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COMPARISON OF THE PREVALENCE OF DENTAL CARIES IN 12-15 YEAR-OLD CHILDREN WITH DENTAL FLUOROSIS AND THOSE WITHOUT DENTAL FLUOROSIS FROM JUJA IN RURAL KENYA
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L.W. WAWERU, G. N. OPINYA and P. M. NG'ANG'A

ABSTRACT

***Objective*: To determine any association between varying degrees of dental fluorosis and dental caries in children aged 12-15 years in a rural community in Kenya.**
***Design*: Descriptive cross-sectional study.**
***Setting*: A rural school in the central province of Kenya.**
***Subjects*: Two hundred and twenty five primary school children aged 12-15 years consisting of 100 males and 125 females.**
***Results*: A total of 225 children were included in the study, of these 125 were males and 100 were females and the age range was 12-15 years with a mean of 13.28 + 1.11SD. The prevalence of caries was 39.1% and the mean DMFT of the sample population was 1.51 + 2.25SD. The mean decayed component was 1.48 and none of the children had any filled teeth. The mean DMFT of the children with fluorosis and those without fluorosis was 1.44 and 1.55 respectively.**
***Conclusion*: There was no association between dental fluorosis and dental caries. Though there was no association between dental fluorosis and caries experience.**

INTRODUCTION

Dental caries is still high prevalent and one of the most important oral health problems in developing countries, especially among under five (1) and school age children (2). Globally, the experience of dental caries varies with geographic and socio-economic status. It has been demonstrated that in industrialised or developed countries, caries is more common among minorities and deprived groups, while in developing countries, like Kenya, it is common among children in urban areas, especially due to increased dietary intake of sugar and fermentable carbohydrates (3).

At an optimal level fluoride has been shown to have a cariostatic effect (4). The caries incidence begins to increase when chronic ingestion of high doses of fluoride during the period of tooth development, maturation, and mineralisation. The presence of the high chronic dose of fluoride has been reported to result in the malfunctioning of the ameloblasts which lay out a haphazard protein matrix resulting in a defective enamel. It has been reported that such enamel is brittle and it fractures with the forces of mastication with giving rise to varying degrees of severity fluorosis (5).

However fluoride has been shown to have a role in the clinical and microscopic changes associated with dental fluorosis. An increase in caries rate with increase severity of dental fluorosis was reported in an area whose fluoride content in the two communal sources 0.25 ppm and 2.5ppm fluoride in drinking water in Sudan (6). There was no significant difference in the DMFT between children from this two studies. Among Tanzanian children consuming water with different fluoride concentration 3.6 mgf/l and <0.4mgf/l. The mean DMFT score was 0.22 and the prevalence of caries was 14% (7).

In Turkey there was no statistical significant relationship found between caries experience and severity of dental fluorosis in high and low fluoride areas among children aged 12-14 years[8] Epidemiological studies have reported varied

findings on the association between dental fluorosis and dental caries experience. It is against this backdrop that this study aimed to identify associations between varying degrees of dental fluorosis and dental caries in children aged 12-15 years in a rural community in Kenya.

MATERIALS AND METHODS

Two hundred and fifteen primary school children aged 12-15 years were selected for the study. These ages were important as this was the last time that a sample can be obtained through the primary school system before they leave the schools. Also this is the age group with a fully erupted and functional dentition and the post eruptive changes of dental fluorosis tend to appear in the enamel. A questionnaire was used to elicit if the children were born in the area and had lived in the selected area of study and it also identified the children who had migrated in the area after tooth development whose teeth were not fluorosed. The two groups who were currently living in the same community reduced the confounding factor. The main source of water used by the respondents was a borehole. The study community was selected as it was a migratory worker population hence it was possible to get children in the same community with and without dental fluorosis.

A sampling frame was developed and a table of random numbers was used to randomly select the school. The pupils in class five, six, seven and eight were selected and all individuals in the cluster who met the inclusion criteria and consented to participate in the study were recruited after parents had signed the informed consent form.

Oral examination was done in one of the classrooms using natural light. Dental probes and mirrors were used for examination while the community periodontal index was used to score for periodontal disease.

Dental fluorosis was scored using the (8) Index which scores dental fluorosis from 0-9; where zero is given normal and nine was the most severe degree of dental fluorosis. Dental caries was assessed using the decayed missing filled teeth Index (DMFT) in accordance with the world Health organization criteria (9). Water from the borehole and surface water in the area was sampled for fluoride and the colorimetric method was used in the analysis of the fluoride levels.

RESULTS

This was a descriptive cross sectional study with the aim of determining the periodontal status of children with dental fluorosis. The area was purposively selected as it is known to have ground water as a major source of domestic water supply.

One hundred and thirty seven children 60.9% were caries free while 39.1% had dental caries, the distribution of caries by gender showed that 36% of the males and 41.6%of the females had dental caries. There was no statistical significant difference in the caries prevalence between males and females p=0.33. The caries prevalence varied among the different ages, 24% of the 12 year-olds males had dental caries and 25 54.3%of the females in this age had dental caries. The p value of dental caries by gender among the 12 year–olds was 0.01, which was statistically significant (Table1).

Table 1
Caries prevalence by gender and age (n=225) children

Age	Caries status	Males		Females		X^2	P value
		N	%	N	%		
12	Sound	19	76.0	21	45.7	6.06	0.01
	Decayed	6	24.0	25 54.3			
13	Sound	19	63.3	22	62.9		
	Decayed	11	36.7	13	37.1	0.00	0.59
14	Sound	14	56.0	15	75.0		
	Decayed	11	44.0	5	25.0	1.75	0.16
15	Sound	12	60.0	15	62.5		
	Decayed	8	40.0	9	37.5	0.03	0.56
Total	Sound	64	64.0	73	58.4		
	Decayed	36	36.0	52	41.6	0.73	0.33

Out of the 332 carious lesions the first molars had 201 carious lesions. The first molars in both the maxilla and the mandible had the highest DMFT of dental caries though the maxillary molar had the highest DMFT. The least affected teeth were the canines, which had no carious lesion (Figure 1).

The distribution of caries among males and females in the group with fluorosis and the one without fluorosis showed that 45.5% of the males with fluorosis had dental caries while 37.1% of the females with dental fluorosis had dental caries. There was no statistical significant difference in the caries experience between male and females, the odds ratio for males was 2.08 (95%CI 0.909-4.776) and the odds ratio for females was 0.659(95% CI 0.332-1.351). The common odds ratio was 1.080. (95% CI 0634-1.841) meaning that sex was not a confounding factor in the relationship between caries experience and dental fluorosis (Table 2).

At 12 years, the DMFT was 1.66±2.26 SD while the DMFT at 13 years, 14 years and 15 years were 1.45±2.38SD, 1.24±2.14 SD and 1.57± 2.20SD respectively. The overall DMFT for the sample population was 1.51 ± 2.25 SD years. The major contributing factor was decayed teeth, which accounted for 1.48. The rest was due to teeth missing due to caries (0.03). This was from the age groups 12 and 15 years, which had missing teeth due to caries component of 0.04 and 0.05 respectively. However, there were no teeth missing due to caries in the age groups 13 and 14 years. No filled teeth were observed among the respondents (Table 6). The mean DMFT for the male and female respondents were 1.46± 2.44 SD and 1.55±2.16SD respectively. However, this was not significantly different (t=-0.300, p=0.765).

Figure 1

Distribution of decayed teeth in the various tooth types. n =332 teeth

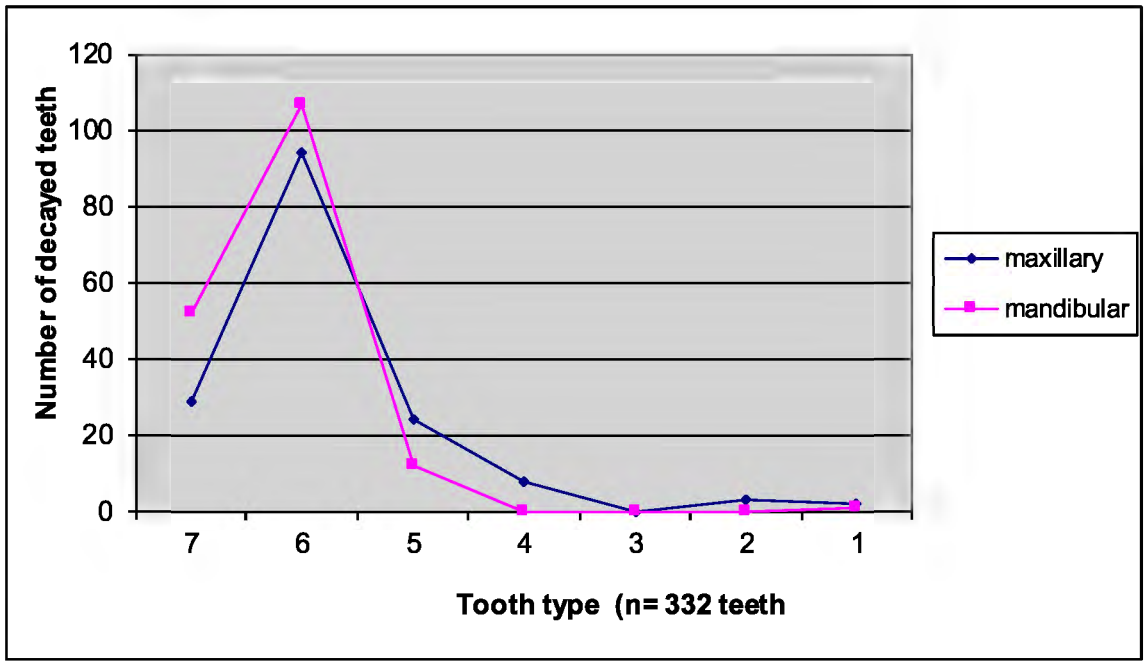

Table 2

Caries prevalence by gender among children with and without fluorosis (n=225) children

Gender	Caries Status	Without fluorosis N	%	With fluorosis N	%	OR	95%CI
Males	Sound	40	71.4	24	54.5	2.0	0.9 -4.8
	Decayed	16	28.6	20	45.5		
Females	Sound	29	52.7	44	62.9	0.7	0.3 -1.4
	Decayed	26	47.3	26	37.1		
Total	Sound	69	62.2	68	59.6	1.1	0.6 -1.8
	Decayed	42	37.8	46	40.4		

Table 3
Caries experience by age in the sample population. (n = 225)

Age (years)	Decayed (D) Mean	Missing (M) Mean	Filled (F) Mean	DMFT Mean	SD
12	1.62	0.04	0	1.66	+2.26 SD
13	1.45	0	0	1.45	+2.38 SD
14	1.24	0	0	1.24	+2.14 SD
15	1.52	0.05	0	1.57	+2.20 SD
Total	1.48	0.03	0	1.51	+2.25 SD

Table 4
Number of decayed teeth per child among children with and without dental fluorosis (n =332)

No. Of teeth decayed/ child	Children without fluorosis N (children)	Total teeth	%	Children with fluorosis N (children)	Total teeth	%
0	69	0	62.2	68	0	59.6
1	4	4	3.6	5	5	4.4
2	10	20	9.0	12	24	10.5
3	6	18	5.4	5	15	4.4
4	9	36	8.1	13	52	11.4
5	2	10	1.8	4	20	3.5
6	4	24	3.6	2	12	1.8
7	1	7	0.9	3	21	2.6
8	6	48	5.4	2	16	1.8
Total children	111		100	114		100
Total decayed teeth		167			165	

One hundred and thirty seven children 60.9% were caries free while 39.1% had dental caries. 36% of the males and 40.6% of the females had dental caries.

There was no statistical significant difference in the caries prevalence between males and females P = 0.33. Age was found not to be a confounding factor in the occurrence of caries among children with fluorosis and those without fluorosis. The adjusted odds ratio was 1.2 (95%) CI 0.7 – 2.1). The overall DMFT for the sample population was 1.51 + 2.25 SDI. The major contributing factor was decayed teeth which accounted for 1.48. Among the children without fluorosis 62.2% were carried free while 59.6% of those with fluorosis were caries free

Dental fluorosis was present in 114 (50.7%) of the sample population of all the teeth examined 51.9% scored TFI score 0, while 41.4% scored TFI score 1-4 and 8.7% scored TF score > 5. The fluoride level in the surface water was 0.2ppm and 3.6ppm in the borehole water. The DMFT of the children with fluorosis was 1.44 and among those without fluorosis was 1.55. There was no association between the caries experience and dental fluorosis. OR = 1.1 (95% CI 07-1.9).

DISCUSSION

The prevalence of dental caries in the population was 39.1% and the mean DMFT was found to be 1.51 + 2.25 SD. The children with fluorosis had a DMFT of 1.44 while those without fluorosis a DMFT of 1.55. In Kenya (10) reported the prevalence of dental caries among 13-15 years old to be 50% and a DMFT of 1.8 among children in Nairobi. The relatively lower prevalence and DMFT in the study would be due to the fact that it was based in a rural area, the presence of fluoride in the drinking water would also have a protective role in the development of caries. The DMFT in the current study was higher compared to other studies in the East African region (11). in Uganda reported a DMFT of 0.68 among 12 years old children while[11]reported a DMFT of 0.76 among

children aged 12 years in Tanzania. Differences in dietary patterns as the studies are done in diverse areas could have contributed to the differences in the mean DMFT.

The lack of any restorative treatment done in the sample population despite 39.1% of the population having dental carries could be due to the low level of awareness and practice. The low level of practice could be due to limited oral health education or inaccessibility to dental health facilities (12) and low social economic status of the community hence unaffordability of dental treatment (13). Studies show that in low and middle income countries the relative cost of basic restorative treatment is beyond the ability of many people to bear (13).

In conclusion, the prevalence of dental caries was 39.1% with a mean DMFT, of 1.51 SD 2.25. The decayed component was 1.48. 0.03 was due to missing teeth and there was were no filled teeth. The as no significant difference in the mean DMFT of the children with fluorosis and those without fluorosis was 1.44 and 1.55 respectively.

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