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RESEARCH ARTICLE

DENTAL CARIES AND TREATMENT NEEDS AMONG CHILDREN WITH PHYSICAL DISABILITIES IN DHAMAR CITY, YEMEN: A COMPARATIVE STUDY

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Abstract

Background and objective: A child with disability is a child who, for any reason, has a problem with learning, communication, or using their physical, and social activities. There are a lot of people with different disabilities around world which forms an important section of the community. The Objective of this study was to compare the prevalence of dental caries and treatment needs among children with and without physical disabilities in Dhamar City, Yemen.
Study design*:* A comparative cross-sectional study was conducted among physical disability children (n=101) and control children (n=101), their age ranged from 6 to 12 years old in Dhamar City, Yemen. WHO Oral Health Assessment Form for children, 2013 was used for assessment of dental caries and treatment needs.
Results: The findings of this study indicate a statistically significant difference in dt (decayed teeth) between children with physical disabilities and the control group (p=0.013). Among children with physical disabilities, 55.4% exhibited decay in their primary teeth, whereas the prevalence was 72.3% among the control children. The highest mean dmft scores were observed in the 6-7 years age group. Additionally, a significant difference in dmft values was found in the control children (p=0.001). It is essential to highlight that only 14.4% of the children evaluated in this study had no treatment needs identified.
Conclusions: In conclusion, the prevalence of dental caries was lower among physical disability children than control. Control children have a significantly higher dental caries in primary teeth than physical disability children. Additionally, both groups exhibit a considerable proportion of unmet treatment needs.
Keywords: Dental caries, disabled children, treatment needs, Yemen.

INTRODUCTION

In Yemen, there is a scarcity of research and study pertaining to oral health issues, despite some existing studies that have addressed topics such as caries prevalence, malocclusion among children, premature tooth loss, traumatic dental injuries, and impacted third molars[1,2,3,4,5]. However, currently, only one study available that specifically examines the oral health of children with disabilities[6]. This study represents the second investigation of dental caries among children with disabilities, and is the first to compare dental caries rates between physically disability children and their healthy counterparts. A child with disability is a child who, for any reason, has a problem with learning, communication, or using their physical, and social activities[7]. There are many people with different disabilities around world, forming an important section of the community[8]. According to 2013 survey of National Health in Yemen, it has been reported that 3% of the Yemeni population has some type of disability, with physical disability being the most frequent, accounting for about 38% of other disabilities[9].

Oral health is important and related to general health, as oral health problems can affect a person's appearance, speech, nutrition and digestion[10]. The major oral health problems are generally considered to be dental caries and periodontal diseases[11]. One of the very commonly chronic diseases around the word is dental caries[12]. It has been found that between 70 and 90% of populations have untreated tooth decay[13], and it is the main reason for oral pain and tooth loss[12].

Children with disabilities have been found to have more dental diseases compared to normal children[14]; however, dental care among disability people is one of the most neglected health needs[15]. They can contribute to a higher risk of dental caries due to various factors, including limited manual dexterity, impaired mobility, difficulties in maintaining oral hygiene practices, and potential dietary restrictions or difficulties in consuming certain foods[16].

Unfortunately, in Dhamar City, there is no available data related to dental caries and the required treatment of physically disabled children. Therefore, the aim of this study is to determine the prevalence of dental caries and treatment needs among children with physical disability and compare it with control children in Dhamar city. This will help us to improve oral health and understand the need of children with disabilities, giving them a chance for better oral health.

MATERIALS AND METHODS

Examiner Calibration

Before data collection, the calibration of the examiner was performed. Intra and inter calibration had been done to test the selected indices and diagnostic criteria for dental caries and Kappa statistic was used for assessing.

Ethics approval and consent to participate

Before starting this study, ethical approval was taken from the Association for Care and Rehabilitation of physical disability children. Furthermore, there was a need to get an approval from the schools that were participating in the study. From children's parents a consent was also acquired.

Study Design

A comparative cross-sectional study.

Study Population

The study population required 160 participants, which were collected using Open Epi Info software, version 3, according to Chaudhary *et al*.[17]. The expected frequency of dental caries in children with disabilities was estimated at 90%, with a confidence level of 95%. However, for this study, the sample size was increased to 202 subjects to enhance result precision. The 202 participants were randomly selected and divided into two groups. One group consisted of 101 physically handicapped children attending special need schools for physical disabilities, physiotherapy center, and public schools that integrated physically disabled and healthy children. The other group comprised 101 healthy children attending government schools with integrated physically disabled children. The age range of the participants was 6 to 12 years old. The ages were then categorized into four categories, as shown in Table 1. The gender distribution in each group was 56.4% male and 43.6% female. Uncooperative children or those with mental disabilities, visual impairment, and hearing impairment were excluded from the study.

Clinical Examination

Children were examined in a classroom of the school that was selected by the principles school. Dental examinations were performed under good lighting conditions, using dental mirrors and Community Periodontal Index (CPI) probe while sitting on an ordinary chair or in their wheelchair.

Dental caries and treatment needs were evaluated by DMFT/dmft indices accordance with the World Health Organization (WHO) Oral Health Survey Basic Methods 2013. Parents were communicated about all the clinical finding and refer the child who needs any treatment to the dental clinic. In addition, appropriate awareness was given about oral health.

Statistical Analysis

SPSS version 24 was used to analyze the collected data. Descriptive statistics such as percentages, frequencies, means and standard deviations was taken. Data was analyzed by Chi square test, while t-test or ANOVA was used to analyzed the quantitative results (DMFT/dmft and their components). The results considered significant when p-value is less than 0.05 at confidence interval level 95%.

RESULTS

As shown in Table 2, there is a significant difference in dt between physical disability and control children (p=0.013) with odds ratio (OR=2.095). In contrast, there are no significant differences in the indices of missing and filling primary teeth (p=0.071) (p=1), respectively. Among physical disability children, 55.4% had decay in primary teeth, while 72.3% in control children. Only 6.9% among physical disability children had missing in primary teeth in compared with 14.9% among control. Filling in primary teeth was 3% in both groups. Table 3 shows no significant differences with permanent teeth indices among physical disability and control children.

Table 1: Demographic data and characteristics of the study subject.

Children	Age	Gender		Total (%)
		Male	Female	
With physical disability	6-7	9	13	22 (21.8%)
	8-9	18	14	32 (31.7%)
	10-11	12	6	18 (17.8%)
	More than 11	18	11	29 (28.7%)
	Total	57 (56.4%)	44 (43.6%)	101 (100%)
Control	6-7	9	13	22 (21.8%)
	8-9	18	14	32 (31.7%)
	10-11	12	6	18 (17.8%)
	More than 11	18	11	29 (28.7%)
	Total	57 (56.4%)	44 (43.6%)	101 (100%)

Table 2: Prevalence of decay, missing and filling primary teeth among physical disability and control children.

DMFT	Physical control		Frequency (%)	*p*-value	OR
Decay primary teeth (dt)	Physical	Yes	56 (55.4)		
		No	45 (44.6)	0.013	2.095
	Control	Yes	73 (72.3)		
		No	28 (27.7)		
Missing primary teeth (mt)	Physical	Yes	7 (6.9)		
		No	94 (93.1)	0.071	____
	Control	Yes	15 (14.9)		
		NO	86 (85.1)		
Filling primary teeth (ft)	Physical	Yes	3 (3.0)		
		No	98 (97.0)	1.000	____
	Control	Yes	3 (3.0)		
		NO	98 (97.0)		

$p<0.05$ statistically significant

Total 40.6% of physical disability children had decay in permanent teeth, while 44.6% in control children. Total 3%, 2% of physical disability and control children had missing in permanent teeth, respectively. Among physical disability children 3% had filling in permanent teeth and only 1% among control children.

The difference in means of dmft (decay, missing and filling in primary teeth total) and DMFT (decay, missing and filling in permanent teeth total) according to physical and control children in Table 4 shows that there is no statistically significant difference in dmft and DMFT values in physical disability and control children either. The means of dmft and DMFT were slightly highest in physical disability children than control children. As shown in Table 5, a decrease in dmft was found in both physical disability and control children with increasing age. The highest dmft means were found among 6-7 years age group. Furthermore, there was a significant difference in dmft value in control children (p=0.001). In contrast, the highest DMFT mean in physical disability children was among 10-11 years age group, while in control children was among children more than 11 years with no significant difference in physical disability and healthy children either. Table 6 shows the distribution of dental treatment need among physical disability and control children. Total of (50%) children needed prompt treatment, followed by 49 (24.3%) of children needed prevention or routine treatment, while only (1.5%) needed to refer for comprehensive evaluation. No treatment need was almost equal between physical disability (14.9%) and control children (13.9%). No significant difference was found between physical disability and control children (p=0.465).

Table 3: prevalence of Decay, Missing and Filling permanent teeth among physical disability and control children.

DMFT	Control		Frequency (%)	*p*-value
Decay permanent Teeth (DT)	Physical	Yes	41 (40.6)	
		No	60 (59.4)	
	Control	Yes	45 (44.6)	0.569
		No	56 (55.4)	
Missing permanent Teeth (MT)	Physical	Yes	3 (3.0)	
		No	98 (97.0)	
	Control	Yes	2 (2.0)	0.650
		NO	99 (98.0)	
Filling permanent Teeth (FT)	Physical	Yes	3 (3.0)	
		No	98 (97.0)	
	Control	Yes	1 (1.0)	0.302
		No	100 (99.0)	

$p<0.05$, statistically significant

DISCUSSION

Dental caries is a chronic, multifactorial disease caused by bacteria that affect dental tissue, leading to cavitation and loss of tooth substances. It is one of the most prevalent diseases in children and is considered a major health problem worldwide[18]. Previous studies have mentioned that dental caries is one of the most common oral problems affecting disabled individuals[19]. According to many studies, disabled children have higher levels of caries than normal children[14,20-26], which contradicts the result of this study. In this study, caries was found in 80.2% of physical disabled children and 85.1% of control group. The prevalence of decay among control children (72.3%) was higher than that among disabled children (55.4%), with a significant difference (p=0.013) and an odds ratio (OR=2.095) in primary teeth. In permanent teeth, the prevalence was slightly higher among control children (44.6%) than disabled children (40.6%). However, this finding is consistent with the studies by Choi & Yang, and Akinwonmi & Adekoya-Sofowora, who reported a lower dental caries rate in children with disabilities compared to healthy groups[27,28]. This can be interpreted as disabled children having better dietary control and consuming less sugar than control children, who rely on themselves to obtain more sweets and drinks.

Table 4: The difference in means of dmft (decay, missing and filling in primary teeth) and DMFT (decay, missing and filling in permanent teeth) according to physical disability and control children.

Dmft\DMFT	Children	N	Mean	SD	*p*-value
dt	Physical	56 (55.4%)	4.50	2.90	
	Control	73 (72.3%)	3.79	3.07	0.188
	Total	129	4.10	3.01	
mt	Physical	7 (6.9%)	1.71	1.11	
	Control	15 (14.9%)	1.53	0.83	0.674
	Total	22	1.59	0.90	
ft	Physical	3 (3%)	1.00	0.00	
	Control	3 (3%)	1.33	0.57	0.423
	Total	6	1.16	.40	
dmft	Physical	57 (56.4%)	4.68	2.95	
	Control	73 (72.3%)	4.16	3.37	0.360
	Total	130	4.39	3.19	
DT	Physical	41 (40.6%)	2.34	1.38	
	Control	45 (44.6%)	2.37	1.35	0.903
	Total	86	2.36	1.36	
MT	Physical	3 (3%)	7.33	10.96	
	Control	2 (2%)	1.50	0.70	0.527
	Total	5	5.00	8.39	
FT	Physical	3 (3%)	1.00	0.000	
	Control	1 (1%)	1.00		
	Total	4	1.00	0.00	
DMFT	Physical	45 (44.6%)	2.62	2.98	
	Control	46 (45.5%)	2.41	1.35	0.667
	Total	91	2.51	2.30	

SD= Standard Deviation, t-test

Furthermore, there is lack of understanding regarding the importance of oral health and the important of regular dental visit. As shown in Table 4, there were few differences in the mean dmft between physically disabled and control children, with values of (4.68±2.95) and (4.16±3.37), respectively. The mean DMFT among physically disabled children was (2.62±2.98), while among control children, it was (2.41±1.35). Decayed teeth accounted for the major component of the dmft/DMFT index. The mean dt was (4.50±2.90) among physically disabled children and (3.79±3.07) among control children. The mean DT among physically disability children was (2.34±1.38), while among control children, it was (2.37±1.35). This study is similar to a study in Sana'a, Yemen, where the authors reported a mean dmft of (4.68±3.30) among physically disabled children, while the mean DMFT was (0.96±1.35), which is lower than the mean DMFT among physically disabled children in Dhamar city[6]. However, the mean dmft/DMFT in this study was higher than the mean dmft/DMFT from Nigeria, which was very low, it was (0.7±1.77) (0.4±1.44), respectively, among children and young adults with disabilities[29]. This finding is consistent with previous studies that showed lower mean dmft/DMFT values than those found in this study[20,28,30-33]. In contrast, Gace *et al*., and Khan *et al*., showed higher mean dmft/DMFT values than those found in this study[34,35]. This could be a result of low parental awareness regarding oral hygiene practices .

According to age, the mean dmft decreases markedly with age among physical disabled and control children, with significant differences observed among control children, as shown in Table 5.The decrease in dmft in older age groups is due to the natural exfoliation of primary teeth. This result is consistent with previous studies[6,36]. The highest score in the 6-7 years age group may be attributed to the lack of ability to follow oral hygiene practices.

Table 5: Distribution of dmft and DMFT in physical disability and control children according to age groups.

	Age	DMFT Mean (SD)	DMFT Mean (SD)
Children with physical disability	6-7 years	5.66 (3.32)	1.00
	8-9 years	4.69 (2.78)	1.92 (.86)
	10-11 years	3.78 (2.607)	3.46 (5.076)
	More than 11	2.00 (.00)	2.61 (1.81)
	p-value	0.178	0.580
Control children	6-7 years	6.35 (5.13)	2.00
	8-9 years	4.60 (2.83)	1.71 (.99)
	10-11 years	3.81 (2.34)	2.22(.97)
	More than 11	1.66 (.816)	2.95 (1.52)
	p-value	0.001	0.053

Table 6: Distribution of dental treatment needs among physical disability and control children.

	Intervention					Total	*p*-value
	Prevention or routine treatment need	Prompt treatment including scaling	Immediate (urgent) treatment need	Referred for comprehensive evaluation	No treatment needed		
Physical	26 (25.7%)	45 (44.6%)	13 (12.9%)	2 (2.0%)	15 (14.9%)	101	
Control	23 (22.8%)	56 (55.4%)	7 (6.9%)	1 (1.0%)	14 (13.9%)	101	0.465
Total	49 (24.3%)	101 (50.0%)	20 (9.9%)	3 (1.5%)	29 (14.4%)	202	

p< 0.05 statistically significant, Chi-square test

Additionally, the mean DMFT score among physically disabled children was highest in the 10-11 years age group (3.46) and lowest in the 6-7 years age group (1.00). Among control children, the highest DMFT was in the age group older than 11 (2.95), while the lowest was observed in the 8-9 years age group (1.71). On the other hand, Shaw *et al*., found an increase in mean DMFT with increasing age in both disabled and control children[30]. The different age groups and number of participants in the study may account for the differing results between this study and Shaw's study.

Several previous studies have reported that children with disabilities generally require more treatment than normal children[25,34]. However, a study in India has shown that children with physical disabilities have almost equal treatment need compared to children without disabilities[17]. As shown in Table 6, treatment needs among physically disabled children and control children are slightly different but not significantly different. The high caries rate reported in this study was associated with a higher percentage of children who needed different types of dental treatment. Caries was found in 80.2% of physically disabled children and 85.1% of the control group. Therefore, only (14.4%) of children had no treatment needs, which is almost similar to the findings of Al-Maweri and Zimmer[6] at (14.8%). This is in agreement with a study in India, where most special needs children needed prompt treatment (51.6%)[37]. Furthermore, immediate treatment was more common among physically disabled children (12.9%) compared to control children (6.9%). This could be interpreted as control children visiting the dentist more frequently than physically disabled children, resulting in their treatment before the progression of more sever or painful cases.

Limitations of the study

The study only focused on comparing children with physical disabilities to children without disabilities. Therefore, it is recommended that further research be conducted to include other groups of children with special needs. This will provide a more comprehensive understanding of the oral health status of children with disabilities in Yemen.

CONCLUSIONS

In conclusion, the prevalence of dental caries was lower among physical disability children than control. Control children have a significantly higher dental caries in primary teeth than physical disability children. Among control children, the mean dmft score was significantly higher in age group of 6-7 years old when compared with other groups. Treatment needs among physical disability children and control children are slightly different with no significant different and high unmet treatment. The presence of high unmet treatment needs highlights the importance of addressing and prioritizing dental care for children, particularly those with physical disabilities. This information underscores the need for further attention and resources to ensure adequate access to dental treatments and interventions for these vulnerable populations.

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AUTHOR CONTRIBUTIONS

Al-Subbary IA: writing original draft, collecting data and analysis. **Obeyah AA:** statistical analysis. **Al-Mogahed NM:** conceptualization, methodology. **Al-Ammari MH:** literature searches, research design. All the authors reviewed the results and approved the final version of the manuscript.

DATA AVAILABILITY

The data will be available to anyone upon request from the corresponding author.

CONFLICT OF INTEREST

None to declare.

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