

Oral Hygiene, Caries Prevalence and Oral Health Knowledge among 12 to 15 Year Old Schoolchildren in Al Karak, Jordan

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ABSTRACT

Objectives: The aim of this study was to evaluate oral hygiene, gingival status and prevalence of dental caries among 12 to 15 year old schoolchildren in Al Karak governorate, Southern Jordan. Oral health knowledge among the study population was assessed through a questionnaire.

Methods: A cross sectional study was conducted among 730 pupils from the 12 to 15 year old age group. Of those there were 263 (36%) males and 467 (64%) females from sixth, seventh, eighth and ninth grades. All participants were examined for oral hygiene, gingival condition and dental caries experience, using the Silness and Loe Plaque Index (PI), Loe and Silness Gingival Index (GI), and Decayed (D), Missing (M) and Filled (F) teeth (DMFT) codes respectively. The examiner evaluated oral health knowledge among the study population through a special questionnaire designed for this purpose.

Results: Regarding oral hygiene, the mean PI of the total subjects was 1.33. With regard to gender variation, results showed that the mean PI for males was 1.38 but for females it was 1.30. The difference was statistically non-significant, ($p=0.126$). The mean GI of the total subjects was 1.40. For males it was 1.55 but for females it was 1.32. The difference was statistically significant ($p<0.001$). Regarding caries prevalence, 25.8 % of the study population were caries free. The mean DMFT index of the total subjects was 2.82, with a mean DMFT value of 2.62 for males and 2.91 for females. The difference was statistically non-significant ($p=0.110$). Regarding oral health knowledge, 55.2% of all study population knew that gingival bleeding means gingivitis, 35.5% of participants knew that brushing and flossing are used to prevent gingivitis, and only 28.5% of the sample knew the meaning of dental plaque.

Conclusions: Regarding oral hygiene, the results of this study showed that males had non-significant higher plaque index and significantly higher gingival index than females, but with regard to caries prevalence, females had non-significant higher DMFT scores than males. However, the values of these clinical scores were lower than those results previously reported from other places in Jordan. This study indicated that oral health awareness level among public schoolchildren in Jordan is still poor and needs to be improved. Long-term school based oral health education programme is highly recommended.

Key words: Caries prevalence, Gingival conditions, Oral health knowledge, Oral hygiene, Schoolchildren

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Introduction

Good oral hygiene is a basic factor for good oral health. Poor oral hygiene leads to dental plaque accumulation, which among other factors may lead to gingivitis, periodontitis and dental caries.^(1,2) Epidemiological data from Jordan regarding oral hygiene status and dental caries prevalence among schoolchildren mainly described the oral hygiene status of schoolchildren in Northern Jordan, whether in Irbid⁽³⁻⁶⁾ or Jerash governorates.⁽⁷⁾ For example, these studies showed that dental caries experience, as measured by Decayed (D), Missing (M), and Filled (F) teeth (DMFT) index.⁽⁸⁾ was found to be between 3 and 5 for the 12-16 year old schoolchildren age group.^(3-7,9) These values are relatively high as compared with the declining DMFT values in most industrialized countries.⁽¹⁰⁻¹¹⁾ A study about oral health trends in Jordanian schoolchildren⁽⁵⁾ concluded that oral hygiene, gingival conditions and dental caries have improved since 1993. A recent study of the prevalence of dental caries experience in 12-13 year old Jordanian students in Irbid showed that the mean DMFT index was 2.51.⁽¹²⁾ None of the previous studies were related to oral hygiene and dental caries in schoolchildren in Al Karak governorate.⁽¹³⁾ Therefore, there is a shortage of this necessary information. Collecting and analyzing epidemiological data regarding prevalence of caries and oral hygiene status is important. These epidemiological data can be used to help in reducing the prevalence of these diseases, by giving data to public health administrations to plan their future preventive oral health programs and developing dental services. Also, such data can be used to compare the results of future studies with baseline data obtained here and to monitor oral health changes. Another important aim in this work was to assess oral health knowledge among schoolchildren. Assessing oral health knowledge and improving it among schoolchildren, will lead to improving gingival conditions and reduce dental caries among them, because schools are a commonly used setting for dental health education, health promotion and intervention with preventive agents.⁽¹⁴⁾

The aims of the present study were to:

- 1- Evaluate oral hygiene status

- 2- Evaluate the gingival condition
- 3- Assess the prevalence of dental caries and
- 4- Assess oral health knowledge among 12-15 year old schoolchildren in Al Karak, Jordan.

Methods

Prior to commencing the study, ethical approval by the Human Research Ethics Committee at the Royal Medical Services was obtained. Approval of the directorate of education in Karak governorate was obtained. In this study, we included 3 male and 4 female public schools attending the sixth, seventh, eighth and ninth grade classes (12-15 year old pupils). The subjects were examined for dental and periodontal health status by one examiner during the period from February to May 2009. A letter was sent to the children's parents informing them of the study and asking for their consent. Parents' approval and participant's consents were obtained for 730 students. Of those, there were 263 (36%) males and 467 (64%) females.

The children were examined for oral hygiene status, gingival conditions and dental caries while seated on a chair beside the classroom's windows utilizing day light and room artificial light.⁽⁷⁾ Oral hygiene was evaluated by examining the dental plaque present on the inner and outer aspects of the six index teeth, using the criteria of the Plaque Index of Silness and L  e.⁽¹⁵⁾ The six indexed teeth are: upper right first molar, upper right lateral incisor, upper left first premolar, the lower right first premolar, the lower left lateral incisor and first molar. Missing teeth are not substituted. The gingival condition was determined for the same teeth using the criteria of the Gingival Index of L  e and Silness.⁽¹⁶⁾ Dental caries was diagnosed by visual examination using dental mirror and probe utilizing the criteria recommended by the World Health Organisation.⁽⁸⁾ One examiner did the clinical examination which took place in the classroom. No radiographs were taken. Examiner reliability was tested by duplicate examination for 20 subjects for plaque, gingival and DMFT indices, which revealed a 90% of same readings of plaque and gingival indices, and 95% for DMFT index among the 20 duplicate schoolchildren.

Table I. Means (M) and standard deviations (SD) of Plaque Index and Gingival Index scores for all subjects and among males and females of the study population (n=730)

Variables	All subjects	Males	Females	p-value*
Plaque index (M±SD)	1.33±0.65	1.38±0.55	1.30±0.70	0.126
Gingival index (M±SD)	1.40±0.70	1.55±0.67	1.32±0.69	<0.001

*Independent-Samples T Test

Table II. Means and standard deviations of decayed (D), missing (M) and filled (F) teeth (DMFT) scores of all subjects and for males and females of the study population (n=730)

Variables	Decayed teeth (D)	Missing teeth (M)	Filled teeth (F)	DMFT±SD*
All subjects	1.98	0.26	0.58	2.82±1.96
Male	2.04	0.24	0.34	2.62±1.69
Female	1.93	0.26	0.72	2.91±2.09
p-value (ANOVA)	0.377	0.768	<0.001	0.110

*Standard Deviation

Table III. Frequency and percentages of answered oral health knowledge questions by gender

Knowledge questions	All subjects (n=730)	Male (n= 263)	Female (n=467)
<i>1-Gingival bleeding means:</i>			
Healthy gingiva	32 (4.4)	10 (3.8)	22 (4.7)
Gingivitis	403 (55.2)	126 (47.9)	277 (59.3)
Gingival recession	95 (13)	52 (19.8)	43 (9.2)
I don't know	200 (27.4)	75 (28.5)	125 (26.8)
<i>2-How to prevent gingivitis?</i>			
Soft food	54 (7.4)	21 (8.0)	33 (7.1)
Vitamin C	225 (30.8)	63 (24.0)	162 (34.7)
Brushing and flossing	259 (35.5)	108 (41.1)	151 (32.3)
Don't know	192 (26.3)	71 (27.0)	121 (25.9)
<i>3-What does plaque mean?</i>			
Soft deposits on teeth	208 (28.5)	92 (35.0)	116 (24.8)
Hard deposits on teeth	78 (10.7)	29 (11.0)	49 (10.5)
Tooth discoloration	73 (10.0)	31 (11.8)	42 (9.0)
Don't know	371 (50.8)	111 (42.2)	260 (55.7)

*The correct answer is given in bold.

Following examination, the second part of the study consisted of filling a questionnaire. This questionnaire included questions regarding oral health knowledge. Filling of the questionnaire was carried out in the classroom by the pupils themselves under the direct supervision of researchers and the teacher of the 12-15 year old schoolchildren. The questions were in simple Arabic language. All questions were of multiple choice type. The students were asked to make a tick or circle around the answer. Questions were adopted from Peterson *et al.*⁽¹⁷⁾ and Stenberge *et al.*⁽¹⁸⁾ Only three questions regarding oral health knowledge were used in this study. These questions were also used in other studies assessing oral health knowledge among schoolchildren in Northern Jordan.^(19, 20)

Statistical Analysis

The data were analyzed using computerized Statistical Package for Social Sciences 15 for windows (SPSS Inc, Chicago, IL, USA).

Means, standard deviation and frequency distribution were calculated. An independent samples T-test was used to compare the means of two variables, while ANOVA test was used to compare the means of multiple variables. The level of statistical significance was chosen at $p < 0.05$.

Results

The total number of participants in this study was 730, of those 263 (36%) were males and 467 (64%) were females. The results of the Mean Plaque and Gingival scores for the total subjects

and for both males and females are given in Table I. The results showed that the mean plaque index of the total subjects was 1.33. Regarding gender variations, the mean plaque index of the males was 1.38 but for females it was 1.30. The difference was statistically non-significant, ($p=0.126$). Also Table I showed that the mean gingival index of the total subjects was 1.40. For males it was 1.55 but for females it was 1.32. The difference was statistically significant ($p<0.001$).

Regarding caries prevalence among the study population, 25.8% were caries free and a range of DMFT between 0 and 10 was scored. The results of the Means and standard deviations of decayed (D), missing (M) and filled (F) teeth (DMFT) of the total subjects and for both sexes are given in Table II. The mean DMFT index of the total subjects was 2.82, with a mean of 1.98 for the D-component, 0.26 for the M-component, and 0.58 for the F-component. With regard to gender variation in caries prevalence, results showed that the mean DMFT value for males was 2.62 but for females it was 2.91. The difference was statistically non-significant ($p=0.110$).

The D-component was higher in males while the F-component was significantly higher in females. According to Table III which demonstrate frequency and percentages of answered oral health knowledge questions, it's observed that 55.2% of all study population knew that gingival bleeding means gingivitis; 35.5% of study group knew that brushing and flossing are used to prevent gingivitis; 28.5% of the sample knew the meaning of dental plaque, while the rest did not know or reported wrong answers.

Discussion

Most epidemiological oral health surveys conducted in schoolchildren in Jordan focused on oral hygiene status and prevalence of dental caries among schoolchildren in the northern governorates or the capital Amman. None of these studies were related to schoolchildren in Al Karak governorate.

This study revealed that the mean plaque index for the total subjects was 1.33. Regarding gender variations, Plaque Index for males was 1.38 but for females it was 1.30. The difference was statistically non-significant, ($p=0.126$). The mean gingival index of the total subjects was 1.40. For males it was 1.55 but for females it was 1.32. The

difference was statistically significant ($p<0.001$). This study reveals a mean plaque index of 1.33 for total subjects. This finding disagreed with earlier studies in 13-14 year old Northern Jordanian schoolchildren that reported plaque index scores were 1.82 and 1.63 during 1993 and 1999 respectively.⁽⁵⁾ Furthermore, gingival index scores reported in the same study⁽⁵⁾ were 1.89 in 1993 and 1.67 in 1999 which were also higher than the figure found in this study which was 1.40. A more recent study took place in 2006 for 14-15 year old schoolchildren in Jerash district and reported a plaque index score of 1.46 and gingival index score of 1.56. But these results are still higher than results obtained in this study. Regarding gender variations, these findings agreed with a previous study⁽⁵⁾ that described trends in oral health in Jordanian male and female schoolchildren, where it showed that boys had higher plaque and gingival scores than girls within this age group. This gender difference with regard to plaque and gingival scores may be related to the patterns of personal oral hygiene, hormonal changes occurring during puberty and grooming effect at this age.⁽⁷⁾ Another study found that girls scored more favourably on behavioural measures, showed more interest in oral health, and perceived their own oral health to be good to a higher degree than did boys.⁽²¹⁾

With regard to hormonal changes occurring during puberty that affect the gingiva, several cross-sectional studies have demonstrated an increase in gingival inflammation without an accompanying increase in plaque levels during puberty.⁽²²⁾ This gingivitis manifests as marginal and interdental gingival enlargement found primarily on the facial surfaces, with the lingual surfaces remaining relatively unaltered. This finding was included in the 1999 International Workshop Classification for Periodontal Diseases, with a Section specific to endogenous female sex steroid hormones as puberty associated gingivitis.⁽²³⁾

This study revealed a direct relationship between plaque index and gingival index scores. This finding agreed with the general view that gingivitis is related to plaque deposits. A study of oral health trends in Jordanian schoolchildren.⁽⁵⁾ concluded that oral hygiene, gingival conditions and dental caries have improved since 1993. This finding agreed with other studies from developed

countries that showed decline in the occurrence of dental caries, gingivitis and an improvement in oral hygiene.^(11,24)

This study revealed that the mean DMFT index of the total subjects was 2.82, with a mean of 1.98 for the D-component, 0.26 for the M-component, and 0.58 for the F- component. With regard to gender variation in caries prevalence, results showed that the mean DMFT value for males was 2.62 but for females it was 2.91. The difference was statistically non-significant ($p=0.110$).

The DMFT value for the total subjects in this study was 2.82. This finding disagreed with other studies that reported a DMFT score of 3.26⁽⁵⁾ in 12-15 year old Northern Jordanian schoolchildren. Also the caries prevalence in this study was slightly less than results obtained from studies in other Arab countries.⁽²⁵⁻²⁷⁾ This lower caries prevalence among this study group may be due to better oral hygiene habits, better dietary habits and widespread use of fluoridated toothpastes than other places in Jordan. Also in this study radiographs were not taken, which will underestimate caries prevalence for the presence of inter-proximal caries. However there is no obvious cause that can explain results disparities between the results of this study and with other places in Jordan or other countries in the world. Regarding gender variations in caries prevalence, this study showed that caries experience as measured by DMFT was more among females than males, and mostly due to the F-component. This finding agreed with previous study from Northern Jordan.⁽⁵⁾ This may be due to better awareness of oral health among females, or may be due to better use for governmental dental services.

According to Table III the frequency and percentages of answered questions regarding oral hygiene knowledge among study population was poor. Oral health knowledge is part of the more general term, that is, oral health attitude. According to Myers⁽²⁸⁾ a person's attitude is defined by cognitive, affective, and behavioural components. The cognitive component represents the person's beliefs and knowledge, the affective component the strength of their beliefs, and the behavioural component their readiness to act to a certain object or situation. In this study the

percentages of schoolchildren who correctly answered the first two questions was less than the percent from other study of Northern schoolchildren.⁽¹⁹⁾ but regarding the last question which was about definition of dental plaque, the percentage was higher.

This study showed that the highest percent of correctly answered questions was that gingival bleeding reflects gingivitis. This finding agreed with other studies from Jordan.^(20,29) There was an obvious variation in the percentage of correctly answered questions according to the gender of the study population. This variation agreed with other studies from the world that found that gender is an important factor regarding oral health knowledge.^(25,30)

Conclusions

Regarding oral hygiene, the results of this study showed that males had non-significant higher plaque index and significantly higher gingival index than females, but with regards to caries prevalence, females had non-significant higher DMFT scores than males. However, the values of these clinical scores were lower than those results previously reported from other places in Jordan.

Also this study indicated that oral health awareness level among public schoolchildren in Jordan is still poor and needs to be improved. A long term school based oral health education programme is highly recommended.

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