



Pesquisa Brasileira em Odontopediatria e
Clínica Integrada

ISSN: 1519-0501

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Brasil

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Pesquisa Brasileira em Odontopediatria e Clínica Integrada, vol. 16, núm. 1, 2016

Universidade Estadual da Paraíba

Paraíba, Brasil

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Original Article

School Environment and Dentoalveolar Trauma in Public Schools of Xaxim, Brazil

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Academic Editors: Alessandro Leite Cavalcanti and Wilton Wilney Nascimento Padilha

Received: 30 April 2015 / Accepted: 17 September 2015 / Published: 18 January 2016

Abstract

Objective: To assess the environment of elementary public schools of Xaxim, SC, Brazil, targeting the prevention of dental trauma. **Material and Methods:** All thirteen public schools in the city of Xaxim had their physical structure assessed concerning the conditions of floors, windows, stairs, capacity, type of surface of the schoolyard, number of supervisors during recess, and social inclusion. The social environment was assessed through the application of the Brazilian National School-Based Health Survey (PeNSE) to either school principals or educational coordinators. Regarding the social environment, areas for student physical activities, episodes of violence (swearing, physical and verbal aggression), and cases of robbery and theft in the school environment were assessed. Data were analyzed by descriptive statistics. **Results:** Situations considered of risk for the occurrence of accidents and dental trauma were identified. Most schools presented episodes of swearing and fights among students, as well as inadequate physical environment. **Conclusion:** Both social and physical environments were favorable to the occurrence of dental trauma; however, studies that establish this relationship in a deeper fashion are still necessary.

Keywords: Dental trauma; School health; Environmental health.

Introduction

Dental traumas are injuries that affect the face and teeth of individuals, especially children attending elementary school. These injuries may cause esthetic, psychological, social, and functional problems, as well as irreparable dental losses, not only at the accident, but also during post-treatment [1].

The main site of occurrence of dental trauma in school-aged children (7 to 12 years) with mixed dentition is the school [1]. Since the school environment is associated with the occurrence of dental injuries [2,3], the school commitment to the safety of their students should involve the prevention of traumatic injuries. However, some schools have offered unsafe leisure options and unsafe physical space, including stairs and floors [4].

Schools are probably where the Federal Government has invested most of health education programs. One example is the Health in School Program, created in 2007. One of its goals is to promote and assess the oral health of students; however, dentoalveolar trauma and its prevention have not been addressed. Another strategy has been the Health Promoting Schools, which drives actions and resources to health promoting areas [5].

In such schools, the physical environment must be adequate to avoid accidents. As to the social environment (relationship among staff, students, and teachers), it aids the reduction of violence, improvement of relationships among members of the school community, and the reduction of dropout rates. The development of personal health skills of the community and schoolteachers through educational activities that consider health in a coherent, holistic, and realistic way is also a differential of health promoting schools [5].

Oral impairments and diseases have been indicated to present common risk factors to other important chronic diseases, such as cardiovascular diseases, cancers, and lesions of other nature. Moreover, the risk of oral health problems may increase due to other health problems. As an example, the risk of dental trauma is higher in the presence of child overweight or obesity [6]. Therefore, an association with other areas and environments involved in health promotion, helping to improve the efficacy and efficiency of health promotion activities is expected [7].

Recent studies have evidenced the lack of association between socio-economic [8,9] and clinical indicators [9] with dental trauma. However, its occurrence may be higher in men, who are typically involved in contact sports [9]. Since the social school environment has an impact on the oral health of students [2], the prevention of dentoalveolar trauma should be included in oral health prevention strategies in schools, aiding the development of healthy lifestyles and self-care practices of students [10]. A healthy school environment associated with health care at the school may control risk factors and hazards in oral health at this particular space [10].

Risk factors that may result in dental trauma involve fights, moral harassment, and the practice of contact sports. Individualized approaches to help prevent dental trauma include the orthodontic treatment in children with pronounced overjet and the use of mouthguards during sport activities [7]. However, interventions towards the environment may generate higher impact in the

reduction of dental trauma. This study aimed to assess the social and physical environment of public schools in Xaxim, SC, Brazil, targeting the prevention of dental trauma.

Material and Methods

This study is a cross-sectional, observational, and descriptive study performed from September to December 2013 in public schools of Xaxim, Southern Brazil.

The population of Xaxim corresponds to 25,713 people [11]. The Human Development Index of Xaxim in 2010 was the 48th of the State of Santa Catarina (0.752). The Education Index was 0.662. The indexes of the State capital, Florianópolis, which is first place in the State ranking, were 0.847 and 0.800, respectively. According to the School Census, as of 2013 Xaxim had thirteen public elementary schools. All the schools were assessed. Two of them were located in the rural environment, nine schools were run by the City, while the other four were state schools. The number of students enrolled in elementary school was of approximately 3200 students [12].

The study project was approved by the Municipal Department of Education and by the Regional Agency of Education. Then, the study was submitted and approved by the institutional Research Ethics Committee under protocol n. 144/2013. After the objectives of the study were clarified, school principals or educational coordinators signed an informed consent form, according to Regulation n. 196/1996 of the National Council of Research Ethics (acronym in Portuguese - CONEP).

They were interviewed on social and environmental aspects of the school based on the second edition of the Brazilian National School-Based Health Survey (acronym in Portuguese - PeNSE) of 2012. PeNSE is a supervision and monitoring system of school health that aims to verify the ability of school managers to ensure a permanent and systematic supervision process for students' health, in Brazil [13].

The study variables given as potentially affecting the occurrence of dentoalveolar trauma were: areas for student physical activity, categorized in six groups (outdoor court, indoor court, running track, swimming pool, schoolyard, and no areas designed for physical activities), episodes of violence in the school environment (among students, and among students and teachers/staff), presence of gangs nearby or inside the school, episodes of students carrying any type of weapon, episodes of theft or robbery, and presence of students with some kind of disability. The latter variables were dichotomized (Yes/No).

Data concerning the physical structure of the school environment were collected by the researcher and recorded in a specific worksheet. The variables observed were: conditions of windows, conditions of the floor in classrooms, hallways, cafeteria, bathrooms, schoolyard and playground, and conditions of stairs, when present. Each variable was classified as poor, regular, and good according to pre-established criteria [3] (Table 1). The percentage of hard surfaces present in the schoolyard (concrete, pavement, stone, wood, metal, bricks) were assessed and categorized in tertiles (rate of these surfaces in the schoolyard).

Table 1. Criteria for assessment and classification of physical school environment [3].

Space	Classification	Criteria
Conditions of the windows	1- Poor 2- Regular 3- Good	Low windows and broken glass High windows, but no protection grid Windows with protection grid
Conditions of the floors: - classrooms; - hallways; - cafeteria; - bathrooms; - backyard/playground	1- Poor 2- Regular 3- Good	Irregular surface, holed and slippery Most of the surface is slightly irregular, but not slippery Regular and slip-resistant surface, without holes or any other physical obstacle, and easy to clean
Conditions of the stairs	1- Poor 2- Regular 3- Good 4- Absent	Absence of handrails, slippery and irregular surface, and narrow Slippery or slightly irregular surface with only one handrail Regular and slip-resistant surface with handrails in both sides
% of surface in the backyard/playground	1- > 66% 2- 34 to 66% 3- 0 to 33%	Hard surfaces: concrete, pavement, stone, wood, metal, bricks Soft surfaces: sand, grass, and soil

The rate of hard surfaces in the schoolyard was measured and categorized in tertiles. The area designated to accommodate children during recess was measured by the researcher using a 5 m measuring tape. The area measured was used to estimate the number of students per square meter during recess in each school period (morning and afternoon). The number of supervisors in each recess period was obtained with the school manager and used to calculate the rate for each 100 students.

Data were tabulated in Microsoft Excel 2010 (Microsoft Corp.) and transported to the Statistics Package for Social Sciences (SPSS) 19.0. Descriptive analysis was applied to data.

Results

The results for social school environment are presented in Table 2. Indoor and outdoor courts and yards are the main areas for student physical activity. Episodes of violence between students were reported by most schools. Although less often, violence against teachers and staff was also reported. A high frequency of disabled students was observed.

Table 2. Absolute and relative frequency of the social environment conditions at the schools.

Variable	n	%
Areas for physical activities at the school		
Indoor court	11	84.6
Outdoor court	10	76.9
Schoolyard	10	76.9
Running track	0	0
Swimming pool	0	0
Episodes of violence in the school environment		
Swearing and arguments among students	11	84.6
Physical aggression and fights among students	10	76.9
Physical or verbal aggression from students to teachers	7	53.8
Physical or verbal aggression from teachers/staff to students	3	23.1

Presence of students possessing any weapon		
Yes	2	15.4
No	11	84.6
Presence of gangs		
Yes	0	0
No	13	100
Episodes of theft or robbery		
Theft	2	15.4
Robbery	3	23.1
Presence of students with any type of disability		
Yes	10	76.9
No	3	23.1

Results concerning the school physical structure are presented in Table 3. The condition of the physical structure of the schools was mostly poor or regular, with emphasis on schoolyards used for student physical activity.

Table 3. Absolute and relative frequency of the conditions of physical structure of the schools.

Physical structure	n	%
Condition of the windows		
Poor	5	38.4
Regular	6	46.2
Good	2	15.4
Condition of the classroom floor		
Poor	13	100
Regular	0	0
Good	0	0
Condition of the hallway floor		
Poor	9	62.9
Regular	4	30.8
Good	0	0
Condition of the cafeteria floor		
Poor	11	84.6
Regular	2	15.4
Good	0	0
Condition of the bathroom floor		
Poor	13	100
Regular	0	0
Good	0	0
Condition of the schoolyard/playground floor		
Poor	7	56.8
Regular	6	46.2
Good	0	0
Condition of the stairs		
Poor	2	15.4
Regular	6	46.2
Good	0	0
Absent	5	38.5

Approximately 54% of the schools presented 34-66% of the yard floor constituted by hard surfaces. The mean number of students per square meter at the schoolyard during recess was 0.29 students/m². The mean number of supervisors during recess was 1.8 supervisors per 100 students.

Discussion

Children and adolescents spend approximately one third of the day at school or commuting to it. Therefore, the safety of the school environment, which involves the physical, emotional, and psychological environment, should be a constant concern for parents, teachers, and school management [14]. The authors of this study opted to investigate the physical environment of public schools and its potential collaboration for the occurrence of dental trauma, based on the understanding that the structure of such areas is more precarious than that of private schools [3,15].

The study identified the precariousness of the physical and social conditions of the school environment in the city of Xaxim, SC, Brazil. Nevertheless, assumptions based on our results to other realities should be made cautiously regardless of the fact that the total number of schools were included in the study, considering Xaxim is a small city with a reduced number of schools when compared to other cities in the region.

It is noteworthy that, due to the municipalization process of the elementary school, three state schools share their physical space to accommodate extensions of municipal schools, determining different social environments and behaviors in a single physical space.

When it comes to the areas available for physical activities in the school environment, the School Census of 2009 revealed the presence of sport courts in 60.4% of Brazilian schools [12]. Our results, however, indicated that most of them presented irregular floors and inadequate maintenance, thus not reflecting the safest conditions for the practice of physical activities. Moreover, due to their hardness, such surfaces tend to increase the severity of accident injuries involving students [3].

Episodes of violence in schools are not a recent phenomenon and characterize a serious social problem [16]. Episodes of physical aggression were reported by the majority of the school principals (Table 2). Fights usually generate critical situations that may involve several people, increasing the risk of injuries in the face or the body.

The presence of wheelchair users, even though small, was identified in the study, and should be considered during planning and construction of school facilities, helping to avoid accidents. Social inclusion and accessibility in public spaces have become a recent concern, and in order to allow specialized educational attendance to handicapped people, they are regulated by article 208 of the Federal Constitution [17] and by articles 58 and 59 of the Law of Directives and Bases (LDB) [18]. The term accessibility has been mainly associated with handicapped people; however, access planning should be guaranteed to any person and should obey the technical normative established [19]. A well-planned environment favors the circulation of people in a safer fashion, decreasing the risks for traumatic injuries.

The quality of school facilities has been considered poor and does not meet the minimal requirements of environmental comfort and safety [20]. The windows of the schools assessed were mostly classified as regular (Table 1). Commonly, a single school presented more than one type of window. Safety criteria hereby adopted was based on a previous study that considered the presence of broken glass, the height of the window, and the presence of protection [3]. The authors of that study found 76.5% of windows of public and private schools were classified as poor or regular [3]. In our study, most windows presented low height and broken glass, generating insecurity.

Most floors of classrooms, hallways, cafeterias, bathrooms, and backyards/playgrounds were classified as poor (Table 1). Floors of school environments should be regular, steady, stable, and slip-resistant, and should avoid trepidation of wheelchairs and baby strollers [13,19,21]. In a study conducted in Thailand, the authors observed that 73% of the floors of the schools followed the technical safety normative, 21% presented good conditions, and 6% were in poor conditions [2]. In a recent study conducted in Brazil, different areas in the same school presented floors with different conditions [3]. Most floors of cafeteria and bathrooms were considered in good conditions, while hallways and backyards/playgrounds were classified as regular. The lack of a constructive pattern of floors in school environments favors the occurrence of traumatic injuries, including those involving teeth. Furthermore, the presence of hard and irregular surfaces increases the magnitude of the injury comparing to absorbent surfaces [3].

Approximately 62% of the schools presented stairs, wherein 46.2% were in regular conditions and 15.4% were in poor conditions. The absence of handrails on both sides of the stairs and of access ramps, and the presence of pavement with broken slabs make such areas susceptible to the occurrence of trauma. In another study, the schools of Pelotas-RS that presented stairs (approximately 38%) were classified as regular [3]. In our study, the presence of ramps was observed in some schools. According to the Brazilian Technical Normative 9050/2004, when ramps present good conditions, they are preferable to stairs [21].

The schoolyard is considered the main space for the occurrence of traumatic injuries, followed by gym, classroom, hallways, and stairs [22]. The schoolyards are understood as the areas where students stay when they are not performing school activities. Nevertheless, such areas are important for social interaction and leisure activities, and not necessarily follow a specified, standardized design [21]. The condition of schoolyards and playgrounds was classified as poor in 57% and regular in 46% of the schools. Most of them are made of hard surfaces that do not absorb impacts during an accidental fall and might increase the impact of trauma. Previous studies also identified that the floor of these areas was essentially constituted by hard surfaces [2,3].

Studies have suggested that the number of students in schoolyards during recess and the presence of supervisors influence the occurrence of traumatic injuries [2,3]. During class a teacher is responsible for approximately 40 students, which would result in two/three teachers for each 100 students [3]. Since the recess period is more prone to the occurrence of traumatic injuries, one

would expect the number of supervisors to be higher than the aforementioned, although there is no recommendation about the minimal number required.

According to the National Council of Education, the recess period is considered a period of effective school activity [23]. Therefore, free or directed activities during recess integrate the pedagogic project of the school and should be effectively supervised. A monitored recess period would turn into an excellent opportunity for educators to better acknowledge the students, as well as to act in an educational fashion [24].

In another study, 74.5% of the teachers supervised sports practice at school and 90.9% supervised children during recess. Only 2.9% of the teachers stated that they did not supervise children during either recess or sports practice [25]. These data suggest the need to review student supervision logistics during recess, helping to control dangerous situations to which the students are exposed.

Significant changes in the school environment are required to promote oral health, including the prevention of dental trauma. In addition, the planning of other school areas should follow the technical normative, considering safety and accessibility issues. The isolated, compartmentalized, and individualized approach is not effective to promote oral health in all sectors of the school community. The common risk factor approach suggests a higher integration of oral health and general health strategies [7], and may be a valuable alternative for the prevention of dentoalveolar trauma in the school environment.

Conclusion

It was observed that the physical environment of public schools of Xaxim is not favorable to the prevention of dental trauma; additionally, several situations considered of risk for the occurrence of accidents and dental trauma were identified. The condition of the physical structure of the schools does not follow the normative for school facilities.

The social and physical environment of schools could favor the occurrence of dental trauma; however, further studies correlating the prevalence of dental trauma and school environment are still required.

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