

Oral health practices and dietary habits of intermediate school children in Riyadh, Saudi Arabia

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الغرض من هذه الدراسة هو تقييم العادات الصحية الفموية و العادات الغذائية لدى طلاب المدارس المتوسطة في الرياض، المملكة العربية السعودية، بالإضافة إلى التحقق من العلاقة بين هذه العادات والعمر، الجنس، نوع المدرسة والمستوى التعليمي للام. تم عشوائياً اختيار مدرستين، إحداهما للبنات والأخرى للبنين، من المناطق السكنية الخمس في منطقة الرياض بالإضافة إلى مدرستين خاصتين بحيث أصبح المجموع الكلي للمدارس ١٢ مدرسة. تم جمع المعلومات من الطلبة عن طريق استخدام استبانة ذاتية متعددة الاختيارات. اكتمل الاستبانة من ١١٥٠ طالبا وطالبة. أظهرت نتائج الدراسة أن حوالي ٦٥٪ من الطلبة ينظفون أسنانهم مرة واحدة على الأقل يوميا. فقط ١٠٪ من الطلبة استخدموا الخيط السني. أكثر من ٦٥٪ من الطلبة استهلكوا الأغذية المحلاة مرة واحدة على الأقل يوميا. نتائج الدراسة أظهرت أن الفتيات يقمن بتنظيف أسنانهم أكثر من الفتيان ($P < 0.0001$). طلاب المدارس الخاصة قاموا بتطبيق العادات الصحية الفموية أكثر من طلاب المدارس الحكومية ($P < 0.0001$). كان لعمر الطلبة علاقة عكسية مع العادات الصحية الفموية ($P < 0.0001$) بينما وجد أن المستوى التعليمي للام كان لها علاقة طردية مع العادات الصحية الفموية و علاقة عكسية مع العادات الغذائية ($P < 0.0001$). وجد أن استهلاك المواد الغذائية المحلاة كان عاليا في العينة المدروسة وظهر احتلافا ضمن مجموعات الأعمار المختلفة، بين الجنسين و نوع المدرسة. نستنتج من هذه الدراسة أن هناك انخفاضا عاما في الاهتمام بالصحة الفموية والوقاية ضمن طلاب المدارس المتوسطة في الرياض وهذا قد يمثل تحديا كبيرا لصحة الفم.

The objective of this study was to evaluate the oral health practices and dietary habits of intermediate school children in Riyadh, Saudi Arabia, and to assess the relationship of these habits to age, gender, type of school and educational level of the mothers. Two intermediate public schools, one for boys and one for girls, were selected randomly from each of the five educational zones of Riyadh, in addition to two private schools giving a total of twelve schools. Data were collected from the students using a multiple-choice self-administered questionnaire. A total of 1150 students completed the questionnaire. Data analysis showed that nearly 65% of the students cleaned their teeth at least once a day. Only 5.1% used the dental floss. Over 65% of the students consumed sweetened products at least once a day. Using Chi-square test, females were found to practice oral hygiene habits more than their male counterparts ($P < 0.0001$). Private schools students practiced oral health care behavior more than public school students ($P < 0.0001$). Age was inversely related to the oral hygiene habits ($P < 0.0001$). The mothers' educational level was found to be directly related to the oral hygiene habits and inversely related to the dietary habits ($P < 0.0001$). The consumption of sweetened items was found to be quite high among the surveyed sample and differed among the different age groups, gender and type of school. It can be concluded from this study that there was a generally low interest in dental health care and preventive measures among intermediate school children in Riyadh and that this may constitute a major challenge to oral health.

Introduction

The prevalence of dental caries has shown a dramatic decline over the past decades among children and adolescents in developed countries.¹⁻³ This reduction may be attributed to several factors such as improved oral hygiene practices, effective use of fluorides, modification of dietary habits and consumption of sweets as well as the establishment of school-based preventive oral care programs.¹ In contrast, increasing levels of dental caries have been reported in some developing countries particularly those countries which have not established any preventive dental programs.⁴⁻⁵

Dental caries occurs as a result of a complex interplay of social, cultural, behavioral, dietary and biological risk factors.⁶ Of the oral health behaviors, regular tooth brushing is the most important together with the use of dental floss to clean interproximal surfaces.

During the adolescent years, young individuals learn and acquire health related attitudes and behaviors that continue with them into their adulthood.⁷ It was found that relatively stable patterns of tooth brushing and dietary behaviors are usually established during the childhood and adolescence period.^{7,8}

A study evaluating the oral health behavior of Chinese school children found that 22% of the 12-year-old group brushed at least twice a day, 62% brushed once a day and 16% never brushed or brushed less frequently.⁹

Russel *et al.*¹⁰ in Wichita, Kansas, found that almost all the sixth grade students examined reported brushing their teeth once or twice daily with the use of toothpaste. Also, over half of the students reported using the dental floss once or more a week.

Walsh,¹¹ in a study of 12- and 14-year-old students in San Francisco, reported that about 96% of the respondents used the toothbrush at least once a day, and 75% claimed to use the dental floss at least once a day.

In a survey conducted on Finnish adolescents, about half of the girls and one quarter of the boys reported brushing their teeth more than once a day and this proportion increased with age.¹²

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Rise *et al.*¹³ assessed the dental behaviors of Finnish, Norwegian and Swedish school children and found that a higher percentage of girls brushed their teeth more than once a day compared to boys. Among the girls, the proportion increased with increasing age, whereas in boys, it remained stable across the age groups. With regard to the use of dental floss, there was a decrease in frequencies of daily use as the age increases except for the Swedish adolescents.

In a survey describing the oral hygiene habits of 11-year-old school children in 22 European countries and Canada, tooth brushing was reported to be less frequent among boys than girls in all countries except France.¹⁴ Also, the use of the dental floss was rare and in general, it was less frequent among boys than girls.

In a study in Madina, Saudi Arabia, 61% of the respondents aged 12 years reported brushing their teeth at least once a day and 16% used the Miswak chewing stick.¹⁵

Several studies have shown that sugar consumption and the consumption patterns are essential factors in the etiology of dental caries.¹⁶⁻¹⁹ Honkala²⁰ reported that nearly 50% of the surveyed Finnish adolescents consumed sugary products as pastries and cookies daily. However, the use of sweets decreased with age and there was no significant difference between boys and girls. With regard to the consumption of soft drinks, only 7% of the respondents reported using them daily and this percentage increased with age among boys only.

A study conducted among adolescents in Ghana found that the daily intake of sugary snacks and consumption of soda was more common among females and those having parents with higher education.²¹

Since preventive oral health programs focus mainly on improving the oral health practices of the targeted population, assessment and description of the current practices are very important. It has been found that dental caries prevalence was high among school children in Riyadh.^{22,23} So far, however, scarce information is available on children's oral health practices and dietary habits, which could account for the high levels of dental caries. The aim of this study was to assess the oral health practices and dietary habits among a representative sample of intermediate school children (grades 7-9) in Riyadh, Saudi Arabia and to determine whether age, gender, type of school and mothers' educational level are related to the oral health practices and dietary habits of the children.

Materials and Methods

In the year 2001/2002, there were 189 public and 84 private intermediate schools for boys and 195 public and 85 private intermediate schools for girls in Riyadh. Stratified random sampling was utilized to select the schools to be included in this study. The stratification was done according to the locations of the schools. Two public schools were selected from each educational zone in Riyadh (southern, northern, eastern, western, central) for each gender. In addition, two private intermediate schools (one for each gender) were also selected giving a total of six schools for girls and six for boys. Students enrolled in grades seven, eight and nine were included in the study and the number of students selected from the public and private schools were based on the total number of students enrolled in them. The number of students selected from the government schools was 1014 (88.2%), whereas, from the private schools it was 136 (11.8%).

Data on oral health practices and dietary habits were obtained by a multiple choice, self-administered questionnaire of 20 questions, which covered the following areas:

Socio-demographic Background

Name, age, sex, nationality, place of birth, school, father and mother's educational level and occupation. Four categories of education were defined namely: illiterate, secondary school or less, bachelor degree, and postgraduate studies. With regard to the occupation, eight categories were defined for the fathers' occupation as follows: high professions (doctor, dentist, pharmacist, lawyer, engineer), businessman, intermediate professions (teacher, accountant, government employee, journalist, translator), officers (army or police), small businessman, laborer (driver, farmer, cook, security guard, plumber), retired and others (unemployed or dead). Six categories were defined for the mothers' occupation as follows: high professions, intermediate professions, laborer (cook, nanny, house keeper), retired, housewife, others (dead).

Oral Health Practices

Oral hygiene methods, use of tooth paste and frequency of tooth brushing which was assessed on a scale of 1 = never, 2 = sometimes, 3 = once a day and 4 = twice or more a day.

Dietary Habits

The type of drinking water, the consumption of sweets and sweet drinks which were assessed on a scale of 1 = rarely, 2 = once a day, 3 = twice a day and 4 = three times or more a day.

All the data were entered into a computer and analyzed using the Statistical Package for the Social Sciences (SPSS version 10) program. Frequency distribution was used for the descriptive analysis and the Chi-square test was used for the statistical relationship.

Results

Socio-demography

Respondents were 1150 intermediate school students of whom 575 were males and 575 were females. The age of the students ranged from 12 to 18 years with 39% in the age group of 12-13 years, 52% in the age group of 14-15 years and 9% in the age group of 16-18 years. About 70% of the students were Saudis.

Figure 1 shows the parent's educational level. Nearly 52% of the mothers and 42% of the fathers had secondary school education or less. Only 6.1% of the fathers were illiterate compared to 15.5% of the mothers. With regard to the parents' occupation, about 45% of the fathers had an intermediate professional level and over three quarters of the mothers were housewives (Table 1).

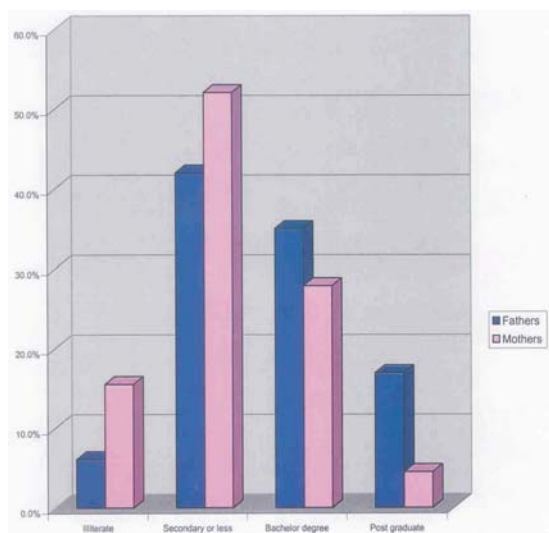


Fig. 1. Percentage distribution of parents by level of education.

Table 1. Distribution of the parents (%) and level of occupation

Occupation	Fathers	Mothers
High professions	152 (13.5)	16 (1.4)
Businessmen	97 (8.6)	NA
Intermediate professions	507 (45.1)	235 (20.9)
Officers	119 (10.6)	NA
Small business men	42 (3.7)	NA
Laborer	106 (9.4)	8 (0.7)
Retired	70 (6.2)	3 (0.3)
House wife	NA	855 (76.2)
Others	30 (2.7)	5 (0.4)
Total	1123	1122

NA= Not Applicable

Oral Health and Dietary Habits

Thirty-eight percent of the students cleaned their teeth at least twice daily, 27.4% cleaned their teeth once a day, whereas 4% reported that they never clean their teeth (Fig. 2). Eighty-six percent used the toothbrush, 27.3% used the miswak and only 5.1% used the dental floss. When asked about the use of toothpaste, over 90% of the surveyed children stated that they used it, with or without the toothbrush (Fig. 3).

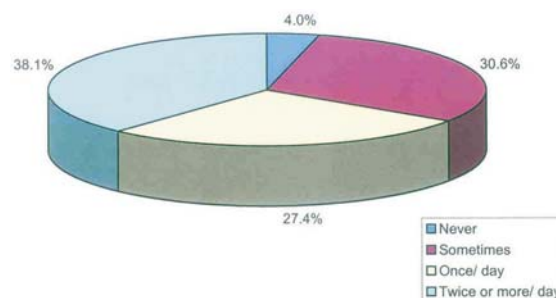


Fig. 2. Percentage distribution of respondents by the frequency of teeth cleaning.

With regard to the consumption of sweets, 35.8% reported that they rarely consumed sweet snacks and 31.6% reported that they rarely consumed sweet drinks (Fig. 4).

Oral Health, Dietary Habits and Gender

Table 2 shows that a significantly higher percentage of female students used the

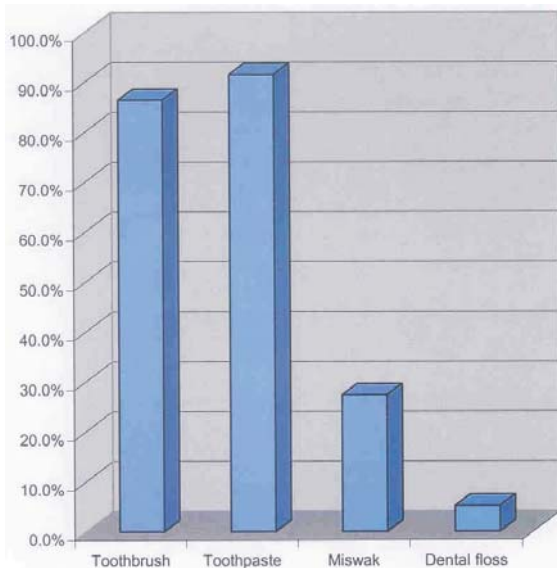


Fig. 3. Percentage distribution of respondents in oral health practices.

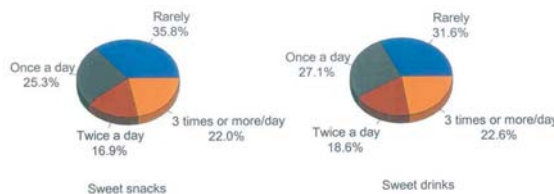


Fig. 4. Consumption of sweet snacks and drinks by the students.

toothbrush, used the toothpaste and cleaned their teeth more frequently ($P < 0.0001$) than boys. Male students used the miswak more than girls ($P < 0.0001$), but no significant difference was found between the two groups in the use of the dental floss ($P = 0.211$).

Regarding the consumption of sweets, female students reported consuming sweet snacks more frequently than boys ($P < 0.0001$), whereas, the frequency of sweet drinks was higher among males compared to females ($P = 0.005$) (Table 3). Male students were also found to consume tap water more than female students ($P < 0.0001$).

Oral Health, Dietary Habits and Age

An inverse relationship was found between age of the students and brushing of teeth, frequency of cleaning the teeth and the use of toothpaste ($P < 0.0001$). As the children grew older, they brushed their teeth less frequently and they stopped using toothpaste ($P < 0.0001$), but they used the miswak more ($P = 0.001$) (Table 2).

In respect of sweet snacks consumption, no significant relationship ($P = 0.519$) was found between the child's age and the frequency of consumption of sweet snacks, however, a highly statistically significant relationship ($P < 0.0001$) was found between the students' age and consumption of sweet drinks. As the students grew older they consumed more sweet drinks three times or more a day. Also a higher

Table 2. Percentage distribution of the students' oral hygiene practices (OHP) according to gender, school type, age and mothers' education level

OHP	Gender		P value*	School		P value*	Age			P value*	Mothers Educational Level				
	Male	Female		Public	Private		12-13	14-15	16-18		Illiterate	Secondary of Less	Bachelor Degree	Post Grad.	P value*
Frequency of Cleaning															
Never	5.9%	2.1%	0.0001	4.5%	0.0%	0.0001	2.0%	4.5%	8.7%	0.0001	8.6%	3.6%	2.2%	0.0%	0.0001
Sometimes	17.8%	17.8%		32.4%	16.9%		31.2%	29.0%	37.9%		46.6%	33.3%	16.3%	26.0%	
Once a day	29.0%	29.0%		26.4%	34.6%		23.1%	31.0%	24.3%		22.4%	26.1%	32.7%	28.0%	
Two or more times a day	51.1%	51.1%		36.7%	48.5%		35.5%	29.1%	22.4%		22.4%	36.9%	48.7%	46.0%	
Methods															
Brushing	78.8%	94.1%	0.0001	85.0%	97.1%	0.0001	90.6%	85.2%	75.7%	0.0001	70.7%	87.5%	94.2%	88.0%	0.0001
Flossing	4.5%	5.7%	0.211	4.4%	10.3%	0.006	4.9%	6.2%	0.0%	0.030	1.1%	4.3%	8.0%	12.0%	0.001
Toothpaste use	85.2%	97.7%	0.0001	87.3%	97.8%	0.001	94.6%	90.9%	81.6%	0.0001	82.7%	92.3%	96.2%	86.0%	0.0001
Miswak	35.1%	9.6%	0.0001	22.3%	22.8%	0.484	16.8%	25.2%	30.1%	0.001	32.8%	22.0%	16.0%	26.0%	0.0001
TOTAL	50.0%	50.0%		88.2%	11.8%		39.0%	52.0%	9.0%		15.5%	52.1%	27.9%	4.5%	

* Statistical test= χ^2

Table 3. Percentage distribution of the students' dietary habits according to gender and school type, age and mothers' education level

	Gender			School			Age			Mothers Educational Level								
	Male	Female	<i>P</i> value*	Public	Private	<i>P</i> value*	12-13	14-15	16-18	<i>P</i> value*	Illite- rate	Secondary of Less	Bach- elor Degree	Post Grad.	<i>P</i> value*			
Sweet Snacks																		
Rarely	42.1%	29.6%	0.0001	36.8%	28.4%	0.003	35.7%	34.6%	42.9%	0.519	50.9%	32.0%	33.4%	47.9%	0.0001			
Once/day	29.0%			23.7%	37.3%			24.4%	26.9%		20.4%		16.6%	25.0%		32.2%	18.8%	
Twice/day	18.3%			16.7%	18.7%			17.8%	17.1%		12.2%		13.0%	18.1%		16.1%	14.6%	
3 times or more/day	21.0%	23.1%			22.9%		15.7%		22.1%		21.4%	24.5%		19.5%		24.9%	18.3%	18.8%
Sweet Drinks																		
Rarely	28.8%	34.5%	0.005	31.4%	33.8%	0.009	36.6%	29.3%	25.5%	0.0001	40.2%	26.4%	36.5%	30.6%	0.0001			
Once/day	29.1%			26.4%	32.3%			26.2%	27.8%		24.5%		24.7%	24.3%		30.8%	42.9%	
Twice/day	17.6%			18.1%	22.6%			19.4%	9.4%		11.8%		12.1%	22.4%		17.0%	16.3%	
3 times or more/day	26.5%	18.8%			24.1%		11.3%		17.8%		23.6%	38.2%		23.0%		26.9%	15.7%	10.2%
Use of Bottled Water	66.9%	83.4%	0.0001	74.1%	83.0%	0.014	79.0%	74.2%	63.0%	0.003	60.0%	74.5%	84.6%	74.0%	0.0001			

* Statistical test= χ^2

percentage (79%) of the younger students consumed bottled water compared to older students (63%) ($P = 0.003$) (Table 3).

Oral Health, Dietary Habits and School Type

Students in private schools were found to use the toothbrush, the dental floss and the toothpaste more than the students in government schools ($P < 0.0001$, $P = 0.006$ and $P = 0.001$, respectively) (Table 2). They were also found to use bottled water more than government school children ($P = 0.014$). No significant differences were found between the two groups regarding the use of miswak ($P = 0.484$).

The children in the government schools consumed both the sweet snacks and sweet drinks more frequently than the private school children and the differences between the two groups were statistically significant ($P = 0.003$ and $P = 0.009$, respectively) (Table 3).

Oral Health, Dietary Habits and Mothers Educational Level

Statistically significant differences were observed between the children of mothers with different educational levels in respect of oral health practices and dietary habits ($P < 0.0001$). Children of mothers with bachelor degrees were

found to use the toothbrush more ($P < 0.0001$), use the toothpaste more ($P < 0.0001$), drink more bottled water ($P < 0.0001$) and clean their teeth more frequently ($P < 0.0001$) than the other children (Table 2).

Children of mothers with postgraduate education reported using the dental floss more than the other children ($P = 0.001$), whereas, children of illiterate mothers reported using the miswak more than the other children ($P < 0.0001$) (Table 2).

Children of mothers with secondary school education or less consumed sweet snacks and sweet drinks more frequently than the other children and this difference was found to be statistically significant ($P < 0.0001$) (Table 3).

Discussion

The present study provided an opportunity to examine the oral health practices and dietary habits of intermediate school children in Riyadh, Saudi Arabia. It showed that only 65.5% of all the respondents cleaned their teeth at least once a day. This result is comparable to the finding (61%) reported in Madina by Al-Tamimi and Petersen in 1998. However, it is far less than the 92-100% finding reported in some developed countries^{10,11} which might be attributed in part to the establishment of preventive dental public health

programs in these countries.

The study also demonstrated that the use of the dental floss was very low among the surveyed sample, which agrees with the findings of Rise and his group¹³ who found that the use of the dental floss was rare in the sample they surveyed in 22 European countries and Canada. In contrast, Walsh¹¹ found that a high percentage of the sample they studied in the United States used the dental floss. This might suggest the lack of awareness and understanding of this procedure and its value in preventing oral diseases among the surveyed sample.

Dental literature data have indicated that the frequency of consuming sugary products is a greater risk factor in the etiology of dental caries than the quantity consumed.²⁰ This survey showed that the frequency of consumption of sweetened items seemed to be quite high among Saudi adolescents which may be due to the availability of such products in school cafeterias.

The study also showed that the level of oral health practices differs among age groups and between the two sexes. Saudi females performed oral hygiene practices more than their male counterparts, which is in agreement with other previous studies on adolescents.^{12-14,21} This difference has been attributed to a higher concern regarding personal hygiene and health care among females.²¹ Some oral health practices were found to decline with increasing age and this finding is somewhat expected since disciplinary problems increase as the teenagers grew older. This finding, however, is in disagreement with the finding of several other studies^{12,13} in which peer approval and an interest in self-image might have been more powerful determinants of behavior.

Socio-economic factors are known to have a major impact on both general and dental health. In this study, a high correlation was found between the oral health practices and the type of school (public, private) the child is enrolled in which might reflect the child's family economy. This has also been reported in a previous study.¹⁴ Oral health practices were also found to be related to the mothers' educational level, which reflects the family socio-economic class, and this finding agrees with the findings of other studies.^{14,24}

Consistent with an earlier study,¹³ the consumption of sweet drinks was found to be more common among male students and to increase as they get older. Consumption of sweet snacks was found to be more common among females and this is in agreement with the findings of Blay *et al.*²¹ This finding, however, contradicts

the findings of other previous studies^{13,20} in which females were found to consume less sugar-containing products than males. This might be explained by the association of the consumption of sugar-containing products with overweight problems and the avoidance of these products by females to maintain a pleasing appearance.

Considering the relationship of sugar consumption to socio-economic status, children in public schools and children of mothers with lower school education consumed more sweet snacks and drinks than other children and this is in agreement with the findings of Honkala *et al.*²⁰ who reported that adolescents with parents of higher occupational and educational levels consumed less sugar containing products. In contrast, Blay *et al.*²¹ found the consumption of sugared snacks to be more common among adolescents with parents of higher education in Ghana, which suggests an economic explanation, indicating that sugar consumption is most common among affluent adolescents who could afford such products.

In this study, the reported oral health practices and dietary habits reflect a general low interest in dental health care and preventive measures among intermediate school children in Riyadh. These habits may also constitute a major challenge to oral health. School-based dental health educational programs should be designed to reinforce and encourage existing oral health practices, promote and initiate new ones. Also, information regarding oral health should be included on wider bases in the school curricula in an attempt to prevent and control dental diseases.

Conclusions

1. Nearly 2/3 of the surveyed students cleaned their teeth at least once a day.
2. Gender and age were found to be significantly related to the oral hygiene habits and the use of the dental floss was very low in the surveyed sample. Care for oral health was greater among female than male students.
3. The socio-economic status was directly related to the oral hygiene habits and inversely related to the dietary habits.
4. The frequency of consumption of sweetened items was quite high among the surveyed students.
5. The oral hygiene and dietary habits of the surveyed sample may constitute a major challenge to dental health in Riyadh area.

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