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Review Article

Oral Health Status of Athletes with Intellectual Disabilities: A Review

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Abstract

BACKGROUND: Oral health reflects the overall health of an individual; it impacts the mental and physical well-being, quality of life, and social relations of an individual. Special Olympics (SO) athletes have been found to have poorer oral health, and high unmet treatment needs globally. Nine articles are included in this systematic review to determine the oral health status of Special Olympics athletes with intellectual disabilities.

AIM: To identify the oral health status of athletes with intellectual disabilities who participated in the Special Olympics.

METHODS: Electronic bibliographic databases (PubMed, Biology database, Health management database, Science Direct, Health and medical collection (ProQuest), Mendeley, and Health reference centre academic) were used to search for eligible publications using "oral health," "special needs athletes," and "intellectual disabilities" terms. All included articles are in English and were published from 2000–2018. The whole process was conducted following PRISMA guidelines.

RESULTS: The search strategy yielded 4,090 articles. Only nine articles met the criteria and were included in the final analysis. All included articles reported outcome measurements of gingival signs, missing teeth, untreated decay, filled teeth and sealant.

CONCLUSION: The oral health status of athletes with intellectual disabilities can be considered poor compared with athletes without intellectual disabilities, which points to the need for oral health policies for this specific population.

Introduction

Dental health is an essential aspect of general health and quality of life (World Health Organization [1], but it is also a major problem in public health, with strong links to people with health needs [2]. It has been reported that people with intellectual disabilities are more vulnerable to oral health issues [3]. Also, the oral treatment needs of intellectually disabled persons have been reported to be high in several studies [4], [5], [6]. According to the World Health Organization (WHO), around 10% of the world's population is disabled (approximately 650 million).

Gingival diseases and decay, in particular, are considered among the top ten secondary conditions within this population [7]. There is also strong evidence that poor oral hygiene is the primary cause of the increased prevalence of serious periodontal diseases [8]. Compared to the neurotypical population, people with intellectual disabilities have higher self-inflicted traumatic rates, poorer oral hygiene [9]. People with disabilities or their caregivers must seek dental care, but many factors, such as their living conditions or geographical location about dental services, influence access to care [10]. Likewise, low family income and lack of or inadequate dental health insurance may be a hindrance to oral care [11]. However, large amounts of oral health data

concerning persons with intellectual disabilities are scarce, although these data may be significant for the evaluation of existing policies [12]. Poor oral health can also cause sleep disturbances, difficulty eating, pain, and decreased self-esteem, which can all negatively impact an individual's quality of life [8].

Also, poor oral health negatively impacts the quality of life and athletic performance of special needs individuals. In 2015, Fernandez et al., [6] published data on the treatment need of oral health screening of athletes with intellectual disabilities in Belgium. He points out that an individual's cognitive and motor abilities can affect oral cleaning habits. The ability to perform oral hygiene is limited by the level of intellectual disability so that the assistance of a caregiver or supervision becomes necessary. Also, poor lip closure could be a predominant highlight among people with an intellectual disability that influences the cleansing of the oral cavity.

Moreover, Marks et al., [13] concluded that the high prevalence of oral health conditions among special needs individuals might be due to an inability to perform adequate personal oral hygiene, which leads to high levels of plaque, gingival inflammation, and periodontal disease. It has also been reported that individuals with ID are less cooperative with dentists and have more obstacles with the management of dental behaviour [14]. Currently, to the best of our knowledge, no systematic review has been done that examines this topic in depth, including Special Olympics (SO) athletes with intellectual disabilities, and evaluates these athletes' oral health status.

This systematic review aims to describe the oral health status (gingivitis, missing teeth, untreated decay, filled teeth, and sealant) of Special Olympics athletes with intellectual disabilities.

Methods

Search strategy

A systematic literature review was performed to identify existing articles that present data on the oral health status of athletes with intellectual disabilities between the years 2000 and 2018. Seven electronic databases accessed from the Zayed University library were carried out in PubMed, Biology database, Health management database, Science Direct, Health and medical collection (ProQuest), Mendeley, and Health reference centre academic. The search strategy consisted of terms and keywords of "oral health, athletes, intellectual disabilities and Special Olympics." The search specified two elements: the population of interest in athletes with intellectual disabilities, and the outcomes are gingivitis, missing teeth, untreated caries, filled teeth, and sealant.

Study outcomes

The outcome of our study is presence gingivitis, missing teeth, untreated decay, filled teeth, and sealant in athletes with intellectual disabilities.

Sampling

The initial search from online electronic databases yielded 4090 records, of which 1465 remained after duplicate articles were removed. With the screening of titles and abstracts, 75 publications were found to be not relevant, which left 19 publications eligible for full-text review. However, only nine of these publications met the inclusion criteria (Figure 1).

Study selection and eligibility criteria

The systematic review was performed by the PRISMA (Preferred Reporting Items for Systematic review and Mata-Analyses) guidelines. All duplicate articles were removed. Titles and abstracts of searched records were screened to identify "potentially eligible" studies. The full texts of "potentially eligible" studies were retrieved and reviewed to determine whether all studies met the inclusion criteria.

Inclusion criteria

1. Papers are written fully in English

2. Articles published between the years 2000 and 2018

3. Male and females included

4. Ages from 3 to 80 years old.

5. Included only athletes with ID who participated in the Special Olympics

6. Oral health outcomes were included (missing teeth, gingival signs, filled teeth, sealants, and untreated caries)

7. Not limited by study design (e.g., cohort and cross-sectional).

Exclusion Criteria

1. Did not include specific disabilities such as Down syndrome.

2. The study failed to provide all oral health outcomes (missing teeth, gingival signs, filled teeth, sealants, and untreated caries).

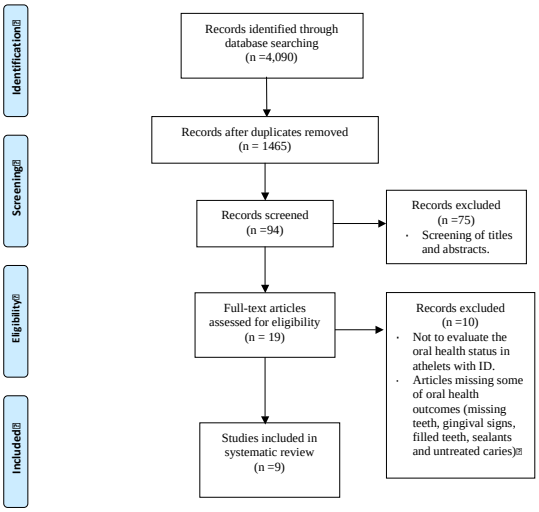

Figure 1: PRISMA 2009 Flow Diagram-oral health status of athletes with intellectual disabilities

Analytical tool

Information extracted from eligible studies included participants, age range, sample size, and key outcome measurements (gingival signs, missing teeth, untreated decay, filled teeth, and sealant). Forest plot was used for the meta-analysis, and the R language tool was used for representing the meta-analysis. The forest plot represents the result of a set of studies and estimates the effect of each study with a line that represents the confidence interval. Another tool called the funnel plot was used to visually assess potential publication bias.

Results

The main characteristics of the included studies are presented in Table 1. The included nine studies published within the past 18 years. One study was published in 2000, and the rest were published from 2010 to 2018. All articles evaluated the oral health status of athletes who participated in the Special Olympics from different regions in which the Special Olympics provided oral screening (SOSS) because the primary interest is the frequency of occurrence of oral conditions in athletes with intellectual disabilities. All studies included similar dental health outcomes (dental caries, filled teeth, untreated decay, sealants, and gingival signs).

Target population

All studies evaluated participants from the Special Olympics. The total number of participants obtained from the included articles was 159,219. Each study collected data from different age groups; the first study focused on participant's aged 8 to more than 40 years old, the second study focused on those less than 18 to more than 26 years and the third from 9 to 80 years. The fourth study collected data from three countries, Poland, Romania, and Slovenia, and the participants were mainly adults, with an average age of 23.2 years (Poland), 22.9 years (Romania), and 27.8 years (Slovenia). The fifth study examined oral health status among 3 to 54-year-old. The sixth study focused only on participants who were less than 21 years of age, whereas the seventh study focused on ages 3 to 72 and the eighth study from 6 to 44. Finally, study number nine compared data between international and U.S. athletes, with the mean age of international athletes being 17.4 versus 24 years for U.S. athletes. Almost all studies recruited all age groups: children, adolescent, and adults.

Table 1: Articles included in Systematic Review

Results of the prevalence of:									
Articles	*N* = athletes	Type of disability	Country	Age group	Missing teeth	Gingivitis	Untreated caries	Filled teeth	Sealant
1. Marks et al. [24]	149,272	ID	Africa, Asia Pacific, East Asia, Europe/Eurasia, Latin America, Middle East North Africa (MENA)& North America.	*(8–11) *(12–18) *(19–39) *(40+)	28.20%	46.40%	36.60%	49.80%	14.20%
2. Fernandez C et al. [6]	132	ID	Belgium	* < 18 *18–25 *26+	49.70%	44.30%	27.10%	67.65	9.60%
3. Leroy et al. [4]	687	ID	Belgium	Mean age 33 years (range 9–80 yrs)	73%	44%	22%	76%	6%
4. Fernandez C et al. [3]	3,545	ID	Poland Romania Slovenia	Mainly adult. Average: 23.2 years (Poland); 22.9 years (Romania); and 27.8 years (Slovenia)	52.80% 38.40% 47.40%	44.20% 70.40% 43.40%	40.90% 19.10% 61.80%	70.90% 33.90% 83%	4.30% 3.80% 37.70%
5. Hanke-Herrero et al. [17]	930	ID	Latin-American & Caribbean countries	3-54 yrs	23.02%	48%	51%	52.50%	40%
6. Fernandez C et al. [3]	503	ID	53 countries of Europe/ Eurasia	< 21 yrs	25.20%	38.70%	33.40%	47.70%	9.90%
7. Oretugba Folakemi et al. [19]	1,286	ID	Nigeria	3–71 yrs	4.30%	48.10%	21.10%	0.30%	Non had
8. Fernandez JB et al. [16]	664	ID	New York	Children 6–8 Adolescent 12–19 Adult 35–44	29%	32%	28%	60%	11%
9. Reid et al. [18]	2200	ID	International (China, Lebanon, Poland, south Africa, Turkey)	Mean age 17.4 yrs	17.70%	27.80%	41.60%	19.60%	1.80%

Study location

Regions of the world where studies on oral health status among athletes with intellectual disabilities were conducted include 1. Africa & North Africa (MENA); 2. East Asia & Pacific; 3. Europe & Eurasia; 4. Middle East; 5. North America; 6. Latin America and the Caribbean.

Assessments of oral health

A standardized Special Smile screening form and procedure (SOSS program) was used to guide oral assessment in all nine studies [3], [12], [13], [15], [16], [17], [18], [19], [20].

Data Analysis

The main results of the meta-analyses regarding the prevalence of oral health issues are shown in Figure 2.

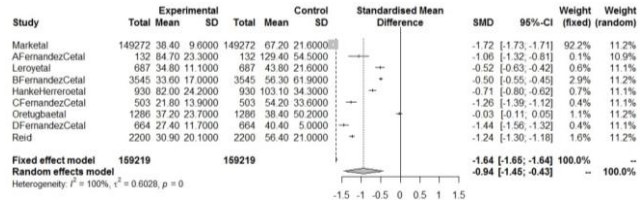

Figure 2: Forest plot on the fixed effect model of the dental health status of athletes with intellectual disabilities

As illustrated, by the meta-analysis, the R package Meta from the fixed-effects model fitting was used. We noted from the 95% confidence intervals (CIs) that the overall analysis of the included studies from the fixed-effects model with a P = 0.0 with a corresponding 95% CI of [-043, -1.45]. Another test was performed, the funnel plot, which is shown in Figure 3 and visually assesses potential publication bias.

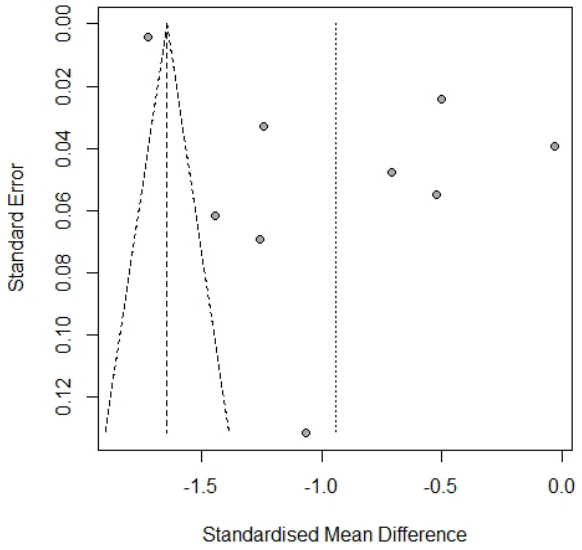

Figure 3: Funnel plot of the nine studies

Discussion

The results of this study support the hypothesis by providing evidence that athletes with intellectual disabilities have a high level of oral health problems compares with the healthy ones. In all included studies, a significant number of athletes were diagnosed with oral health problems such as missing teeth, gingivitis, filled teeth, sealants, and untreated decays. The prevalence of filled teeth had the highest score among the seven studies compared to other dental conditions. However, it had a wide variation, showing values between 47.7 and 83%. Also, the risk of gingival diseases was found to be 40% or greater in seven studies. Needleman et al., [21] found that athletes who participated in the London 2013 Special Olympics also had a high prevalence of gingivitis. This study also showed that untreated decay occurred in 18.5 – 61.8% of the participant subjects. Likewise, at the 2005 Glasgow Special Olympics [22], more untreated dental diseases were reported in participants than in the general population.

The eight studies indicated that the prevalence of sealant among athletes with intellectual disabilities was the lowest of the found oral conditions, with values between 0 and 37.7%; similarly a cross-sectional study of dental health and odontogenic infections among German students with intellectual/learning disabilities (ID/LD), sensory disorders (SD), and physical disabilities (PD) revealed that fissure sealants had the lowest prevalence among all students with ID/LD [23].

Another point to be highlighted is the prevalence of dental issues among regions, as a study found that people with intellectual disabilities in Europe/Eurasia, MENA, and Latin America have higher rates of gingivitis than other regions at all age groups [24].

In this review, only one study conducted oral health status research on individuals with intellectual disabilities in MENA and two studies in Latin American, with five studies being undertaken in Europe/Eurasia. These results agree with our findings that the prevalence of gingival diseases was highest in the regions of MENA, Europe/Eurasia, and Latin America, showing values between 38.7 and 70.4%. Instead, a study in Africa, particularly in Nigeria [19], showed a value of 48.1%, which is considered high.

The high prevalence of oral health issues in athletes with intellectual disabilities can be attributed to an association of several factors; for instance; their living conditions or geographical location can influence their actual access to health care institutions [10]. Low family income and lack of or inadequate dental health insurance may also be a hindrance to oral care [11].

Moreover, other researchers demonstrated that individuals with intellectual disabilities had more dental conditions, partly due to the cognitive and motor abilities that can affect their oral cleaning habits in performing oral hygiene [6], [23]. The side effects of medication use may also have contributed to lower dental health status [25]. Another important factor that should be considered is that individuals with intellectual disabilities are less cooperative with dentists and have more obstacles with the management of dental behaviour [14].

Study limitations and Recommendations for the future research

This review has several limitations that can affect the generalizability of this study. First, one of the main limitations is the heterogeneity of the studies. High heterogeneity was found based on an I^2 test, the value of which was I^2 = 100%, when the recommended value is less than 50%. The high value of heterogeneity was expected, as the included studies have a wide age range. The second limitation is that this review does not include all oral health problems; it includes only the gingivitis, filled teeth, untreated decays, sealants, and missing teeth. This is because each study examined different oral health outcomes, and in this article were only included studies that used similar oral health problems.

Also, the sample characteristics in all studies were not matched with the same age group, and each study had a different wide age range. Studies that evaluate individuals with special needs commonly use convenience sampling, which justifies the failure at presenting the relatively small number of the participants and their wide age range in the included studies. This could be related to the difficulties of intellectually disabled athletes in cooperating with the examiners. Also, the findings of the eligible studies might represent the oral health status of athletes with mild or less severe intellectual disabilities, as athletes with severe intellectual disabilities may not tolerate dental examination.

The recommendation for the future research should include the oral hygiene level with the outcomes we measured (missing teeth, untreated decays, filled teeth, gingival signs, and sealant) assessing of the hygiene factor that could be associated with these conditions in individuals with intellectual disabilities. This is because the cognitive and motor abilities of intellectually disabled individuals can affect their oral hygiene performance.

Conclusion

The findings from this systematic review of the nine studies indicated that the oral health status of Special Olympics athletes with intellectual disabilities is below expectations. The meta-analysis provided an estimate of the prevalence of oral health issues of athletes with an intellectual disability that indicates a significant unmet treatment need among this population. The consistency of the results in this review supports the necessity for better dental preventive care of athletes with intellectual disabilities, even though this study sample is not representative of the whole population of athletes with intellectual disabilities. Moreover, research in this area should focus on strategies that promote self-care, in particular, improving the daily hygiene of individuals with intellectual disabilities.

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