

Disparities in Dental Caries among Students in Senegalese Koranic School: Epidemiological Study in Daara of Koki

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Abstract

Background: School is a space where children are exposed to the social and psychosocial environment that can affect their health. In Senegal, the prevalence of dental caries is high in classic schools according to fragmented data, and unknown in the koranic school (Daaras). **Objective:** The objective is to describe the disparity of dental caries in the schoolchildren (talibes) of Daara of Koki. **Method:** A cross-sectional study was carried out on 400 talibes aged 7 to 12 years. Dental caries and socio-demographic data were, respectively, collected by clinical examination and questionnaire. **Results:** The sex ratio was 9, the mean age of 9.9 ± 1.5 years and the mean length of stay in the Daara was 2.3 ± 1.1 years. The prevalence of dental caries was 47.4%. The average mixed DFMT index was 1.1 ± 1.5 . The prevalence was 51.2% among boys, 60% among eight-year-old children and 37.4% among twelve-year-old children. By length of stay, the prevalence was 52.9% at the start and 22.2% at the end with a significant downward trend ($p < 0.0001$). **Conclusion:** The study showed an unequally distributed of caries among talibes of Koki's Daara. She suggests that oral health promotion policies are needed in Koranic schools and must rely on koranic teachers.

Keywords

Dental Caries, Students, Koranic School

1. Introduction

School health is a global public health issue. School is a space where the child, still weakly prepared for the difficulties of life, is exposed to a particular social and psychosocial environment as well as to various influences that can shape his lifestyle and affect his health [1] [2]. School is also a place for education, for producing knowledge and for the construction of behaviors that can be beneficial to health [1]. Thus, the school environment has both positive and negative implications for student health in general and oral health [3].

In Africa, oral pathologies with their social and emotional implications in schoolchildren are a real concern [4] [5]. They affect the quality of life and cause absenteeism [6] [7]. One of the most common oral diseases is tooth decay. Its prevalence is estimated at 60.1% among students in a primary school in Ouagadougou in Burkina Faso [8], at 95% and 50.3% among 12-year-old schoolchildren, respectively, in the District of Bamako in Mali [9] and northern Kenya [10]. The distribution of dental caries is unequally distributed in children according to a social determinism with a more pronounced impact on the underprivileged layers [11]. In a 2015 study, Folayan *et al.* reported a prevalence of early childhood caries of 15.3%, 39.4% and 45.5% respectively in children of better, average, and lower socioeconomic status [12].

In Senegal, children's education is provided by the classical school, the Franco-Arab school, and the Koranic school (called Daara). The first represents formal education in the French language; it can be public or private. Daaras are primarily concerned with Islamic education and are generally private initiatives, made up of traditional Daaras and modern Daaras [13]. The dental health situation in Senegalese schools remains worrying. In schools in charge of formal education, the prevalence of caries has been estimated at 51.6% in 12-year-old Senegalese schoolchildren [14], at 64.8% in 3 to 9-year-old children. from the department of Pikine, a suburb of Dakar [15]. A review of the literature carried out in 2016, reported a social inequality in the prevalence of caries observed among schoolchildren in Senegal [16]. In the Daaras, to our knowledge, epidemiological data on dental caries are not available. However, the physical and social environment between the french classical school and that of the Koranic school may differ. This latter is generally more precarious. Several koranic schools are in a boarding school system where social living conditions are generally difficult, and the schoolchildren (called talibe) are cut off from their families [17]. This socio-educational environment is predictive of a dental health status that should be evaluated. This work aims to describe the disparities in oral health among the talibe of Daara of Koki.

2. Method

Type, setting, and study population

A descriptive cross-sectional study was carried out. The study population was students aged 7 to 12 years old, selected among the children, presented at the

time of the study and agreed to participate in the research. The study was done in the period from March 7 to May 23, 2019, at the Islamic Koki Institute called Daara of Koki. This Institute was created in 1939 and the philosophy boils down to teaching, educating, and training children for free on the foundations of the Islamic religion and the values of Senegalese society. The Daara is a boarding school with a sixty-six-class school and a health post. To register, the talibe must meet the following criteria: be a Muslim, be over 6 years of age and be in good physical and mental health. In 2019, the Daara had 3742 residents, including 404 girls (10.79%). Teaching is organized in four stages; the first is devoted to memorizing the Koran and Franco-Arabic education at the primary, middle and secondary levels. In the last three stages, teaching is mixed (Koran, Arabic and French). The children are organized into study groups and each group is under the responsibility of a trainer [18].

Sampling and sample size

A two-stage survey was carried out on the talibes. The first was to draw 40 groups of them at random out of 57 in the Daara; groups consisted of around 50 talibes. Then in each group, a draw of 10 talibes was made until the calculated size was reached. The sample size is calculated using Schwartz's formula ($N = \frac{\epsilon^2 \cdot p \cdot q}{i^2}$) where N represents the sample size; ϵ is equal to 1.96 for risk of error α of 5%; i corresponds to the desired precision of 0.05; p representing the prevalence, is theoretically estimated at 50% and q is the complementary probability, that is to say $1 - p$. In total, $N = 385$, but rounded to 400 to avoid collection errors and any damaged files.

Study variables

The variables are formed from clinical data and socio-demographic factors. The clinical data relate to dental caries, which corresponds to the presence of a clinically visible lesion.

It is assessed by clinical examination and described by prevalence and DMFT/dmft index. The socio-demographic data of the child are the sex (M/F), the age in years, the length of stay in the Daara in years, the child area of origin (rural/urban) and the frequency of financial support from parents (no/rarely/frequently).

Collection of data

Data were collected using a questionnaire administered to talibes by a dental surgeon calibrated for this purpose. Through an interview with the talibe, the investigator provides information on socio-demographic data. He collects clinical data through an oral examination.

Analysis plan

The entry and analysis of data are done using the Epi info 7 software. This involved the calculation of frequencies for the qualitative variables, means and standard deviations for the quantitative variables. The distribution of tooth decay by talibes characteristics was tested by Pearson, Trend or Fischer Chi2.

Ethical aspects

The study was carried out after the authorization of the chief medical officer of the health district of Koki and the muslim chief of the Daara and moral officer of the talibes.

3. Results

Characteristic of the sample

In total, 388 questionnaires, representing 97% of the sample, were analyzed. It is made up of 85.6% boys with a sex ratio of 9. The average age is 9.98 ± 1.5 years. Talibes had an average length of stay in the Daara of 2.3 ± 1.12 years and more than a third (34.3%) had spent two years. They had come to 65% from rural areas and 81.5% of parents sent money to children and only 36% did it frequently (Table 1).

Clinical data

The prevalence of dental caries was 47.4%. The average mixed DMF index was 1.1 ± 1.5 . It consisted of 77.6% decayed teeth, 22.2% missing teeth due to decay and 1.1% treated teeth (Table 2).

Tooth decay disparity

Trend tests show a significant disparity in caries prevalence by age; from eight to twelve years old, the prevalence of caries decreases significantly ($p < 0.046$) from 60% to 37.4%. By length of stay in the Daara, the prevalence was 52.9% at the start of the stay and 22.2% at the end with a significant downward trend ($p < 0.001$) (Figure 1). Caries prevalence is significantly different according to sex ($p < 0.001$); the risk of dental caries is higher in boys (51.2%) compared to girls; However, the prevalence of dental caries is higher among children from urban areas (53.7%) than that of children from rural areas (44%), but the reported difference is not significant ($p < 0.070$). According to the frequency financial support, the tests did not show a significant difference ($p < 0.174$) in the prevalence of caries (Table 1).

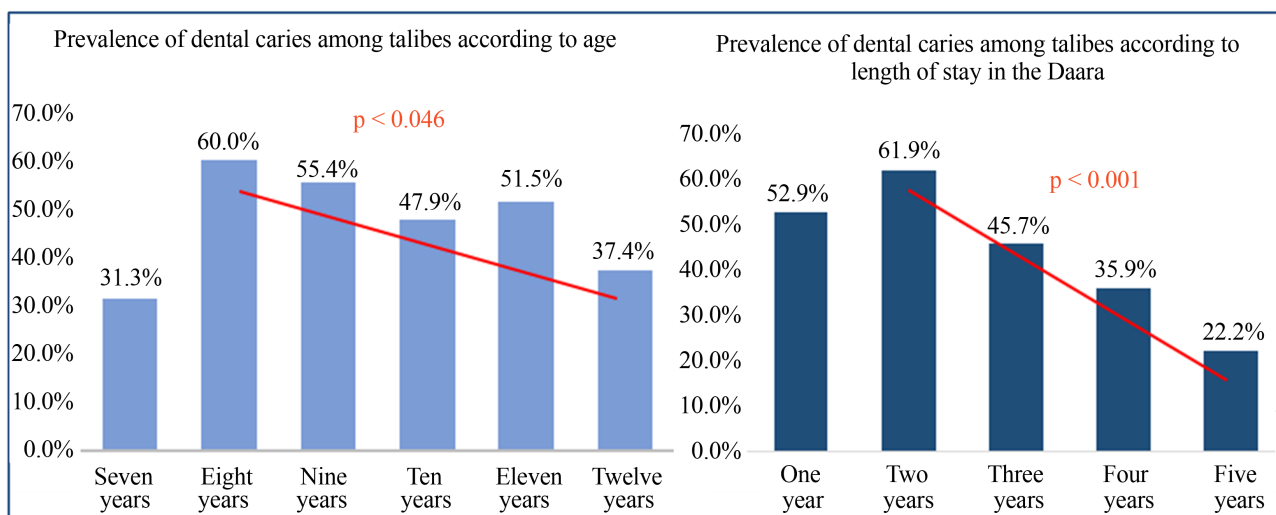


Figure 1. Disparity of dental caries according to the age of the talibes and the length of stay in the Daara.

Table 1. Description of the sample and distribution of dental caries according to the characteristics of children.

| Variables | N = 388 Distribution N (%) | Dental caries | | P |
|--|----------------------------------|---------------|--------------|-----------|
| | | No N (%) | Yes N (%) | |
| Sex | | | | |
| Girl | 56 (14.4%) | 42 (75%) | 14 (25%) | p < 0.001 |
| Boy | 332 (85.6%) | 162 (48.8%) | 170 (51.2%) | |
| Area of origin | | | | |
| Rural | 252 (65%) | 141 (55.9%) | 111 (44.1%) | p < 0.070 |
| Urban | 136 (35%) | 63 (46.3) | 73 (53.7%) | |
| Frequency of financial support | | | | |
| No | 72 (18.5%) | 45 (62.5%) | 27 (37.5%) | p < 0.174 |
| Rarely | 140 (45.4%) | 70 (50%) | 70 (50%) | |
| Frequently | 176 (36.1%) | 89 (50.6%) | 87 (49.4%) | |
| Age Moyenne = 9.98 ± 1.50 | | | | |
| Seven years | 32 (8.3%) | 22 (68.7%) | 10 (31.3%) | p < 0.046 |
| Eight years | 35 (9%) | 14 (40%) | 21 (60%) | |
| Nine years | 74 (19.1%) | 33 (44.6%) | 41 (55.4%) | |
| Ten years | 96 (24.7%) | 50 (52.1%) | 46 (47.9%) | |
| Eleven years | 68 (17.5%) | 33 (48.5%) | 35 (51.5%) | |
| Twelve years | 83 (21.4%) | 52 (62.6%) | 31 (37.4%) | |
| Length of stay at Daara Moyenne = 2.30 ± 1.12 | | | | |
| One year | 104 (26.8%) | 49 (45.1%) | 55 (52.9%) | p < 0.001 |
| Of them | 133 (34.3%) | 65 (48.9%) | 68 (61.9%) | |
| Three years | 94 (24.2%) | 51 (54.3%) | 43 (45.7%) | |
| Four years | 39 (10.1%) | 25 (64.1%) | 14 (35.9%) | |
| Five years | 18 (4.7%) | 14 (77.8%) | 4 (22.2%) | |

Table 2. Description of dental caries.

| Qualitative data | |
|----------------------|---------------------------|
| N = 388 | Total number (Percentage) |
| Dental caries | |
| No | 204 (52.6%) |
| Yes | 184 (47.4%) |

Continued

| | Quantitative data | | | | |
|-----|-------------------|------|-----------|--------|------------|
| | Mean | Sd | Min - Max | Median | Proportion |
| CAO | 1.14 | 1.45 | 0 - 9 | 1 | - |
| C | 0.88 | 1.26 | 0 - 8 | 0 | 77.6% |
| A | 0.24 | 0.60 | 0 - 3 | 0 | 21.2% |
| O | 0.13 | 1.34 | 0 - 2 | 0 | 1.1% |

4. Discussion

This study describes the disparities in the prevalence of dental caries among talibes in Daara of Koki. The results show a relatively high prevalence of dental caries, unequally distributed according to sex, age, area of origin and length of stay of children in Daara. The prevalence of caries decreases significantly inversely with the length of stay in the Daara and the age of the children. It is higher in boys and in rural areas compared to girls and in urban areas, respectively, but this difference is not significant.

A disparity and a downward trend in the prevalence of caries among talibes were noted according to their length of stay. These results suggest a positive impact of the physical and social environment of the Daara on the dental health of talibe. The Daara of Koki, a modern Islamic institute, places the conditions for the development of talibes at the heart of the educational project. A certain interest is given by the religious guide to the health of talibes, including oral health. Various initiatives have been developed in this direction, including the establishment of a medical structure equipped with an odontology service, a collaboration with the health district of Koki and a partnership with an association of dental surgeons which regularly offer oral health care at the Daara. Such initiatives can help improve children's oral health behaviors, thus explaining the decrease in the prevalence of caries over the course of their stay. This may also explain the decline in prevalence, which has been observed inversely with the age of the children; the number of years spent in the Daara being years older than the children's ages. This last result is in contradiction with the data found in the literature where the prevalence of dental caries in talibes increases with age. This is explained by a risk of cavities and duration of exposure of the teeth to cariogenic factors which increase with the age of the child [19].

The prevalence of caries was higher in boys than in girls. Beyond the fact that there are 9 boys for every girl in Daara, the poor social conditions of boys are an explanatory hypothesis. In fact, the boys live in overcrowding and in relatively precarious general sanitation and hygiene conditions. A significant number of boys prefer to look for their meals in the houses, often contenting themselves with leftovers. Conversely, girls are better treated and generally have guardians who watch over their living conditions. However, not taking into account special social conditions, some literature supports the opposite results where the preva-

lence of caries is higher in girls. Suggested explanations include earlier tooth eruption in girls which increases exposure time to a potentially cariogenic oral environment, hormonal influences, and genetic predisposition [20] [21].

The results suggest a disparity in dental caries between talibes from urban areas and those from rural areas with a lower prevalence for these latter. Previous studies approach this by explaining it by the persistence of a natural diet that is less cariogenic and less risky behavior [22]. However, recent studies have reported the opposite conclusions supporting the importance of dental caries in African children living in rural areas compared to urban areas [23]. Indeed, the evolution of lifestyles associated with the increase in the prevalence of dental caries in Africa is a reality observed in both rural and urban areas. However, poverty is higher in the rural areas in Senegal; its social and health consequences for households do not spare children putting them at greater risk of dental caries [23] [24] [25].

The study suggests that talibes whose parents send money (frequent or rare) have more prevalence of dental caries than those whose parents never send money. This conclusion supports the literature which has largely established a significant correlation between the level of risk of dental disease occurrence and the amount of income [26] [27]. It assumes that income improves social conditions with its corollaries and makes it easier to obtain adequate oral hygiene products when needed [26].

The strengths of the study lie in the quality of the clinical data collected by a review performed by a professional. The large sample size is also strength in that it helps to highlight the differences that exist. One of the weaknesses of this study is the evaluation, in children by a questionnaire, of certain socioeconomic characteristics with potential classification bias. The scarcity of epidemiological data on the children of the Daaras makes comparison difficult.

5. Conclusion

Tooth decay among students at Koki Koranic School is still relatively high and shows disparities. Gender, area of origin and length of stay in Daara are factors that discriminate against decay among talibe. These results suggest that Koranic schools are suitable places for policies to promote oral health. The Daara of Koki is an example through the good initiatives developed in this direction. WHO recommendations on oral health in schools must be implemented in Daaras. Through a participatory approach based on proportion universalism, these actions will help to significantly reduce, if not eliminate, social inequalities in dental health in the Daaras.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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