International Journal of Dental Sciences and Research, 2017, Vol. 5, No. 6, 137-140
Available online at http://pubs.sciepub.com/ijdsr/5/6/1

DOI:10.12691/ijdsr-5-6-1

Study of the Prevalence of Dental Caries and Malocclusion in a Population of Primary School Pupils in Ouagadougou, Burkina Faso

Wendpoulomdé AD Kaboré[1,*], Youssouf Ouédraogo[1], Carole Nathalie Ténin Ouédraogo[2], Raoul Bationo[1], Diouma Ndiaye[3], Anta Seck[3], Fatou Leye-Benoist[3]

[1]Unité de Formation et de Recherche en Sciences de la Santé (UFR/SDS), Université Ouaga I Professeur Joseph Ki-Zerbo, 03 BP 7021 Ouagadougou 03, Burkina Faso
[2]Hôpital de District de Bogodogo, District Sanitaire de Bogodogo, 05 BP: 6150 Ouagadougou 05, Burkina Faso
[3]Service d'Odontologie Conservatrice-Endodontie, Université Cheikh Anta Diop-Dakar. BP 5005 Dakar-Liberté, Senegal
*Corresponding author: dr_kabore@yahoo.fr

Abstract **Introduction**: In order to improve the prevention and treatment of caries as well as to increase knowledge regarding malocclusions in Burkina Faso, a prospective study was undertaken of the prevalence of dental caries and malocclusions in pupils at the Bilbalogho A public primary school in the town of Ouagadougou in Burkina Faso. **Materials and Method**s: The studied population comprised all of the pupils enrolled at the Bilbalogho A public primary school who were physically present at the school at time of the survey. The recorded variables were age, gender, the presence of tartar or bacterial plaque, the presence of a malocclusion, the extent of the tooth decay, the topography of the carious lesions, as well as the indicated therapeutics. **Results**: A total of 313 pupils were examined. The prevalence of caries was 60.1%. The level of oral and dental hygiene was poor and buildup of tartar was found in 82.7% of the pupils. Angle class I malocclusions were the most common (66.8%). There was a clear need for orthodontic care in 8%. **Conclusion**: The prevalence of dental caries and malocclusions at this school in the capital was quite high. Recourse to treatment was quite low for this population. For many of the pupils the reported lesions were quite advanced, thus underscoring the need for greater awareness of oral and dental care as well as systematic routine dental consultations.

Keywords: *dental caries, malocclusion, prevalence, therapeutic, burkina faso*

Cite This Article: Kaboré WAD, Ouédraogo Y, Ouédraogo CNT, Bationo R, Ndiaye D, Seck A and Leye-Benoist F. "Study of the Prevalence of Dental Caries and Malocclusion in a Population of Primary School Pupils in Ouagadougou, Burkina Faso." *International Journal of Dental Sciences and Research*, vol. 5, no. 6 (2017): 137-140. doi: 10.12691/ijdsr-5-6-1.

1. Introduction

Oral and dental diseases are the most common non-transmissible diseases (NTD). Dental caries are the most prevalent chronic disease in the World. In the African region of the WHO, the DMFT (Decay- Missing-Filled) indices vary considerably, from less than 1.0 in Ghana and in Guinea Bissau to more than 4.0 in Gabon and in Mauritius [1]. Dental plaque is an etiological factor implicated in the formation of this type of lesion. Its formation is promoted by poor oral hygiene, with at times local aggravating factors such as incorrectly aligned teeth or a diet rich in carbohydrates [2].

Furthermore, local studies have documented a rapid increase in the burden of morbidity in both urban and rural populations. The majority of caries remain untreated. Since 1995, the WHO has officially recommended boosting preventative measures and education for school-age children. Between 60 and 90% of school-age children in the world have caries [1]. Inequalities in terms of the presence of caries and resources for dental care have been shown to depend on the sociocultural level [3]. The main purpose of schools is to deliver a preset educational program, although they can have an influence in broader sense, particularly since children spend a considerable amount of their time at school. The advantage of health education at school is that it can alter behavioral patterns early in life. This is one of the elements underlying the efficacy of a preventative measure that can enhance awareness for all of the individuals in a specific age group [4]. At the local level, the approach needs to be tailored to suit the children or youngsters, in order to optimize the preventative actions through participation in practical measures that are compatible with their daily schedules and that will continue to be part of their outlook regarding healthcare [5]. The aim of this study was to assess the oral and dental health of pupils of the Bilbalogho A public primary school of Ouagadougou so as to determine their orthodontic needs and the prevalence of dental caries in this population of children.

2. Materials and Methods

2.1. Location, Duration, and Nature of the Study

This was a descriptive prospective study undertaken to determine the orthodontic and conservative odontological care requirements of a population of pupils in the town of Ouagadougou. It took place over the course of one month (January) in 2015. It was a descriptive cross-sectional study based on questioning of the subjects, followed by a clinical examination of the dental health status of the children. The recorded variables were firstly the pupil's age, gender, the area that they live in, the presence of tartar or of bacterial plaque, the extent of decay, the topography of the carious lesions, as well as the indicated therapeutic. Additionally, the Angle classification and the occurrence of dental malocclusions such as tooth crowding, a crossbite, an openbite, or an overbite were also noted in each child.

2.2. Collection of the Data for the Survey

The target population comprised all of the children attending the Bilbalogho A public primary school in the town of Ouagadougou.

2.3. Criteria for Selection

All of the pupils regularly enrolled and following the curriculum at the Bilbalogho A public primary school were included in the study. Conditions such as the pupil's absence at the time of the survey or their refusal to participate in the study warranted non-inclusion in the study. Children who were ill and whose health did not allow for an oral and dental examination were excluded from the survey.

2.4. Statistical Analyses

The statistical analyses of the data were performed using Sphinx version 5 software (Parc Altaïs 74650 Chavanod, France). The χ^2 (Chi^2) test was used to compare pairs of statistical variables. The differences were considered significant for $p < 0.05$. Text and graphs were generated using the 2010 versions of Word and Excel software.

3. Results

3.1. Socioeconomic Characteristics

A total of 313 pupils, of whom 172 were female (55%) and 141 male (45%) ($p = 0.0797$) were examined. The majority of the pupils were between 10 years (22.4%) and 12 years (18.2%) of age. All of them were residents of the town of Ouagadougou, and they lived in neighborhoods surrounding the school.

3.2. Oral and Dental Health Status of the Pupils

3.2.1. Medical History

Little data regarding the medical history of the pupils was gathered at the interview. Furthermore, the teachers had no knowledge of the medical history of the pupils. Only two cases of asthma (0.6%) and a case of allergy to penicillins (0.3%) were reported.

3.2.2. Oral and Dental Health Status of the Pupils

The majority of the pupils (60.1%) exhibited one or more caries. Tartar buildup occurred in 82.7% of them ($p = 0.0001$). The areas of predilection of the caries were on the occlusal sides (47.6%) and the proximal sides (36.7%). The pupils were mostly at the mixed dentition stage (87.2%). The four permanent front molars had erupted in 88.2% of the pupils. The teeth with caries of the furrows were mostly the permanent lower molars (70%). In regard to caries of the dentin, the temporary molars were represented the most (55.3%) followed by the permanent lower molars (20.4%). Coronal decay most often occurred with the temporary molars (36%) (Table 1).

Table 1. Oral and dental lesions compiled among the pupils

Type of lesion	Number
Furrow caries	251
Dentin caries	295
Pain with affliction of the pulp	301
Parulis abscess	101
Tooth with substantial coronal decay	306
Tooth decayed to the root	310
Polyp of the gums or pulp	78

3.2.3. Angle Classification and Malocclusions

The pupils of the Bilbalogho A public primary school exhibited various orthodontic anomalies that were clearly in need of treatment. They mainly (66.8%) involved Angle class I molars (Table 2). Tooth crowding or diastema were encountered the most (37.7%) and overbites less frequently (8%) (Table 3).

Table 2. Angle classification

Angle class	Subjects (N%)
Class I	209 (66,8)
Class II	87 (27,8)
Class III	17 (5,4)
Total	313 (100)

Table 3. Dental malocclusions

Malocclusion		Total (N%)
Crossbite	Yes	49 (15.7)
	No	264 (84.3)
	Total	313 (100)
Tooth crowding or diastema	Yes	118 (37.7)
	No	195 (62.3)
	Total	313 (100)
Openbite	Yes	42 (13.4)
	No	271 (86.6)
	Total	313 (100)
Overbite	Yes	27 (8.6)
	No	286 (91.4)
	Total	313 (100)
Excessive overhang	Yes	59 (18.8)
	No	254 (81.2)
	Total	313 (100)

3.2.4. Indicated Therapeutics

The therapeutic options were numerous. These were first and foremost incentivizing all of the pupils in regard to oral hygiene and the possible prescription of medication, if necessary (e.g. against pain or infections). Tartar removal and polishing was indicated for all of the pupils who exhibited tartar buildup (82.7%). Conservative care was considered to be best option for teeth that could be restored. This amounted to endodontic treatments for permanent teeth in case of affected pulp, obturations with amalgam or composites for lesions limited to the dentin, or sealing of anfractuous furrows for those limited to the enamel. Teeth that could not be restored required being extracted with installation of a spacer if need be.

The indicated orthodontic therapeutics varied, involving interception, orthopedics, or the use of braces. Interception is suitable for patients who have an anterior crossbite, using a palatal plate equipped with a spring to close the gap. Lateral crossbites require treatment with a spreader that delivers an orthopedic action. For patients exhibiting tooth crowding, treatment with braces was prescribed for a duration from one and a half years to three years, depending on the case. There was a clear need for orthodontic care for 8% of the pupils (Table 4).

Table 4. Requirement for orthodontic treatment

Requirement for treatment	Subjects N(%)
None	195 (62.3)
Moderate	93 (29.7)
Pressing	25 (8)
Total	313 (100)

3.2.5. The Treatments that were Performed

Ultimately, 128 pupils underwent tartar removal, 23 received a topical fluor treatment, and 35 underwent sealing of pits and fissures. Eleven (11) tooth extractions, 6 pulpectomies, 16 restorations with amalgam and 5 restorations with composite resins were also be performed on these pupils.

4. Discussion

"No one, in this day and age, can claim to be in good health if they do not have proper oral and dental health". The latter is accessible to all, once good oral hygiene practices have been acquired from as young as possible and maintained throughout one's life, and when an annual dental visit becomes an integral part of everyone's approach to healthcare. The more care is neglected, the more that care is needed, and it then also becomes more onerous [6]. Dental carries are classified as the fourth-most medical scourge in the world, immediately following cancers, cardiovascular diseases, and AIDS [7]. To this, one could add the dysfunctional and esthetic aspects of orthodontic anomalies, for which the psychological impact has proven to be hard to evaluate [8].

While tooth caries still affect way too many people, they are never fatal. Indeed, as they are the result of a multifactorial bacterial disease that is able to destroy the hardest entity (enamel) in the human body, tooth caries are inevitable. Acquisition of a suitable daily behavior allows everyone, young and old, to prevent the occurrence of caries [6]. Oral and dental afflictions represent a major public health issue due their high prevalence and their impact on overall health. The pupils of the Bilbalogho School generally had poor oral and dental health as well as orthodontic anomalies. Our study was in regard to pupils of 5 to 15 years of age, and it revealed a prevalence of dental caries of 60.1%. Baukaka *et al*. [9] in Congo reported in a study of children of 1 to17 years of age that females were represented more (52%) and that the prevalence of caries was 79.1%. This may be due to insufficient availability of oral and dental care and very rudimentary orthodontic therapeutics. Indeed, in Burkina Faso, there were only 80 practitioners who were registered with the Roll of the National Order of Dental Surgeons in 2017, for a total population estimated to be 19 000 000 inhabitants, thus amounting to just 1 dental surgeon for every 237 500 inhabitants. The WHO recommends a ratio of at least 1 dental surgeon for every 10 000 inhabitants. It has been reported that in Senegal there is 1 dentist for every 38 000 inhabitants as well as unequal recourse to care [10]. Over the past twenty years, the prevalence of dental caries has been in decline in developed countries. Their prevalence is still substantial, however, in underdeveloped countries such as Senegal (96%) [11], India (49.8%) [12], the Sudan (65.5%) [13], as well as in Mexico, which has a rate greater than 95% [14]. In developed countries such as France and China, the rates are 43.6% and 35%, respectively in children with an average age of approximately 12 years [15]. In Burkina Faso, the lack of financial means, the inadequate care entities, traditional therapies, and the tendency for self-medication are the main reasons for delayed consultations, with the patients only attending a health center when pain occurs [16]. The availability of oral and dental care in the town of Ouagadougou is lacking and it is inaccessible to the least wealthy populations [17]. The number of proximal lesions was substantial in our study. These lesions promote complications as they can go unnoticed at the initial stage. Delayed consultations explain the number of parulis abscesses and polyps that are encountered. The lack of brushing could also explain the elevated number of caries of furrows and of dentin. In 2009, Koko *et al*. [18] reported in a study in Gabon that the occurrence of caries was proportional to the lack of brushing. This study showed that dental caries in the town of Libreville were a worrisome health issue, with a prevalence of 75% for children of 6 years of age and 81.4% for children of 12 years of age. Baukaka *et al*. [9] found that there was a huge need for treatment and that there was a lack of brushing. Preventative measures hence need to be promoted.

Moreover, good orofacial functioning in children is indispensible for proper craniofacial growth [19]. Being able to chew requires a sound set of teeth. A tooth ache can promote one-sided chewing that may lead to facial asymmetry. Yet in our study, 60.1% of the pupils exhibited at least one tooth decay lesion. Treatment of milk teeth improves masticatory function in addition to sustaining room for the development of permanent teeth without crowding. The reestablishment of alternating bilateral masticatory function, nasal ventilation by removing all obstacles for nasal respiration in children who are often

subjected to rhinitis, and normal swallowing ensure stimulation of the median palatine suture for cross-sectional growth of the jaw [20].

In the present study, 37.7% of the pupils were in need of orthodontic care. This level is similar to the rate of 42.6% found in Senegal by Ngom et al. [21]. It exceeds the 27.3% reported in the study of Perillo *et al*. [22] in Italian school-age children. On the other hand, it is significantly lower than what was noted in patients by Bourne *et al*. [23] and Ghijselings *et al*. [24] who reported 78% and 80.3%, respectively. This difference is due to the fact that their patient samples included individuals who had already sought a consultation. The patients who had already sought a consultation were referred or they had a condition that required treatment. We also noted that the orthodontic anomalies appeared to be cumulative, so that for a given individual there was typically more than one pathological element. Class II cases often had an excessive overhang, an overbite, and tooth crowding. Interceptive therapeutics, by at least preventing the worsening of malocclusions with devices that are less costly to deploy appears to be indicated more.

5. Conclusion

The rate of caries in this study was very high and there was a real need for orthodontic care. This indicates a very low level of recourse to oral and dental care in the population. For many, the reported lesions were very advanced, thus underscoring the need for awareness regarding oral hygiene and the importance of enhancing access to care. A systemization of regular visits to the dentist would allow for better prevention of tooth caries and earlier diagnosis of malocclusions. Early treatment of orthodontic anomalies prevents them from becoming worse, while the treatments are also shorter and less onerous. This study therefore allows the directions for prevention and treatment of dental caries and malocclusions in Burkina Faso to be defined.

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