

Prevalence and Severity of Dental Fluorosis among School Children Aged 7 - 12 Years in Hail City, Saudi Arabia

Hassan Kasim Haridi*, Budoor A Alshammry, Fahad H Albaqawi, Mona M Alshammry, Mohammed E Alhumaid, Rashid S Alhur, Yazeed Y Alshaghдали and Mai H Alshammry

Research Studies Department, Ministry of Health, Hail, Saudi Arabia

*Corresponding Author: Hassan Kasim Haridi, Research Studies Department, Ministry of Health, Hail, Saudi Arabia.

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Abstract

Background: This study aimed to find out the prevalence and severity of dental fluorosis among school children aged 7 - 12 years and to correlate risk factors with dental fluorosis in Hail region, Saudi Arabia.

Materials and Methods: A cross-sectional design having been employed to carry out this study having a sample size of 603 was assigned based on assumptions of a 5% margin of error, within confidence level 99%, expected prevalence 70% based on previous studies for a population size at 30000. Sample has been increased by 10% more to compensate for non-response. However, 650 participants were sought. Assessment of dental fluorosis was recorded using Dean's index. Data processing and statistical analyses were performed using the Epi Info statistical package version 7 (CDC, Atlanta, GA, USA).

Result: Prevalence of dental fluorosis was found to be 77,3% were affected by any degree of dental fluorosis, with no statistical significant difference found for gender ($p = 0.521$) or Age groups ($p = 0.157$). The prevalence of dental fluorosis was not affected by residence ($p = 0.964$), brushing teeth ($p = 0.183$), use fluorinated paste ($p = 0.842$) or having the habit of swallowing paste ($p = 0.588$).

Conclusion: Prevalence of dental fluorosis among younger school children in Hail city was found to be high, which supports the previous reports pointed to the high prevalence of dental fluorosis among adolescents and adults and imply a higher fluorine consumption among Hail population. Further research on contributing factor for dental fluorosis in Hail region and other localities of Saudi Arabia are needed.

Keywords: Severity; Prevalence; Children; Risk Factor; Dental Fluorosis

Introduction

Dental fluorosis is a qualitative defect of enamel resulting from an increase in fluoride concentration within the micro-environment of the ameloblasts during enamel formation [1]. The severity of the condition is dependent on the dose, duration, and age of the individual during the exposure. The "very mild" (and most common) form of fluorosis, is characterized by small, opaque, "paper" white areas scattered irregularly over the tooth, covering less than 25% of the tooth surface. In the "mild" form of the disease, these mottled patches can involve up to half of the surface area of the teeth. When fluorosis is moderate, all of the surfaces of the teeth are mottled and teeth may be ground down and brown stains frequently "disfigure" the teeth. Severe fluorosis is characterized by brown discoloration and discrete or confluent pitting; brown stains are widespread and teeth often present a corroded-looking appearance [2]. People with fluorosis are relatively resistant to dental caries (tooth decay caused by bacteria), although they may be of cosmetic concern [3]. In moderate to severe

fluorosis, teeth are physically damaged. Fluorosis is extremely common, CDC findings on dental fluorosis estimated prevalence among children and adolescents, classified according to Deans Index in 2002, as 11.5%, 22.68%, 6.59% and 3.26% for Questionable fluorosis, Very mild fluorosis, Mild fluorosis, and Moderate to severe fluorosis, respectively. The total confirmed fluorosis prevalence 31.65% and total confirmed and questionable fluorosis prevalence 43.15%. The condition is more prevalent in rural areas where drinking water is derived from shallow wells or hand pumps. It is also more likely to occur in areas where the drinking water has a fluoride content greater than 1 ppm (part per million). In Saudi Arabia, the finding of study done in Riyadh reported prevalence of 75% overall and noted that very mild to mild fluorosis was more prevalent among the study population. In Al Qaseem and Al Madinah regions, dental fluorosis was present in 24 - 67% belonging to age group 12 - 15, 34 - 45 and above 65 years of age. Sixty-seven (67%) of respondent between 34 - 45 years had severe dental fluorosis. In Hail region, two studies were found exclusively on the stated issue. A study By Akpatta E., *et al.* in 1997 on 12 and 15 years of age children reported dental fluorosis to be 31.4% in 12 years of age whilst 20.3% in 15 years of age [8]. A most recent study by Hazza., *et al.* during 2015 amongst resident of Hail region showed dental fluorosis was present amongst 73.5% and most severe type observed was mild to very mild fluorosis [9]. That is in line with the finding of study done in Riyadh by Khan., *et al* [6]. A number of indices have been developed to record dental fluorosis. The earliest widely accepted index was developed by Trendley Dean and published in 1942 [2]. His index of Dental Fluorosis recorded the appearance of the teeth 'wet'. The dentition was not air dried prior to assessment. This is extremely important, as it records the appearance of the teeth in their natural state. The index is classified individuals into 5 categories. Depending on the degree of enamel alteration and which was based on the identification of the 2 most severely affected teeth, giving ordinal numbers as the severity of the enamel alteration increased. This index was later modified by Moller (1982). Subsequent indices dry the teeth and fluorosis will become more apparent as the enamel becomes desiccated. Thylstrup and Fejerskov [15] developed an index (T-F) based on the biological aspects of dental fluorosis, classifying individuals into 10 categories characterizing the macroscopic degree of fluorosis in relation to histological aspects. In the original classification, buccal, occlusal and lingual surfaces were examined. Horowitz., *et al.* (1984) developed a fluorosis index based on aesthetic aspects of tooth surface (TSIF) classifying individuals into 8 categories.

Aim of the Study

The study aimed to find out the prevalence and severity of dental fluorosis and to correlate the risk factors with dental fluorosis in Hail region, Saudi Arabia.

Materials and Methods

Cross-sectional design having been employed to carry out this study. Three primary male schools and their neighbour female one were randomly selected from Hail city representing central, north and south neighbourhood. A sample size of 603 was assigned based on assumptions of a 5% margin of error, within confidence level 99%, expected prevalence 70% based on previous studies for a population size at 30000. Sample has been increased by 10% more to compensate for non-response. However, 650 participants were sought. students were categorized in three groups based on age range. Children from every school were systematically selected randomly, with inclusion criteria of being lifelong residents in Hail City and at least more than 50% of the crown erupted and no restoration at examination. Data collection tool including information on demographic data, permanent residential address, information on aids used for oral hygiene maintenance (fluoridated or non-fluoridated). Assessment of dental fluorosis was recorded using Dean's index. The recording was made on the basis of the two teeth that are most affected. If the two teeth were not equally affected, the score for the less affected of the two was recorded. Students were examined under bright natural light. A sterilized, single use examination kit was used for every subject, which was discarded complying with the recommended infection control guidelines. To standardize examination and dental fluorosis classification, examiners were subject for training in three sessions so as to maintain consistency and to eliminate inter examiner bias. An official permission was obtained from the administrative authority of each school for carrying out the study. Data processing and statistical analyses were performed using the Epi Info statistical package version 7 (CDC, Atlanta, GA, USA).

Result

Among 650 children approached, 626 (response rate, 96.3%) were successfully fulfilled the inclusion criteria, examined and classified according to Dean index. Among respondents, 307 (49%) were males and 319 (51%) were females. Overall, 484 (77.3%; 95% CI: 73.8 - 80.5) were affected by any degree of dental fluorosis, with no statistical significant difference found for gender ($p = 0.521$) or Age groups ($p = 0.157$). According to Dean’s index, 22.7%, 24.9%, 28.6%, 17.7% and 6.1% of subjects were classified as normal, questionable, very mild, mild/moderate or having severe degree of dental fluorosis respectively. The prevalence of dental fluorosis was not affected by residence ($p = 0.964$), brushing teeth ($p = 0.183$), use fluorinated paste ($p = 0.842$) or having the habit of swallowing paste ($p = 0.588$).

Age groups (years)	Gender: n (%)		
	Male	Female	Total
7-8	132 (46.8)	150 (53.2)	282 (100.0)
9 - 10	94 (53.1)	83 (46.9)	177 (100.0)
10<	81 (48.5)	86 (51.5)	167 (100.0)
Total	307 (49.0)	319 (51.0)	626 (100.0)

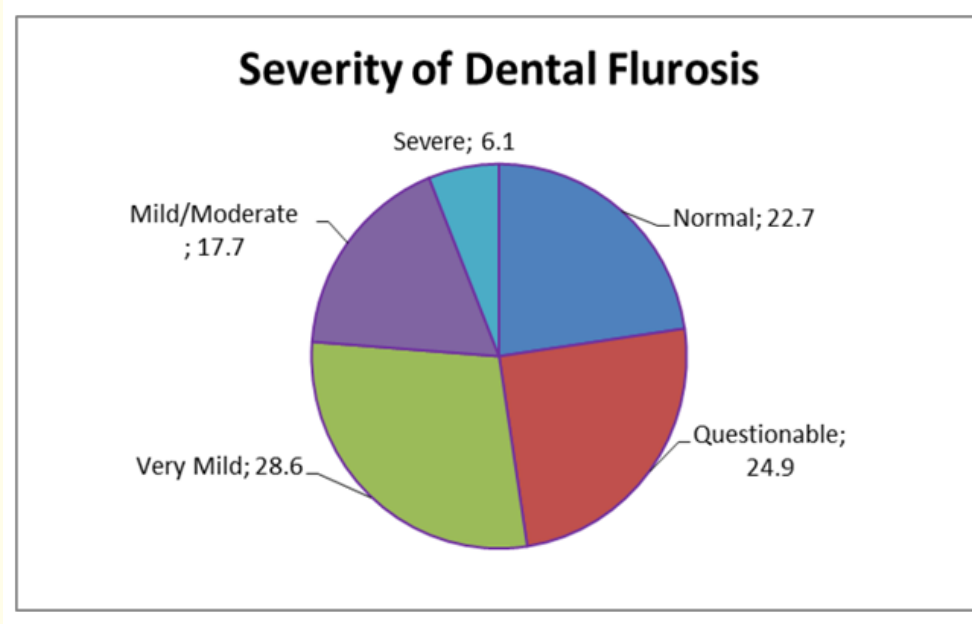
Table 1: Characteristics of the participants.
 $\chi^2 = 1.75, df = 2, p = 0.416$.

Age groups (years)	Dental fluorosis: n (%)		
	Absent	Present	Total
7 - 8	74 (26.2)	208 (73.8)	282 (100.0)
9 - 10	35 (19.8)	142 (80.2)	177 (100.0)
<10	33 (19.8)	134 (80.2)	167 (100.0)
Total	142 (22.7)	484 (77.3)	626 (100.0)

Table 3: Prevalence of dental fluorosis according to age.
 $\chi^2 = 3.37, df = 2, p = 0.157$.

Gender	Dental fluorosis: n (%)		
	Absent	Present	Total
Male	73 (23.8)	234 (76.2)	307 (100.0)
Female	69 (21.6)	250 (78.4)	319 (100.0)
Total	142 (22.7)	484 (77.3)	626 (100.0)

Table 3: Prevalence of dental fluorosis according to gender.
 Odds Ratio (OR) = 1.13 (95% confidence interval (CI) 0.78-1.64); $\chi^2 = 0.412; p = 0.521$.



Discussion

Dental fluorosis is a dental public health concern in Hail city, this study will provide the information about prevalence and severity of dental fluorosis and to correlate risk factors in Hail region, Saudi Arabia. Two studies are conducted in Hail region. A study by Akpatta E., *et al.* in 1997 on 12 and 15 years of age children reported dental fluorosis to be 31.4% in 12 years of age whilst 20.3% in 15 years of age. A most recent study by Hazza., *et al.* during 2015 amongst resident of Hail region was the basis of this current study that showed dental fluorosis was present amongst 73.5% and most severe type observed was mild to very mild fluorosis. That is in line with the finding of study done in Riyadh by Khan. In Riyadh region, the finding of study done reported prevalence of 75% overall and noted that very mild to mild fluorosis was more prevalent among the study and noted that very mild to mild fluorosis was more prevalent among the study population. In Al Qaseem, and Al Madinah regions, dental fluorosis was present in 24 - 67% belonging to age group 12 - 15, 34 - 45 and above 65 years of age. Sixty-seven (67%) of respondent between 34 - 45 years had severe dental fluorosis. In Najran region, prevalence of dental fluorosis was found to be 59.72% among the total screened children, A study of German school children in 2007m and in Indian population 2012 showed fluorosis to be 11.3% and 4%, respectively. A study in (us) 2004 reported a prevalence of 41% among adolescent. As in general the most reason for high prevalent of dental fluorosis in Hail might be because people still drink water from well, that may put them at higher chance of getting dental fluorosis. Recommending People’s awareness programs about dental fluorosis so that it will ultimately help to reduce the morbidity due to excess fluorosis as a nutritional public health problem [16-20].

Limitation of the Study

The difference of examiners will considered to be the limitation of the study.

Conclusion

Prevalence of dental fluorosis among younger school children in Hail city was found to be high, which supports the previous reports pointed to the high prevalence of dental fluorosis among adolescents and adults and imply a higher fluorine consumption among Hail population. Further research on contributing factor for dental fluorosis in Hail region and other localities of Saudi Arabia.

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Bibliography

1. Anthony Blinkhorn and Kareen Mekertichian. In Handbook of Pediatric Dentistry (Fourth Edition) (2013).
2. Dean JA. "McDonald and Avery's Dentistry for the Child and Adolescent (10th edition)". Elsevier Health Sciences (2015): 132.
3. Neville BW, *et al.* "Oral and Maxillofacial Pathology (4th edition)". Elsevier Health Sciences (2015): 52-54.
4. Meiers P. "HT Dean's epidemiology of Mottled Teeth". The History of Fluorine, Fluoride and Fluoridation.
5. "Archived copy" (PDF). Archived (PDF) from the original on 2016-06-16. Retrieved 2011-04-26.
6. Khan N., *et al.* "Dental caries, hygiene, fluorosis and oral health knowledge of primary school teachers of Riyadh, Saudi Arabia". *Saudi Dental Journal* 13.3 (2001): 128-132.
7. Almas K., *et al.* "Prevalence and severity of dental fluorosis in Al-Qaseem province Kingdom of Saudi Arabia". *Tropical Dental Journal* (1999): 44-47.
8. Akpata E., *et al.* "Dental fluorosis in 12 - 15 year old rural children exposed to fluorides from well drinking water in the Hail region of Saudi Arabia". *Community Dentistry and Oral Epidemiology* 25.4 (1997): 324-327.
9. Alhobeira HA., *et al.* "Prevalence and Severity of Dental Fluorosis in Hail, Saudi Arabia". *Journal of International Oral Health* 7.12 (2015): 1.
10. Whelton H., *et al.* "E-training for Dean's Index Version 2". Oral Health Services Research Centre, University College Cork, Ireland (2015).
11. Fluoridealert.org. Diagnostic criteria for dental fluorosis: the TSIF (Total Surface Index of Fluorosis) (2018).
12. Wong MC., *et al.* "Topical fluoride as a cause of dental fluorosis in children". *The Cochrane Database of Systematic Reviews* 1 (2010): CD007693.
13. Bergc JH and Slayton RL. "Early Childhood Oral Health". John Wiley & Sons (2015): 113.
14. Dean HT. "Endemic fluorosis and its relation to dental caries: 1938". *Public Health Reports* 121.1 (2006): 213-219.
15. Thylstrup A., *et al.* "A polarized light and micro-radiographic study of enamel in human primary teeth from a high fluoride area". *Archives of Oral Biology* 23 (1978): 373-380.
16. Al-Shammery AR., *et al.* "The prevalence of dental fluorosis in Saudi Arabia". *Saudi Dental Journal* 9.2 (1997): 58-61.
17. General Authority of Statistics. The Sixteenth Services Guide 2017, Hail Region (2018).

18. Nahid Elfaki., *et al.* "Dental fluorosis prevails among primary school children in Najran". *Merit Research Journal of Medicine and Medical Science* 6.3 (2018).
19. Momeni A., *et al.* "Prevalence of dental fluorosis in German schoolchildren in areas with different preventive programmes". *Caries Research* 41.6 (2007): 437-444.
20. Chauhan D., *et al.* "A study of prevalence and severity of dental fluorosis among school children in a Northern hilly state of India". *SRM Journal of Research in Dental Sciences* (2012).

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