Changes in pattern of dental caries of 12-year-old schoolchildren between 1979-1985. *Sing. Dent J* 1986;11:11-4.
13. Dental Division, Min. Of Health. Dental epidemiological survey of schoolchildren in Peninsular Malaysia 1988. *Dent. Div. Min. Of Health* 1989.
14. International Collaborative Study Of Oral Health Outcomes (ICS II), Document 2: Oral data collection instrument and examination criteria, WHO Geneva, January 1989.
15. Stockwell AJ. Incidence of dental trauma in the Western Australian School Dental Service. *Community Dent Oral Epidemiol* 1988;16:294-8.
16. Ravn JJ. Dental injuries in Copenhagen schoolchildren, school years 1967-1972. *Community Dent Oral Epidemiol* 1974;2:231-45.

THE EFFECT OF FILLER CONTENT AND STORAGE CONDITIONS ON LINEAR DIMENSIONAL CHANGE AND ACCURACY OF THE EXPERIMENTAL PRISMA AP.H COMPOSITE INLAY MATERIAL.

Razak AAA, Harrison A, Alani AH. The effect of filler content and storage conditions on linear dimensional change and accuracy of the experimental prisma AP.H composite inlay material. *Annal Dent Univ Malaya* 1996; 3: 11-17.

ABSTRACT

The effect of filler content and storage conditions such as drying, storing in water and thermal cycling on linear dimensional changes were investigated and evaluated. The dimensional accuracy studies were performed using a specific designed mould and a coordinate measuring machine. The findings gave support to the view that filler content is an important factor influencing the physical and mechanical properties of the composite inlay material. The higher filler content gave less polymerization shrinkage. The greatest linear shrinkage recorded was 0.79%. The average linear shrinkage (in air, water and thermal cycling) for 79% filler Prisma AP.H was 0.33%, for 65% filler Prisma AP.H was 0.35% and for 50% filler Prisma AP.H was 0.42%. Generally, dimensional changes were greatest when stored dry. This was followed by materials which were thermal cycled. The least dimensional change recorded was when the materials were stored in water.

Key Words: Dimensional accuracy, filler content, storage conditions.

INTRODUCTION

Dimensional accuracy of a composite inlay restoration can be considered as the degree of reproduction of the form of the restoration compared to the cavity preparation or that of the cast reproduced from the cavity preparation. The degree to which the dimensions of a material alter with time after polymerization is said to be a measure of its dimensional stability. All available commercial composites contract on polymerization. This is a direct function of the amount of inorganic components present in the system (1). This polymerization shrinkage creates stresses between the composite margins and the tooth cavity only if it is bonded. These stresses will strain the interfacial bond between the composite and the tooth, creating microgaps which can allow marginal leakage.

Composite resins are generally classified by the type of filler/fillers used since most use similar resin matrices. There has been a general concensus that when all other things are equal, the type of filler used in a composite resin most affects its clinical and handling properties (2).

Adding reinforcing filler to a resin matrix will serve two purposes: firstly, it modifies and usually improves the physical properties of the material such as rigidity, hardness, compressive strength and a lower value for the coefficient of thermal expansion (3); secondly, it reduces the polymerization contraction of the resultant composite if the filler occupies a significant proportion of the volume of the composite material. This is because these inorganic fillers do not undergo any contraction during the setting reaction.

The filler content of macrofilled composites is about 78 per cent by weight and 55 per cent by volume whereas

* Abdul Aziz Abdul Razak BDS, MSc, PhD.
Alan Harrison TD, BDS, PhD, FDSRCS. #
Adil Hamed Alani BDS, HDD, PhD.

Department of Conservative Dentistry
Faculty of Dentistry,
University of Malaya,
50603 Kuala Lumpur,
Malaysia.

Department of Oral and Dental Science
Bristol Dental School & Hospital
Lower Maudlin Street,
Bristol, BS1 2LY,
United Kingdom

* corresponding author

the filler loading of the microfilled composite resins varies from 30-60 per cent by weight (4). Although microfilled composite restorations can attain very smooth surfaces as compared to those macrofilled, the material has a number of disadvantages such as high coefficient of thermal expansion, polymerization shrinkage, water sorption, low tensile strength and is more liable to fatigue fracture (2).

The most recent advancement in filler distribution has been the blending of the intermediate size particles of macrofilled resin with that of pyrogenic silica producing composites called hybrids. Hybrids are actually macrofilled composites with the addition of a large amount (7-15 per cent) of microfillers, microfiller pellets or microfiller complexes. Pyrogenic silica has been added in order to reinforce the organic matrix and to reduce the difference in properties between the inorganic macrofillers and the unfilled organic matrix (5,6). Most current conventional composites are considered hybrids and have more than 80 per cent filler by weight or 60-70 per cent by volume.

The purpose of this study was to assess the linear dimensional changes of the composite material in the form of a cone with respect to changes in filler content and storage conditions.

MATERIALS AND METHOD

For the present study, experimental Prisma AP. H (DeTrey / Dentsply, Germany) of 3 different filler content (50%, 65%, and 79% by weight) was used.

The dimensional accuracy of the material was measured using conical-shaped composite specimens made