Prevalence and severity of dental fluorosis in Yemen

Al-Kholani_.I. [1], A M Idris[2] and I.A.Ghandour[3]

Dept. of Restorative Dentistry1, College of Dentistry, Sana'a University , Yemen. Depts. of Oral Pathology2 and Periodontology3, Faculty of Dentistry, University of Khartoum, Sudan.

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إنتشار وشدة التسمم (التبقع) الفلوري للأسنان في اليمن

عبد الوهاب أسماعيل الخولاني وعلي محمد أدريس وأبرهيم غندور

خلاصة: الهدف الأساسي لهذه الدراسة هو تقصي ما إذا كان شدة الإصابة بالتسمم الفلوري للأسنان يصاحبها زيادة في قابلية الإصابة بنخر الأسنان. هذه الدراسة تعتبر الأولى في اليمن بعد الوحدة. تم إستقصاء 793 حالة من طلاب وطالبات المدارس الحكومية من عمر 9–20 سنة في سبع محافظات تمثل اختلافات جغرافية ومناخية. كان عدد الذكور 439 (55.4%) وعدد الإناث 354 (44.6%). تم قياس مستوى التسمم الفلوري بمعيار دين المعدل. تبين أن معدل إنتشار التسمم الفلوري بين الإناث أكثر منه بين الذكور وأن معدل إنتشار التسمم الفلوري بين صغار السن (9–14سنة) أكثر منه بين الأكبر سناً (15–20 سنة). أما معدل إنتشار نخر الأسنان فكان أيضاً أكثر إنتشاراً بين الفئات العمرية الصغيرة عنة في الكبيرة. أوضحت الدراسة أن ثلاثة أرباع اليمنيين يعانون من التسمم الفلوري وبشكل أساسي في مناطق الوسط والجنوب اليمني وخاصة المناطق الحارة. كما تبين أن نسبة الفلور في مياة الشرب أكسبت الأسنان مناعة ضد النخر السني في الحالات المصابة بتسمم فلوري تصنيف بسيط جداً ومتوسط أما تصنيف شديد فقد فشل في منح الأسنان مناعة ضد النخر السني.

ABSTRACT: The specific objective of this study was to examine if severe dental fluorosis is associated with increased susceptibility of dental caries. The present study is the first to be conducted in Republic of Yemen since the unifications in 1990. Cross-sectional study, which used random sample of subjects aged 9-20 years attending or working in non private schools in seven towns strategically, distributed, and represented most geographical and climatic areas. Subjects investigated were (n = 793), their age mean and median were 13.3 and 12 years respectively. The gender distribution (n = 439; 55.4%) was boys and 354 (44.6%) girls. Dental fluorosis was recorded using the modified Dean's index. In which the grade questionable fluorosis was omitted. Among the total number of study subjects (n = 793) the prevalence of dental fluorosis was (n = 495; 62.4%). The prevalence of dental caries among boys was (n = 237; 29.9%) and among girls was (n = 258; 32.5%). Younger subjects aged (9-14 years) had more dental fluorosis than older subjects (15-20 years). Whereas the prevalence of dental caries was (n = 596; 75.2%) of these 332 (41.9%) boys and 264 (33.3%) were girls. The prevalence of (DMFT) among younger subjects (9-14 years) was (n = 397; 78.8%) was significantly higher than older subjects (15-20 years) (n = 199; 68.9%). The present study demonstrated high prevalence of dental fluorosis in approximately two third of the Yemeni population. The high fluorosis was particularly observed in southern and central areas of Yemen. It was also positively correlated with high fluoride in communal drinking water and hot climatic areas. The findings of the present study demonstrated that dental fluorosis showed little protection for those with very mild and moderate degrees of fluorosis compared to those without or with mild fluorosis. Dental fluorosis failed to incur protection to those with severe degree of dental fluorosis compared to those without dental fluorosis. This difference between sbujects with severe detnal fluorosis and those without was statistically highly significant (p-value < 0.05).

Introduction:

The inverse relationship between the concentration of fluoride in drinking water and the development of dental caries and dental fluorosis has been well documented. It was established that optimal fluoride level about 1 ppm in drinking water is associated with a significant caries reduction. While levels higher than this optimal level is associated with enamel defects called dental fluorosis [1].

The prevalence of dental fluorosis showed different variations in different countries specifically Africa [2,3]. As Yemen is part of the African rift valley dental fluorosis expected to be highly prevalent, therefore the object of this study is to determine the prevalence of dental fluorosis in Yemen.

Materials and Methods:

This study was designed to obtain information on the degree of risk for dental caries resulting in teeth affected by severe dental fluorosis.

Cross-sectional study, which used random sample of subjects aged 9-20 years attending or working in non private schools in seven towns strategically, distributed, and represented most geographical and climatic areas. The WHO (DMFT) and Dean's criteria were applied for assessment of dental caries and dental fluorosis. Samples from communal drinking water of these communities were analyzed for fluoride levels.

Private schools were excluded because they are found only in big cities. One town of known high fluorosis areas was purposefully selected and six other towns representing different geographical and climatic areas maximally covering the populated area of Yemen and each town must have primary and secondary schools were selected.

A target sample of 1000 subjects of both sexes attending non-private primary and secondary schools was randomly selected proportional to the size of the population in these towns.

In Taiz which purposefully selected three largest and oldest boys and girls' schools were selected.

1-Dental fluorosis:

Dental fluorosis was recorded using the modified Dean's index. The grade questionable fluorosis was omitted [1].

The score was entered and the following codes were used:

0- Normal. The enamel surface is smooth, glossy and usually a pale creamy-white color.

1-Very mild. Small opaque paper-white areas scattered irregularly over the tooth but involving less than 25% of the labial tooth surface.

2- Mild. The white opacity of the enamel of the teeth is more extensive than in category 2, but covers less than 50% of the tooth surface.

3- Moderate. The enamel surface of the teeth show marked wear and brown stain is frequently a disfiguring feature.

4- Severe. The enamel surface is badly affected and hypoplasia is so marked that the general form of the tooth may be affected. There are pitted or worn areas and brown stains are widespread; the teeth often have a corroded appearance.

2-Method of assessing dental caries:

Caries examination was carried out under similar conditions, and radiographs were not taken. The caries examination was based on visual criteria.

Caries was recorded according to the WHO criteria [1]. The examination was done in daylight using a plane mouth mirror and an explorer with gauze and then the DMFT was recorded. A probe was used only to clean debris. Participants were asked, when teeth were missing, to establish the reasons, and only teeth missing due to caries were recorded.

The examiner has adopted a systematic approach to the examination of dental caries, proceeded in an orderly manner from one tooth or tooth space to the adjacent tooth or tooth space. A tooth was considered present in the mouth when any part of it was visible or can be touched with the tip of the explorer without unduly displacing soft tissue. When a permanent tooth only was recorded.

A numerical coding system was used for recording the status of permanent teeth and an alphabetical coding system for primary teeth. Boxes 18-28 were used for upper teeth and boxes 38-48 for lower teeth. Note that boxes pertaining to premolars or primary molars, cuspids and incisors were used for both primary and permanent teeth. A distinction was made solely by the use of alphabetical or numerical coding [1].

Results:

Subjects investigated were (n = 793), their age mean and median were 13.3 and 12 years respectively. The gender distribution (n = 439; 55.4%) were boys and 354 (44.6%) girls.

Among the total number of study subjects (n = 793) the prevalence of dental fluorosis was (n = 495; 62.4%). The prevalence of dental caries among boys was (n = 237; 29.9%) and among girls was (n = 258; 32.5%). Younger subjects aged (9-14 years) had more dental fluorosis than older subjects (15-20 years). Whereas the prevalence of dental caries was (n = 596; 75.2%) of these 332 (41.9%) boys and 264 (33.3%) were girls. The

prevalence of (DMFT) among younger subjects (9-14 years) was (n = 397; 78.8%) was significantly higher than older subjects (15-20 years) (n = 199; 68.9%).

Table (1) shows the water fluoride level in the study areas. The highest fluoride concentration in drinking water was found in Taiz (2.03 ppm), and the lowest was from Ebb (0.25). Above optimal fluoride level in drinking water (1.35, 1.29 and 1.01 ppm) was also found in Aden, Lahaj and Al-hodydah respectively. Below optimal fluoride level in drinking water (0.55, 0.51 and 0.25 ppm) was found in Al-ammanah, Hajah and Ebb respectively (Fig. 1).

Description of the study sample according to sex and area of residence was shown in Table (2). The study subjects were recruited from seven urban areas of varied geographical distribution. They were shown in the table in descending order. The mean size was (n=113) of the sample in the seven urban areas The largest sample (n=371; 46.8%). The highest number of boys (n=150; 18.9%), and girls (n=221; 36.7%) was from Taiz, followed by boys (n=86; 10.8%) from Hajah and girls (n=63; 7.9%) from Al-hodaydah.

The number of boys and girls in the sample were approximately equally distributed in Aden, Al-hodaydah and Ebb towns. Whearas boys were highly represented compared to girls in Lahaj, (n=21; 95.5%); Hajah (n=86;86.0%) and Al-ammanah (n=72; 80.9%) (Fig. 2).

The prevalence of dental fluorosis was examined in the study population divided into two age groups 9-14 years and 15-20 years table (3). The difference in the dental fluorosis was more marked in the younger age group 9-14 years (n=396;79%) compared to the older age group 15-20 years (n=194;67%). This difference was statistically highly significant (p-value<0.05).

Number and percentage of subjects with and without fluorosis according to sex was shown in table (4). The prevalence of dental fluorosis was higher among girls compared to boys. Of the 354 girls (n=258; 73.0%) were affected compared to (n=96; 27.0%) were not affected, whereas, of the 439 boys (n=237; 54.0%) were affected compared to (n=202; 46%) were not affected. These differences in the dental fluorosis between girls and boys was found statistically highly significant (p-value<0.05).

The number and percentage of fluorosis according to area of residence was described in table (5). The mean prevalence of dental fluorosis in two towns (Taiz and Lahaj) was found approximately 100%, in three towns (Aden, Al-hodydah and Ebb) was 68%, and in the two towns (Hajah and Al-ammanah) was 33%. These differences in the dental fluorosis were found statistically significant (p-value<0.05).

The relationship between the prevalence of caries and fluorosis was described in table (6). Of the 590 study subjects with fluorosed teeth (n=447; 76%) were affected by dental caries, whereas of the 203 of the study subjects with non fluorosed teeth (n=149; 73%) were affected by dental caries. This difference was not statistically significant (p-value >0.05).

The age and sex distribution of the study population was shown in table (7). The study popluation comprised 793 subjects selected from various schools and work places. Mean and median age of the population were 13.3 and 12 respectively. The age range of the subjects was 9-20. the subjects included 439 (55.4%) boys, and 354 (44.6%) were girls.

The relative risk (Odds Ratio) for occurrence of dental caries in teeth exposed to dental fluorosis. The study population was analyzed in a form of case control to quantify the risk of dental caries among those exposed (affected by fluorosis) expressed as dental fluorosis. Cases were all subjects affected by dental caries and controls were not affected by dental caries, the analysis was given as crude (table 8) and as stratified by age and sex in table (9).

The crude odd ratio was OR = 1.1;95% CI=(0.8-1.6), indicating non significant association. The risk was also estimated in the two age groups, the young age group showed also no significant association, OR=1.0 and CI=(0.6-1.7). Similarly, among the older age group the OR=1.0;95%CI=(0.7-1.9), though the 95% CI is also non significant. The risk also estimated by sex, although the risk among boys was slightly higher than girls, the relatioship was also non significant, for the boys OR=1.2 and 95% CI=(0.8-2.0) and for girls OR=1.1 and 95% CI=(0.6-2.0).

Disscution:

The caries preventive efficacy of optimal level for both ingested and topically applied fluorides has been

well established [8, 10]. Generally caries prevalence is reduced with an increase of fluoride level in the drinking water to the optimal level [3,6,7,10]. Some reports from Africa, however, have presented contradictory results [4, 10].

All the children included in the study sample were borne and had been living continuously in the areas selected for the study. The drinking water of the study areas had a fluoride content ranging from 0.25 to 2.03 ppm F (table 1. Fig. 1).

Various studies in different countries have shown strong correlation between water fluoride concentration and prevalence and severity of dental fluorosis, and thus have provided a base line for estimation of optimum fluoride concentration. This optimum level provides maximum protection against dental caries with minimum risk of dental fluorosis. However, in most countries, the balance of maximum reduction of caries and the risk for development of dental fluorosis, were set for fluoride level in drinking water in the range 0.7 to 1.2 ppm F, which is considered optimal, based on average daily temperature [5].

In the present study Dean index was used for classifying the dental fluorosis. Despite limitation of Dean's index it is in use in various parts of the world by researchers. Furthermore the WHO continued to recommend the use of this index. The index is more simple, consumes less time, and it is easy to use. Its wide application allows comparison of various studies within the same country, region or distant countries.

Fluoride level causing very mild to moderate detnal fluorosis appears to be associated with lower risk for dental caries, the severe form was associated with increased risk for detnal caries [8]. This was found in the USA. Thus, this investigation supports driscoll et al. (1986), finding which estimated the risk of dental caries. Odds Ratio (OR), 3.3 in severely fluorosed teeth compared to no fluorosis as shown in table (8) it appear that other environmintal factors do not affect this confirmed association between severe form of fluorosis and dental caries table (10). It is worth noting that the risk for detnal fluorosis amang girls was not discussed by Driscoll et al., (1986). In this study we have found that the risk for dental caries in teeth affected by severe fluorosis among girls was even higher than among boys by 3.8-fold compared to 3.0-fold (table 4.22). The reason for that may be due to:

1. The large number of girls aged 9-14 years which has been selected in this study (table. 7).
2. The majority of girls involved in this study were from high flouride area (Taiz), table.1, Fig.1 and table 2. At the same time the majority of these girls are of a younger age than the groups studied in the other areas. Since the possibility of dental caries in relation to fluorishing is greater in smaller children than older children, detnal caries is more fluoration in subjects studied in Taiz. This phenomenon has been supported by a number of investigators [8, 9].

The caries preventive efficacy of optimal level for both ingested and topically applied fluorides has been well established [11,12,13]. This enhanced caries protection, however diminishs at some unspecified increasing level of severity of detnal fluorosis. This investigation could not determine the specific level at which the protection incurred by fluorides been incorporated in the structure of teeth, described as various degree of fluorosis, as classified by Dean's and others [1]. Each grade of Dean's index, from very mild to severe forms was examined in 2x2 table. Each grade of fluorosis being the exposure and mean DMFT, (caries) being the disease and no fluorosis, no caries were the healthy teeth. While the very mild to moderate grades of fluorosis were protective and the Ors were less than unity (< 1.0), the OR was more than unity (> 1.0), in the severe grade of fluorosis indicating increased risk for dental caries in this grade table (8).

Evidenece of the relatinship between the prevalence of dental caries and severity of dental fluorosis exist in table (10). The findings of the present study demonstrated that dental fluorosis showed little protection for those with very mild and moderate degrees of fluorosis compared to those without or with mild fluorosis. Dental fluorosis failed to incur protection to those with severe degree of dental fluorosis compared to those without dental fluorosis. This difference between sbujects with severe detnal fluorosis and those without was statistically highly significant (p-value < 0.05).

The findings of the present study were in agreement with the observations made by other investigators [8]. They examined the relation ship between mean DMFS scores of children and fluorosis classifications according to criteria described in the Dean's index [14]. The data showed that children classified as having no fluorosis

(score 0) had an average of 1.89 DMFS per child, while children who had questionable signs of fluorosis (score 0.5) as well as children who had very mild to moderate fluorosis (score 1 to 3) had somewhat lower DMFS of 1.40 and 1.58 respectively. In contrast, a higher score of 2.96 DMFS was found for children who were classified as having sever fluorosis (score 4). Multiple comparisons were carried out for all pairsof mean DMFS. These comparisons showed that the DMFS scores for children with severe fluorosis was significantly higher ($p<0.05$) than the score for children who had either questionable or very mild to moderate fluorosis. It was speculated that severe fluorosis lead to loss of enamel structure (pitting), and the tooth surface then becomes susceptible to decay in the affected areas [15,16]. Tis susceptability may be increased further if food debris or plaque build in the hypoplastic defects. A further support to the hypothesis that children with severe dental fluorosis have significantly higher caries experience than do children with lesser degrees of fluorosis, is the evidence when considering individual teeth rather than children or subject. Teeth with higher severe fluorosis have higher percentages of carious lesions and restorations than do teeth with lesser degrees of fluorosis or with no fluorosis. The findings that caries protection was compromised in children with severe fluorosis were supported by a number of other studies [15, 16, 17, 18, 19, 20, 21, 22).

The findings that subjects with no fluorosis had a lower mean DMFT than did subjects with very mild to moderate fluorosis was an expected finding. The role of exposure to fluoride in reduction of dental caries has been supported by many studies [23].

All the children included in the study sample were borne and had been living continuously in the areas selected for the study. The drinking water of the study areas had a fluoride content ranging from 0.25 to 2.03 ppm F (table 1, Fig 1).

Various studies in different countries have showen strong correlation between water fluoride concentration and prevalence and severity of dental fluorosis, and thus have provided a base line for estimation of optimum fluoride concentration. This optimum level provides maximum protection against dental caries with minimum risk of dental fluorosis. However, in most conutries, the balance of maximum reduction of caries and the risk for development of dental fluorosis, were set for fluoride level in drinking water in the ragne 0.7 to 1.2 ppm F, which is considered optimal, based on average daily temprature [24].

The findings of many other studies, conducted in various geographic areas, suggest that the protective effect of fluoride may be compromised by severe fluorrosis [15, 22].

To explain the observed differences in dental fluorosis between the age groups, it is important to trace the period of susceptibility to the condition for each group. The assumption is that the time from birth through age 5 is the period of risk to fluorosis [25]. The findings of the present study demonstrated that young children had more dental fluorosis than older children (table 3) which agrees with this assumption. These observations were supported by other investigators [8, 26].

In addition it has been argued that post-erupive mineralizaiton or continued abrasion diminish the milder level of detnal fluorosis over time [27, 28, 29]. These arguments have not been substantiated, because conflicting results were observed [26], when re-examination of the same children were preformed at an older age in 1980 (8-10 years of age) and in 1985 (at 13-15 years of age). Younger children in 1985 (8-10 years of age) were also re-examined in 1990 (14-16 years of age) fluorosis scores in early erupting teeth revealed no significant difference in the severity of detnl fluorosis from 1985 to 1990, (and these observations were also supported by the five year comparison of children examined from 1985 to 1990; there was no change also in fluorosis severity). Ingestion of different amounts of fluorides has been suggested to account for the change observed in dental fluorosis between younger and older children.

In this study, it was found that the relationship between fluorosis and sex table (4) showed that girls were more affected by dental fluorosis compared to boys. The explanation for that may be due to the selection of a large number of girls from Taiz and Al-hodydah cities which are classified as high fluoried areas (fluoride in drinking water supply = 2.03 and 0.01 respectively), table 2.

The high prevalence of dental caries in the areas with high fluoride level (Taiz and Lahaj) were probably due to high prevalence of severe dental fluorosis, whereas the high prevalence of dental caries in low fluoride areas were due to lock of protective effect of fluoride. The lower caries provalence in Aden in presence of fluoride above optimal level suggests that

people in Aden had mild to moderate dental fluorosis which were protective against detnal caries.

In conclusion it is important to emphasize the following points:

1. Very few studies in the field of oral health have been carried out in Yemen. The most relative work was performed by Hussein [30] in what was then Democratic Republic of Yemen between 1981-1990. The second one was by Tewari [31] in Yemen Arab Republic in 1987. The present study is the first to be conducted in Republic of Yemen since the unifications in 1990.
2. This work has been conducted during the period 1996-1998. seven areas represinting the whole country were chosen for the study. Hence and despite the small number of study areas and subjects examined, it is hoped that the result of this study shall provide future researchers with a sound and helpful base-line for their work in the field of fluorosis and dental caries.
3. The results of this work, I believe answer the questions posed by the research problem and meet the objective spelt out at the onset of the exercise.

Conclusion:

In conclusion the high prevalence of dental fluorosis in Yemen calls for urgent need for determination of optimal fluoride level for different climates in Yemen. Introduction of defluoridation and treatment of dental fluorosis at affordable cost to Yemenis.

Fluorosis is endemic in Yemen. Water and climatic differences play important causes in this invesstigation.

This study has determined the prevalence of fluorosis in 7 towns or communities in Yemen and according to the international standard, both the prevalence of dental fluorosis and dental caries were found to be high.

It has also been proved that the association between high level of dental fluorosis and susceptibility of dental caries was positive and high.

It has also proved that the prevalence of detnal caries varies according to the degree of dental fluorosis.

It has also proved that young children had more dental fluorosis than older children.

The results of the present study revealed that the risk for dental caries in teeth affected by severe fluorosis among girls was even higher than among boys by 3.8-fold compared to 3.0-fold.

It has also proved that there is a positive relationship between level of fluoride in water and prevalence of dental fluorosis.

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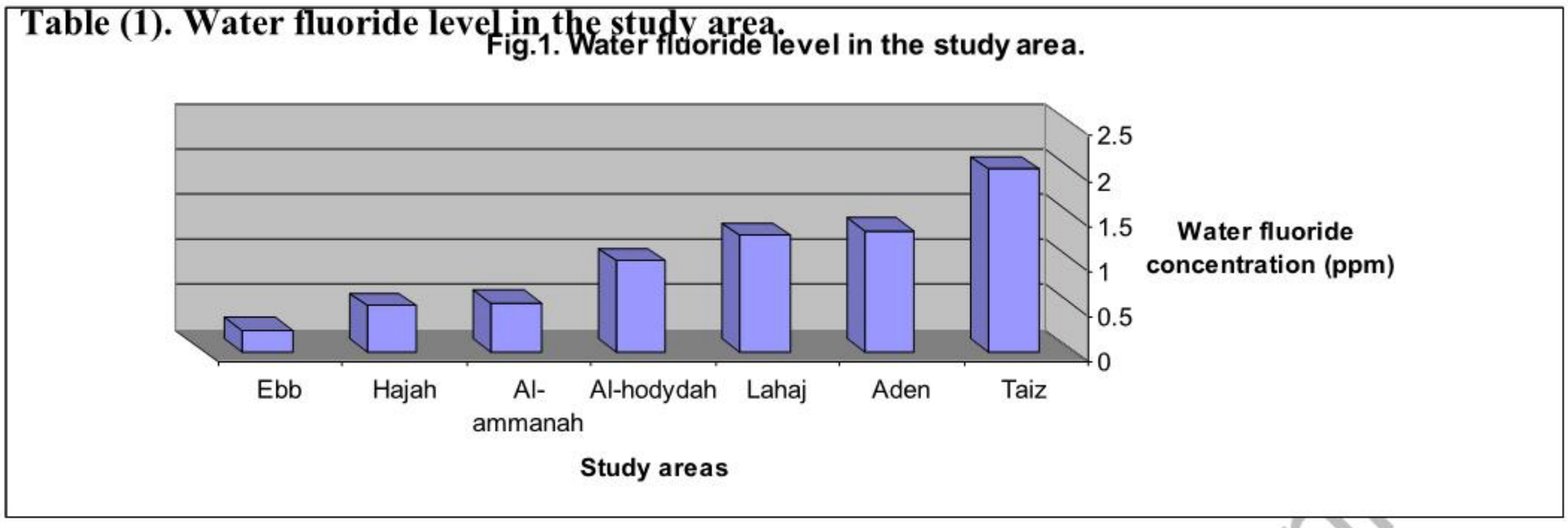
Table (1). Water fluoride level in the study area.



Area	Water fluoride concentration (ppm)
Taiz	2.03
Aden	1.35
Lahaj	1.29
Al-hodydah	1.01
Al-ammanah	0.55
Hajah	0.51
Ebb	0.25

Table (2). Description of the study population according to sex and area of residence.

Sex	n	Area of residence						
		Taiz n (%)	Al-hodydah n (%)	Hajah n (%)	Al-ammanah n (%)	Ebb n (%)	Aden n (%)	Lahaj n (%)
Boys	**439**	**150 (40.4)**	**60 (48.8)**	**86 (86.0)**	**72 (80.9)**	**33 (61.1)**	**17 (50.0)**	**21 (95.5)**
Girls	**354**	**221 (59.6)**	**63 (51.2)**	**14 (14.0)**	**17 (19.1)**	**21 (38.9)**	**17 (50.0)**	**1 (4.5)**
Total	**793**	**371 (100)**	**123 (100)**	**100 (100)**	**89 (100)**	**54 (100)**	**34 (100)**	**22 (100)**

n=number of subjects

Table (3) Description of the study population by fluorosis and age.

Fluorosis	Age (years) 9-14 n (%)	15-20 n (%)
Sound	108 (21.4)	095 (32.9)
Affected	396 (78.6)	194 (67.1)
Total	504 (100)	289(100)

Table (4). Number and precentage of subjects with and without fluorosis according to sex.

Sex	Fluorosis n (%)	No fluorosis n (%)	Total
Boys	237 (54)	202 (46)	439
Girls	258 (73)	096 (27)	354

Fig. 2. Description of the study sample according to sex and area of residence

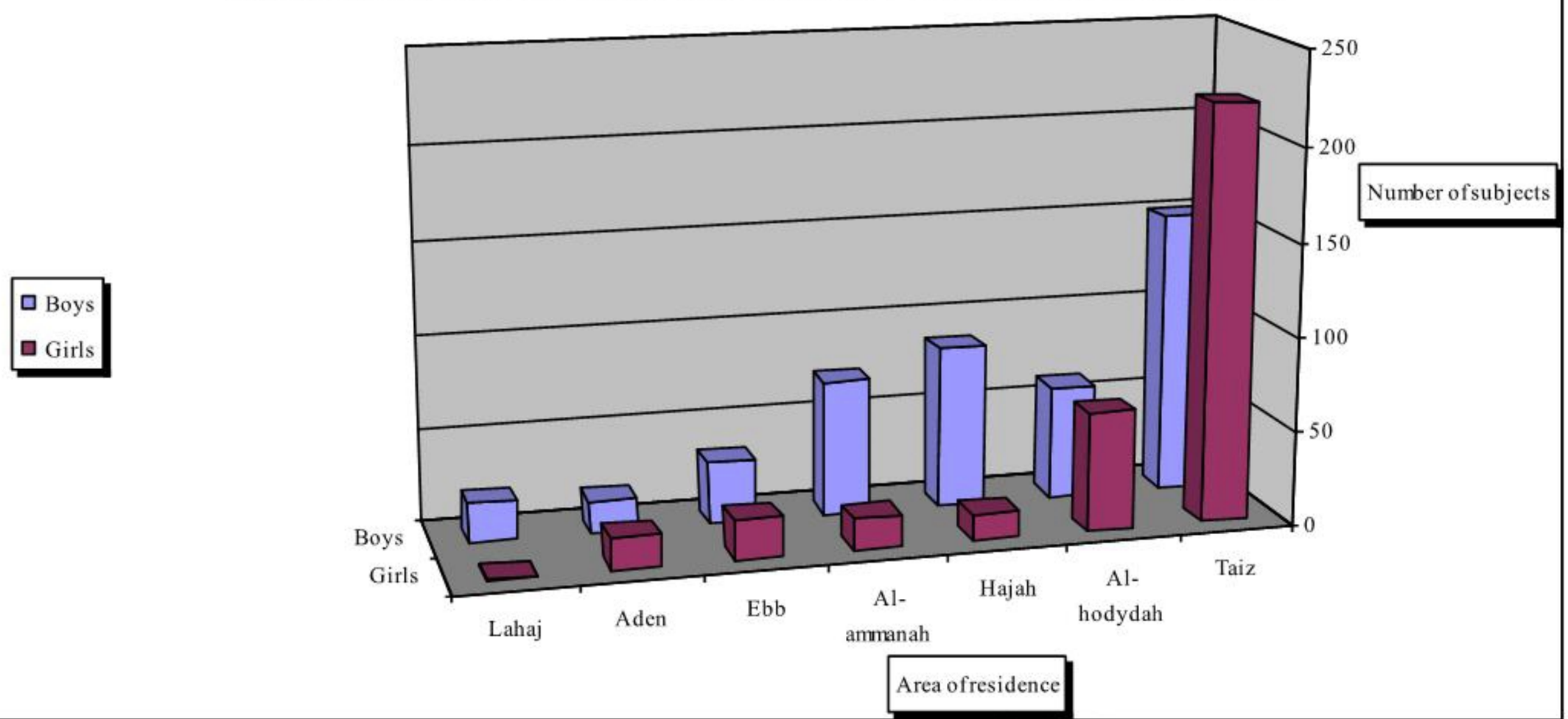


Table (5). The number and percentage of fluorosis according to area of residence.

Fluorosis	n (%)	Area of residence						
		Taiz n (%)	Aden n (%)	Lahaj n (%)	Al-hodydah n (%)	Al-ammanah n (%)	Hajah n (%)	Ebb n (%)
Sound	203(40.7)	004 (01.0)	08 (23.5)	---	14 (33.3)	57 (64.0)	17 (17.0)	22 (40.7)
Affected	590(59.3)	367 (98.9)	26 (76.5)	22(100)	82 (36.0)	32 (36.0)	29 (29.0)	32 (59.0)
Total	793(100)	371(100)	34(100)	22(100)	123(100)	89(100)	100(100)	54(100)

Chi-square statistically significant p-value < 0.05

Table (6). The relationship between the prevalence of caries and fluorosis.

DMFT	Fluorosis	
	Fluorosis free n (%)	Affected n (%)
Caries	054 (26.6)	143 (24.2)
Caries affected	149 (73.4)	447 (75.8)
Total	203 (100)	590 (100)

Table (7). Description of the study population accoridng to age and sex.

Age (years)	Boys & Girls n (%)	Boys n (%)	Girls n (%)
9-14	504 (63.6)	260 (59.2)	244 (68.9)
15-20	289 (36.4)	179 (40.8)	110 (31.1)
Total	793 (100)	439 (100)	354 (100)

Age: mean =13.3, median = 12, and range = 9-20

n = number of subjects.

Table (8). Odd Ratio (OR) for dental caries among study population with severe grade of dental fluorosis.

		Exposed	non exposed	
		Fluorosis		
DMFT		Affected n	Sound n	OR
Controls	Affected	101	149	1
Cases	Sound	11	54	3.3

Odd Ratio = 3.3.

Table (9). Estimate risk for caries among all subjects by fluorosis, age and sex.

Fluorosis	DMFT		OR (95% CI)
	Caries free n (%)	Caries affected n (%)	
Age			
9-14 years			
Normal	23 (04.6)	085 (16.9)	1
Affected	84 (16.7)	312 (61.9)	1.0 (0.6-1.7)
15-20 years			
Normal	31 (32.6)	064 (67.4)	1
Affected	59 (30.4)	135 (69.6)	1.0 (0.7-1.9)
Boys			
Normal	39 (08.9)	107 (24.4)	1
Affected	68 (15.5)	225 (51.3)	1.2 (0.8-2.0)
Girls			
Normal	15 (04.2)	042 (11.9)	1
Affected	75 (21.1)	222 (62.7)	1.1 (0.6-2.0)

Table (10). The relationship between DMFT, and grades of severity of dental fluorosis.

DMFT	Fluorosis				
	Normal n (%)	Very mild n (%)	Mild n (%)	Moderate n (%)	Severe n (%)
Sound	054 (26.6)	28 (29.5)	048 (25.3)	056 (29.0)	011 (09.8)
Affected	149 (73.4)	67 (70.5)	142 (74.7)	137 (71.0)	101 (90.2)
Total	203 (100)	95 (100)	190 (100)	193 (100)	112 (100)