

## ORAL HEALTH STATUS AMONG EGYPTIAN PRESCHOOL CHILDREN

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### ABSTRACT

**Background:** Oral health is a part of general health, as oral cavity is considered a gateway of the body. Health of dentition and mouth play a major role in the children's life. **Aims:** this study aimed to obtain updated information of oral health statuses including dental caries situation, gingival condition and traumatic injuries in Egyptian preschool children.

**Methods:** This cross sectional study was carried out in Mansoura city on one thousand children with an age from 3 - 6 years who were attending private and public kindergarten. Children were examined for dental caries using dmft index of primary teeth. Gingival condition was assessed using PMA index (papillary, marginal, and attached gingiva). Upper and lower primary anterior teeth were assessed for signs of dental trauma: treated dental injury, enamel fracture, enamel/dentin fracture, pulp injury, and missing teeth due to trauma. Data were analyzed by Mann-Whitney, Kruskal-Wallis and Chi-square tests.

**Results:** the prevalence of dental caries in preschool children was 61.4%, while the mean dmft was  $(2.930 \pm 3.281)$  in males and  $(2.332 \pm 2.852)$  in females. However, prevalence of gingival inflammation was 7.4%, and dental trauma was 10%. Enamel fracture was the highest followed by dentin fracture and discoloration.

**Conclusion:** there was high prevalence of dental caries, while the prevalence of gingival inflammation and traumatic injury were low among Egyptian preschool children.

**KEYWORDS:** preschool children, dental caries, gingivitis, dental trauma, prevalence

### INTRODUCTION

Early childhood caries is a global public health problem. It was defined as 'the presence of caries in one or more primary teeth (cavitated or noncavitated) in a child 71 months of age or younger <sup>(1)</sup>.

Initial stages of early childhood caries appears as chalky white areas on the enamel close to the gum margin (enamel caries). As the process progresses, it involves the dentin to form visible cavity (dental caries), after that; it results in pulp involvement causing pain<sup>(1)</sup>. Several epidemiological studies

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estimated the prevalence of early childhood caries; it was found to be 6.8 - 12% in England and 11–53.1% in USA. Prevalence of dental caries was high in maxillary anterior teeth as reported from Africa and South-East Asia<sup>(2)</sup>. In India, early childhood prevalence among children between 8–48 months was reported as 44%<sup>(3)</sup>.

Periodontal diseases are serious infections that if left untreated can lead to tooth loss<sup>(4)</sup>. Gingivitis is the reversible condition of periodontal diseases, as with appropriate treatment and good home care the condition could be returned to the normal. Bacterial plaque is strongly associated with gingivitis. Whereas periodontitis is the irreversible stage that if left untreated, it progress to cause bone resorption. Untreated gingivitis can results in periodontitis. However; if gingivitis and periodontitis are diagnosed at an early stage it would minimize the chance of tooth loss<sup>(5,6)</sup>.

Epidemiological data showed a wide variation in the prevalence of dental injuries in children<sup>(7-10)</sup>. Dental trauma has severe sequelae as pain, loss of function, adverse effect on the developing occlusion and periapical manifestations<sup>(11,12)</sup>. Dental trauma of deciduous teeth can affect the underlying permanent teeth which results in hypoplasia, discoloration, and delay in eruption time, and tooth malformation<sup>(13)</sup>. Also traumatic dental injury affects the physical appearance, speech, and emotion of the child thus affecting his quality of life<sup>(14-15)</sup>. Although several studies have been carried out on TDIs (Traumatic Dental Injuries), however injuries of permanent had more attention than in primary teeth. This neglect of traumatic dental injury in primary teeth could be interpreted by the misunderstanding that primary teeth will exfoliate and replaced by other successors<sup>(16)</sup>. The prevalence of TDIs among preschool children was estimated in different countries to be ranged from 6.2% to 41.6%. In the Middle East, The prevalence of children with traumatized teeth was ranged from 11.1% to 33%<sup>(17-20)</sup>. No epidemiological studies have been conducted

in Mansoura city on the prevalence of TDI among preschool children; therefore, there was a need for studies to assess the prevalence of dental caries, gingival inflammation and traumatic injury among preschool children in Mansoura city.

## MATERIALS AND METHODS

### Study design and locality

A descriptive cross sectional study was carried out in Mansoura city which is the capital city of Dakahlia governorate in Egypt.

### Sample size

The target population was children aged 3 to 6 years attending public kindergarten in Mansoura city. A power calculation was used to determine the minimum sample size required to establish significance (at level of confidence 95% and using margin of error 5%). Using a prevalence figure of 33% for gingivitis, 15% for trauma, and 40% for caries, setting the confidence level at 95%, and using a margin of error of 5%, the minimum required samples were 300, 559, and 515 for trauma, caries and gingivitis respectively. However, the sample size was increased to include 1000 child.

### Sampling procedure

A two-stage random sampling procedure was performed. In the first stage, proportional simple random sampling was used to select kindergartens from different areas in Mansoura city. The second stage involved a random selection of children from each participating kindergarten.

### Study duration

This study took about four months from August to November 2016 to be performed.

### Inclusion and exclusion criteria

Healthy preschool children attending public schools were included in the study. While children with permanent anterior teeth or missing primary

anterior teeth due to exfoliation were excluded from the study. Also children with loss of anterior teeth structure because of caries, and uncooperative or highly anxious were excluded from the study.

### **Ethical approval**

Ethical approval was taken from the Ethical committee in the Faculty of Dentistry, Mansoura University. Then approval from the Ministry of Education in Dakahlia governorate was taken. Parent's informed consents were taken through formal letter sent to them explaining the study purpose in simple words before starting the study.

### **Collection of data**

The examination of children was done through two trained and calibrated examiners in the preschool medical room. They were examined under natural light using WHO Probe<sup>(21)</sup>, infection control guidelines were followed by using appropriate Personnel Protective Equipments (PPE) and disposable diagnostic sets.

### **Dental caries estimation**

Decayed, missed, and filled teeth were recorded according to World Health Organization (WHO)<sup>(21)</sup>. Dental caries experience was estimated by calculating dmft index for primary teeth through adding the three components (decayed, missed, and filled).

### **Gingival health estimation**

Gingival condition was measured through PMA (papillary, marginal, and attached) index<sup>(22)</sup> which is specially designed for measuring gingival health in children. Every area is taken score 0 (absence of inflammation) or 1 (presence of inflammation). Severity of gingivitis is recorded by adding scores from papillary, marginal, and attached areas.

### **Dental trauma estimation**

The primary upper and lower anterior teeth were examined for signs of dental trauma. Traumatic Den-

tal Injuries (TDIs) were recorded according to the epidemiological classification adopted by the World Health Organization (WHO) (1992) and modified by Andreasen et al<sup>(23)</sup>. TDIs classification included: treated dental injury, enamel fracture only, enamel/dentin fracture, pulp injury, and missing tooth due to trauma. Enamel/dentin fracture with pulp exposure, discoloration, and sinus tract without signs of caries are enlisted under pulp injury.

### **Statistical analysis**

Data were analyzed using Statistical Package for Social Science (SPSS)<sup>(25)</sup> version 16. Significance was set at  $P < 0.05$  (Significance level 95%). The prevalence and severity of oral diseases were compared between different groups using either Mann-Whitney, Kruskal-Wallis or Chi-square tests.

## **RESULTS**

Table (1) concluded that prevalence of dental caries was 61.4% among preschool children, this prevalence was higher among males (64.2%) than females (56.6%), and this difference was statistically significant ( $p=0.017$ ). Concerning gingivitis, its prevalence was 7.4% with higher prevalence in males (7.9%) than females (6.5), and this difference was not statistically significant ( $p=0.388$ ). For dental trauma, the prevalence was 10%, also males (11.9%) was higher than females (6.7%), and this difference was statistically significant ( $p=0.008\%$ ).

Table (2) showed that dmft was higher in males (2.930) than in females (2.332) with statistical significant difference between them ( $p=0.01$ ). Also the decayed component was the highest in comparison with other components (missed and filled) in both genders (2.930 in males, 2.332 in females).

Table (3) showed that, PMA was higher in males (0.169) than in females (0.138) with no significant difference between them ( $p=0.699$ ). The most affected area of the gingiva was interdental

papillae and males (0.079) was also higher affected than females (0.065) with no significant difference between them ( $p=0.388$ )

Table (4) showed that there were no cases with pulp injury in both genders, while in males enamel

fracture (0.064) was the highest between all forms of dental trauma, followed by enamel dentine fracture (0.032) and discoloration (0.024). Concerning females, treated traumatic injury (0.029) was the highest followed by discoloration (0.024) and enamel fracture (0.019).

TABLE (1) Prevalence of Oral Conditions among Preschool Children

Oral conditions		Absent N (%)	Present N (%)	P <sup>a</sup> -value
Dental caries	Male (n=629)	225 (35.8%)	404 (64.2%)	0.0001*
	Female (n=371)	161 (43.4%)	210 (56.6%)	
	Total (1000)	386(38.6%)	614(61.4%)	
	p-value	0.017		
Gingivitis	Male (n=629)	579 (92.1%)	50 (7.9%)	0.0001*
	Female (n=371)	347 (93.5%)	24 (6.5%)	
	Total (1000)	926 (92.6%)	74 (7.4%)	
	p-value	0.388		
Dental trauma	Male (n=629)	554 (88.1%)	75 (11.9%)	0.0001*
	Female (n=371)	346 (93.3%)	25 (6.7%)	
	Total (1000)	900 (90%)	100 (10%)	
	p-value	0.008		

*p*: comparison between male and female by Mann-Whitney test

*P<sup>a</sup>*: comparison between absence and presence of oral diseases by Mann-Whitney test

TABLE (2) Severity of dental caries among male and female preschool children

Gender	dmft (mean±SD)	Decayed teeth (mean±SD)	Missed teeth (mean ±SD)	Filled teeth (mean ±SD)
Male (n=629)	2.930±3.281	2.387±2.848	0.046±0.224	0.496±1.032
Female (n=371)	2.332±2.852	1.876±2.413	0.162±0.521	0.294±0.655
P – value	0.01	0.01	0.001	0.04

*P*: Comparison between male and female groups by Mann-Whitney test

TABLE (3) Gingival Inflammation among Male and Female Children

Gender	PMA (mean±SD)	Interdental papillae (mean±SD)	Marginal (mean±SD)	Attached (mean ±SD)
Male (n=629)	0.169±0.658	0.079±0.271	0.064±0.244	0.039±0.196
Female (n=371)	0.138±0.561	0.065±0.246	0.059±0.236	0.019±0.136
P – value	0.699	0.388	0.786	0.070

*P: Comparison between male and female groups by Mann-Whitney test*

TABLE (4) Severity of Dental Trauma among Male and Female Preschool Children

Gender	Treated injury (Mean±SD)	Enamel fracture (Mean±SD)	Enamel/dentin fracture (Mean ±SD)	Pulp injury (mean ±SD)	Discoloration (Mean ±SD)
Male (n=629)	0.008±0.089	0.064±0.244	0.032±0.176	0	0.024±0.153
Female (n=371)	0.029±0.169	0.019±0.136	0.014±0.115	0	0.024±0.154
P – value	0.008	0.001	0.073	1	0.967

*P: Comparison between male and female by Mann-Whitney test*

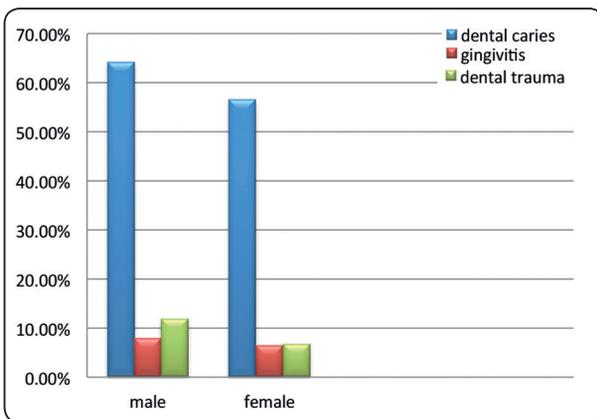


Fig. (1) Prevalence of Oral Conditions among Preschool Children

**DISCUSSION**

Dental caries is one of a dental public health problem affecting majority of the children in many countries (24, 25). This disease has social, physical, mental, and financial impact and the developing countries are the most affected (26). This study was conducted among preschool children aged 3-6 years

in Mansoura city as till date no epidemiological data has been found regarding this age group.

This study revealed high prevalence of dental caries (61.4%) among preschool children which was agreed with Abou El-Yazeed et al (27). This high prevalence could be attributed to lack of awareness among parents about the importance of regular oral hygiene practice. Also males showed higher prevalence of dental caries than females and this was coincided with another study carried out by Awad et al (28) in Cairo Governorate throughout the year of 2003-2004. On the other hand, the result of this study is not in agreement with a study conducted in Al Giza Governorate 1997 as females were more affected than males (29). The study result could be attributed to bad oral hygiene practices in male children and difficult behavior among them.

This study revealed mean dmft score of 2.930 and 2.332 for males and females respectively, and this was matched with the results of other studies performed at Hong Kong on 5-year-old children at

1997 and 2001, which resulted in 2.3 and 1.8 mean dmft scores for males and females respectively<sup>(30,31)</sup>. On the contrary, higher dmft values were found in studies conducted among preschool children of Glasgow (7.9)<sup>(32)</sup> and Riyadh (6.1)<sup>(33)</sup>. The difference in the caries prevalence and mean dmft may be due to different levels of preventive measures practiced in these places and due to different environmental, social and cultural factors prevalent in different places.

Gingivitis is an inflammatory process that begins at early childhood. The information about oral hygiene and gingival health status in a population is important as it helps in planning of preventive services as well as in determination of treatment needs. PMA index was used for evaluation of gingival condition, as this index is designed primarily for the examination of gingivitis in children<sup>(22)</sup>. Low prevalence of gingivitis was recorded in this study (7.4%). This result did not match with results of many studies performed in Srilanka (49.57%)<sup>(34)</sup>, Cambodia (46.2%)<sup>(35)</sup> and Cameroon (26.7%)<sup>(36)</sup>. On the other hand this result agreed with the results of a study performed in Belgium (3.4%)<sup>(6)</sup>. The low prevalence of gingivitis in this study could be interpreted by the fact that gingivitis begins to appear at the age of 5 years and reach its peak by puberty. This was confirmed by many epidemiological studies which indicated that gingivitis occurred at rate of 1-9% in early childhood population<sup>(35)</sup>. This study also revealed higher gingivitis scores among males than females. Variation in gingival index scores regarding gender has been noticed among Nigerian, Sudanese and Jordanian schoolchildren<sup>(37-39)</sup>. This could be attributed to the irregular rate and low efficiency of teeth cleaning with toothbrush by males than females as a result of the poor attention given to oral self-care by males<sup>(40)</sup>.

Glendor<sup>(41)</sup> declared that one-third of all preschool children were suffering from TDI involving primary dentition, which varied from country to another. In this study, the prevalence of

dental trauma was 10%, which was in accordance to many studies performed in Middle East<sup>(17-20)</sup>. Boys showed more prevalence of trauma than girls which was statistically significant<sup>(42, 43)</sup>. Also the age of 3 years was the peak of trauma, and this could be attributed to the poor motor coordination or inability of children at this age to know the potential risks<sup>(44)</sup>. Also other determinants like high cost of treatment, low standard of living, and lack of knowledge of parents play important roles<sup>(45, 46)</sup>.

## CONCLUSIONS

This study revealed high prevalence of dental caries, moderate prevalence of dental trauma and low prevalence of gingivitis among preschool children in Mansoura city, Egypt. Therefore health education programs and oral health counseling should be given to parents, teachers and children altogether with preventive programs to be conducted regularly at schools so that each child is benefitted. Mothers and teachers should give practical and emotional support to their children with regard to oral hygiene habits. In addition, responsible authorities should pay attention for preparing safe playing areas to the children and addressing the importance of dental trauma among preschool children.

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## REFERENCES:

1. Priyantha J P, Nishadhi TA, Meranthi PF, Tania DW, Nayomi R. Prevalence of dental caries among a cohort of preschool children living in Gampaha district, Sri Lanka: A descriptive cross sectional study. *BMC Oral Health* 2012;12:49.
2. Kumar VD. Early childhood caries – an insight. *J Int Oral Health* 2010; 2:1.

3. Nilza M, Ribeiro E, Manoel A, Ribeiro S. Breastfeeding and early childhood caries: a critical review. *J Pediatr* 2004; 80:5.
4. Shafer, Hine, Levy. *Shafer's text book of oral pathology* -2009, sixth edition.
5. Sayegh A, Dini EL, Holt RD, Bedi R. Oral health, sociodemographic factors, dietary and oral hygiene practices in Jordanian children. *J Dent*. 2005;33:379–88.
6. Leroy R, Jara A, Martens L, Declerck D. Oral hygiene and gingival health in Flemish preschool children. *Community Dent Health*. 2011;28:75–81.
7. Berti GO, Hesse D, Bonifacio CC, Raggio DP, Bonecker MJ. Epidemiological study of traumatic dental injuries in 5- to 6-year-old Brazilian children. *Braz Oral Res*. 2015;29:1–6.
8. ElKarmi RF, Hamdan MA, Rajab LD, Abu-Ghazaleh SB, Sonbol HN. Prevalence of traumatic dental injuries and associated factors among preschool children in Amman, Jordan. *Dent Traumatol*. 2015;31:487–92.
9. Bhayya DP, Shyagali TR. Traumatic injuries in the primary teeth of 4- to 6-year-old school children in gulbarga city, India. A prevalence study. *Oral Health Dent Manag*. 2013;12:17–23.
10. Lam R. Epidemiology and outcomes of traumatic dental injuries: A review of the literature. *Aust Dent J*. 2016;61: 4–20.
11. Cortes MI, Marcenés W, Sheiham A. Impact of traumatic injuries to the permanent teeth on the oral health-related quality of life in 12-14 year old children. *Community Dent Oral Epidemiol*. 2002;30:193–8.
12. Feliciano KM, de Franca Caldas A. A systematic review of the diagnostic classifications of traumatic dental injuries. *Dent Traumatol*. 2006; 22: 71–6.
13. Bijella MF, Yared FN, Bijella VT, Lopes ES. Occurrence of primary incisor traumatism in Brazilian children: A house-by-house survey. *ASDC J Dent Child*. 1990; 57:424–7.
14. Aldrigui JM, Jabbar NS, Bonecker M, Braga MM, Wanderley MT. Trends and associated factors in prevalence of dental trauma in Latin America and Caribbean: A systematic review and meta-analysis. *Community Dent Oral Epidemiol*. 2014;42:30–42.
15. Cardoso M, de Carvalho Rocha MJ. Traumatized primary teeth in children assisted at the Federal University of Santa Catarina, Brazil. *Dent Traumatol*. 2002;18:129–33.
16. Aldrigui J, Abanto J, Carvalho T, Mendes F, Wanderley M, Bonecker M et al. Impact of traumatic dental injuries and malocclusions on quality of life of young children. *Health Qual Life Outcomes* 2011;9:78.
17. Zadik D. A survey of traumatized primary anterior teeth in Jerusalem preschool children. *Community Dent Oral Epidemiol*. 1976;4:149–51.
18. Hasan A, Qudeimat M, Andersson L. Prevalence of traumatic dental injuries in preschool children in Kuwait: a screening study. *Dent Traumatol*. 2010;26:346–50.
19. Yagot KH, Nazhat NY, Kuder SA. Traumatic dental injuries in nursery schoolchildren from Baghdad, Iraq. *Community Dent Oral Epidemiol*. 1988;16:292–3.
20. Al-Majed I, Murray JJ, Maguire A. The prevalence of dental trauma in 5–6 and 12–14 year old boys in Riyadh, Saudi Arabia. *Dent Traumatol*. 2001;17:153–8.
21. World Health Organization. *Oral Health Surveys: Basic Methods*- 5<sup>th</sup> Edition. 2013;1-125.
22. Stephen HY, Klaus PL. Periodontal epidemiological indices for children and adolescents: gingival and periodontal health assessments. *The American Academy of Pedodontics*. 1981;3(4), 353-360.
23. Andreasen JO, Lauridsen E, Gerds TA, Ahrensburg SS. *Dental Trauma Guide: A source of evidence-based treatment guidelines for dental trauma*. *Dent Traumatol*. 2012;28:345–50.
24. Petersen PE: *The World Oral Health Report 2003: continuous improvement of oral health in the 21st century - the approach of the WHO Global Oral Health Programme*. *Community Dent Oral Epidemiol* 2003, 31:3–24.
25. Petersen PE, Lennon MA. Effective use of fluorides for the prevention of dental caries in the 21st century: the WHO approach. *Community Dent Oral Epidemiol*. 2004; 32:319–321.
26. Darshana B, Reddy CV, Sunitha S, Nandita K. Oral Health status of 3-6 year old children and their mother's oral health related knowledge, attitude and practices in Mysore City, India. *Asian Journal of Medical Sciences*. 2015;6 : 2.
27. Abou El-Yazeed M, Rashed M, El sayed M, Salah A. Dental Caries Prevalence among a group of Egyptian Nurseries Children. *Life Science J* .2011; 8: 1.
28. Awad SM. Early childhood caries prevalence, demographic characteristics and utilization of dental services provided

- among children attending pediatric dentistry department, Cairo University (2003-2004). Master Thesis in Pedodontics, Faculty of Oral and Dental Medicine, Cairo University. (2006).
29. Abd El-Monem Azza A. Prevalence of nursing caries among nurseries children in rural areas of Giza and their life style. Master Thesis in Pedodontics, Faculty of Oral and Dental Medicine Cairo University (1997).
  30. Chu CH, Fung DS, Lo EC. Dental caries status of preschool children in Hong Kong. *Br Dent J.* 1999;187:616–620.
  31. Department of Health: Oral Health Survey 2001. Hong Kong: Government Printer; 2002.
  32. Cameron FL, Weaver LT and Wright CM. Dietary and Social Characteristics of Children with Severe Tooth Decay. *SMJ* 2006; 51(3): 26-29.
  33. Wyne AH. Caries Prevalence, Severity, and Pattern in Preschool Children. *J Contemp Dent Pract.* 2008; 3: 24-31.
  34. Perera PJ, Abeyweera NT, Fernando MP, Warnakulasuriya TD, Ranathunga N. Prevalence of dental caries among a cohort of preschool children living in Gampaha district, Srilanka. *BMC Oral Health* 2012;12; 1-6
  35. Shidara EK, McGlothlin JD, Kobayashi S. A vicious cycle in the oral health status of schoolchildren in a primary school in rural Cambodia. *Int J Dent Hyg.* 2007;5:165-73
  36. Azodo CC, Agbor AM. Gingival health and oral hygiene practices of school children in the north west region of Cameroon. *BMC Res Notes* 2015; 8;385-91.
  37. Aranza OT, Pena IT. Prevalence of gingivitis in preschool age children living on the east side of Mexico city. 2011; 68: 19-23.
  38. Kolawole KA, Oziegbe EO, Bamise CT. Oral hygiene measures and the periodontal status of school children. *Int J Dent Hyg.* 2011; 9:143–8.
  39. El-Qaderi SS, Quteish T D. Dental plaque, caries prevalence and gingival conditions of 14-15 year old schoolchildren in Jerash District, Jordan. *Int J Dent Hyg.* 2006; 4:150–3.
  40. Farah HH, Ghandour IA. Periodontal health status of 12-year-old Sudanese schoolchildren and educational level of parents in Khartoum province. *Odontostomatol Trop.* 2009; 32:25–33.
  41. Glendor U. Epidemiology of traumatic dental injuries – a 12 year review of the literature. *Dent Traumatology* 2008; 24: 603–11.
  42. Granville-Garcia AF, Vieira IT, Siqueira MJ, de Menezes VA, Cavalcanti AL. Traumatic dental injuries and associated factors among Brazilian preschool children aged 1–5 years. *Acta Odontol Latinoam* 2010;23:47–52.
  43. Norton E, O’Connell AC. Traumatic dental injuries and their association with malocclusion in the primary dentition of Irish children. *Dent Traumatol* 2012;28:81-6.
  44. Flores MT, Holan G, Borum M, Andreasen JO. Injuries to the primary dentition. In: Andreasen JO, Andreasen FM, Andresson L, editors. Text Book and color atlas of traumatic injuries to the teeth, 4th edn, chapter 19. Oxford: Blackwell Munksgaard; 2007:516–41.
  45. Siqueira MB, Gomes MC, Oliveira AC, Martins CC, Granville-Garcia AF, Paiva SM. Predisposing factors for traumatic dental injury in primary teeth and seeking of post-trauma care. *Braz Dent J.* 2013;24:647–54.
  46. Malikaew P, Watt RG, Sheiham A. Prevalence and factors associated with traumatic dental injuries (TDI) to anterior teeth of 11-13 year old Thai children. *Community Dent Health.* 2006; 23: 222–7.