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Association between autism spectrum disorder and elevated DMFT index scores in children

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Abstract: Children with Autism Spectrum Disorder (ASD) are known to be more susceptible to oral disease, with a higher DMFT (decayed, missing, filled teeth) index score compared to their typically developing peers. This is due to limited access to dental care services, involvement in self-injurious behaviors, and the adoption of dietary patterns that cause tooth decay. This study aims to consolidate academic knowledge through a systematic review identifying studies that compared children with autism to healthy control groups and examining the association between DMFT index scores and ASD by searching four representative literature databases (PubMed, Web of Science, Scopus, and Google Scholar) for publications spanning the years 2004 to 2024. Following the PRISMA checklist, a total of fourteen case-control studies met the inclusion criteria. The majority of these studies reported that children with ASD tend to have higher DMFT index scores compared to healthy controls. The findings of this study suggest that ASD is associated with a higher DMFT index score, indicating a potential increased risk of dental caries and oral health problems in children and adolescents with autism spectrum disorders. Further research is needed to elucidate the underlying mechanisms and identify effective interventions to improve dental health outcomes in this population.

Keywords: *Autism, DMFT score, Oral health.*

1. Introduction

In the last three decades, there has been a notable rise in diagnosed cases, with the current prevalence of autism spectrum disorders (ASD) estimated at approximately 1 in 100 individuals [1]. Children with ASD often exhibit a range of eating difficulties, including selective eating, food retention in the mouth, and food refusal [2]. Additionally, certain factors like sensory traits in children with ASD, communication and social aspects, distinct cognitive capabilities, limited interests, and family food preferences also play a role [3]. A study conducted revealed a connection between food rejection and limited food variety, alongside an increased prevalence of malocclusions, altered Community Periodontal Index scores, and bruxism among children diagnosed with ASD when compared to children with typical development of the same age [4]. The estimated prevalence of feeding problems in children with autism has been reported to be as high as 90% [5]. Addressing these issues is crucial as they contribute to compromised oral health, elevating the likelihood of developing dental caries and periodontal diseases.

While autism itself may not directly affect dental and facial features, it theoretically increases the likelihood of encountering oral health challenges, such as elevated DMFT (Decayed, Missing, Filled Teeth) index scores especially in the Asian population [6]. The DMFT index stands as the paramount measure in dentistry for assessing oral health due to its comprehensive nature. By considering decayed, missing, and filled teeth, it provides a holistic view of dental caries prevalence, capturing both current

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disease burden and past treatment interventions [7]. This comprehensive approach makes it the preferred tool for accurately monitoring oral health trends over time and tailoring effective preventive and treatment strategies, especially for children with autism [8]. Increases in DMFT can result from various factors, including unconventional oral habits, medication side effects, and unhealthy dietary choices [9]. Furthermore, the rigid and inflexible adherence to routines often seen in individuals with ASD may worsen oral health issues [10].

The previous literature has consistently indicated that individuals with Autism Spectrum Disorder (ASD) often exhibit poorer dental health outcomes, typically assessed by the DMFT index, compared to their neurotypical counterparts [11]. However, recent studies have presented conflicting findings regarding this association, particularly concerning DMFT index scores. Further research is warranted to establish a clearer understanding of the relationship between ASD and oral health outcomes, specifically focusing on DMFT index scores [12]. Given the potential impact of oral health issues in individuals with autism, numerous studies have explored various aspects of this relationship. Nevertheless, there remains a gap in reported systematic reviews specifically addressing the association between DMFT index scores and autism. Therefore, this study aims to investigate and elucidate this association through a systematic review.

2. Method

The PICO model was used to select eligible studies in the present systematic review.

2.1. Literature Search and Criteria for Extracting Target Papers

For the literature search, PubMed, Web of Science, and Scopus databases were utilized, employing search terms such as ("DMFT" OR "Decayed, Missing, Filled Teeth") AND ("autism" OR "autism spectrum disorder"). The PICO question guiding this study was formulated as follows: "Does DMFT/Decayed, Missing, Filled Teeth associate with autism?"

The systematic review's inclusion criteria were established based on the PICO (Population, Interventions, Comparisons, and Outcomes) framework, guided by Schardt, et al. [13] recommendations. Specifically, the criteria were structured as follows: (1) studies written in English, (2) publications between 2004 and 2024, (3) studies focusing on child and adolescent subjects (age < 23 years), (4) the population encompassed case-control studies, with autism diagnosis adhering to the criteria outlined in either the Diagnostic and Statistical Manual of Mental Disorders or the International Statistical Classification of Diseases and Related Health Problems (ICD), and (5) the interventions focused on oral health-related quantitative parameters, particularly including measurements of the DMFT (Decayed, Missing, Filled Teeth) and/or dmft index.

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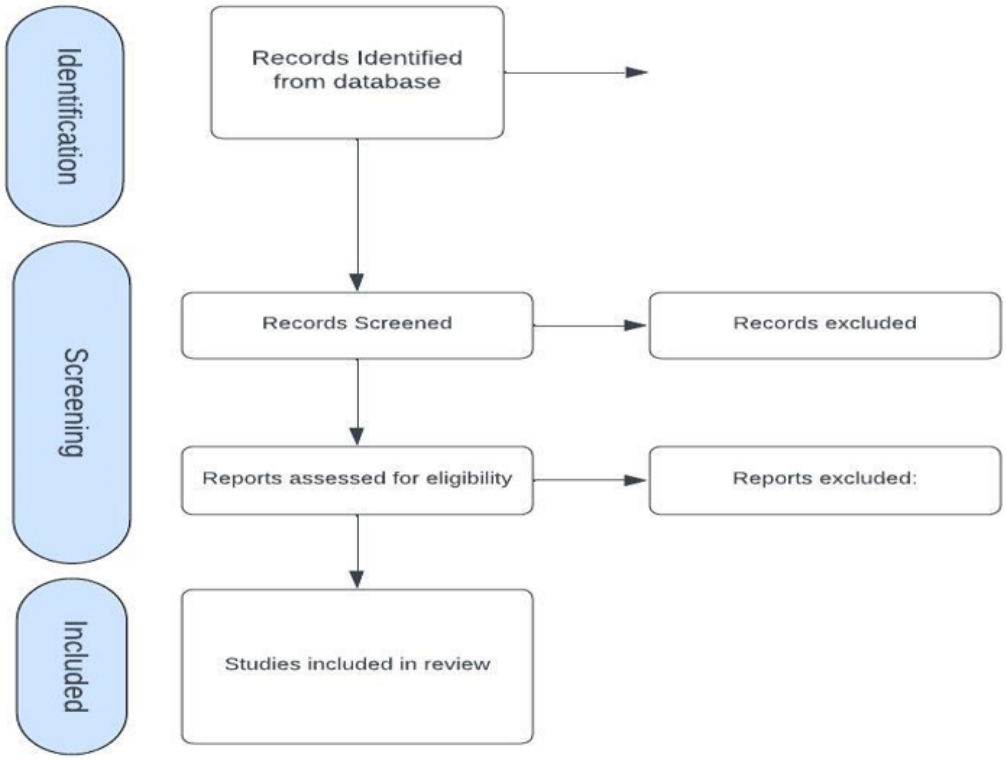

Figure 1.
The PRISMA flow diagram of study selection.

2.2. Ethical Considerations

Since this study relied entirely on publicly available secondary data and materials, no personal information was handled, ensuring that ethical considerations regarding individual privacy were not applicable in this research.

3. Results

A total of 102 papers were identified. Following the removal of duplicates, screening based on titles and abstracts resulted in the exclusion of 32 papers from the remaining 70. Subsequent evaluation of the full texts of these 70 papers led to the exclusion of an additional 56 papers that did not meet the predefined inclusion criteria. Ultimately, 14 papers were deemed suitable and selected as the focus of this systematic review Table 1.

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Table 1.
Characteristic of included studies.

Year	Author	Country	Control (n)	Study (n)	Control (Mean DMFT)	Study (Mean DMFT)
2008	Loo[1]	USA	395	386	5	3
2009	Bassoukou[2]	Brazil	21	22	2.33	2.77
2011	Jaber[3]	UAE	61	61	0.6	1.6
2012	Vajawat[4]	India	126	117	3.73	1.29
2014	Al-Maweri[5]	Yemen	84	42	1.27	2
2014	Richa[6]	India	135	135	0.46	2.07
2014	Fakroon[7]	Libya	50	50	1.15	0.22
2017	Bhandary[8]	India	30	30	0.56	0.62
2017	Kalyoncu[9]	Turkey	60	60	2.22	2
2019	Chávez[10]	Venezuela	34	34	3	1
2021	Bagattoni[11]	Italy	64	64	1.8	3
2021	Moorthy[12]	India	136	136	0.3	0.5
2022	Babu[13]	India	50	50	1.28	2.28
2022	Hasell[14]	Canada	173	173	4.93	8.18

4. Discussion

The table provides data on various studies conducted in different countries over the years, with a focus on the DMFT index. From the table, we can see that each study has reported both the mean DMFT for the control group and the study group. To determine which study has a higher DMFT index, we need to compare the mean DMFT values for the control and study groups within each study.

Notably, the comparison between control and study groups within each study reveals significant differences in DMFT index scores. In some instances, such as in the study conducted by Loo, et al. [14] in the USA, the control group exhibited a higher DMFT index compared to the study group, indicating potentially poorer oral health among the control participants. Conversely, in studies like that of Jaber [15] in the UAE, the study group demonstrated a higher DMFT index, suggesting greater oral health challenges within this population. These variations underscore the importance of considering both control and study groups in dental research to accurately assess the impact of factors such as geographic location, cultural practices, and socioeconomic status on oral health outcomes. Further investigation is warranted to understand the underlying factors contributing to the observed differences in DMFT index scores across diverse populations.

Additionally, when evaluating studies based on population size, it becomes apparent that larger sample sizes contribute to more robust and representative findings. Studies with larger participant pools tend to offer greater statistical power, allowing for more accurate assessments and interpretations of data. For instance, research conducted by Loo, et al. [14] in the USA, which involved 395 participants in the control group and 386 in the study group, provides a substantial dataset for analyzing oral health outcomes. Similarly, studies like Moorthy [16] investigation in India, comprising 136 participants in both control and study groups, benefit from larger sample sizes, enhancing the reliability and generalizability of their findings. Such studies are better equipped to identify trends, variations, and associations related to oral health, thus informing more effective preventive and treatment strategies. Study Therefore, studies with larger population sizes, such as those conducted by Loo and Moorthy, offer valuable insights into oral health status within their respective populations.

A comparative study on salivary electrolytes conducted by Babu and Roy [17] involved 50 children diagnosed with autism in Bengaluru, who were compared to a control group of 50 children undergoing routine dental and oral check-ups. The findings revealed that the DMFT (Decayed, Missing, and Filled Teeth) score of the autism group was significantly higher than that of the control group. Variations in

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the electrolytic concentrations of calcium, sodium, potassium, chloride, phosphorus, and urea in the saliva of autistic children may be contributing factors to the increased DMFT/dmft scores when compared to the healthy control group. A retrospective study conducted by Hasell, et al. [18] analyzed data from 2016 to 2019 and included 346 dental records. Among these records, 173 children were diagnosed with autism. The findings suggest that children diagnosed with autism spectrum disorder (ASD) may experience more barriers to accessing oral health care, resulting in poorer outcomes and increased dental treatment needs.

In analysis of various studies' DMFT index scores reveal notable discrepancies between control and study groups, indicating differing oral health statuses within populations. The disparities underscore the importance of considering both control and study groups in dental research to accurately assess the influence of factors like geographic location, cultural practices, and socioeconomic status on oral health outcomes.

5. Conclusion

In conclusion, despite the variability observed in the DMFT index scores across different studies and populations, the analysis presented here suggests that there is no consistent association between autism spectrum disorder (ASD) and elevated DMFT index scores in children and adolescents. These discrepancies underscore the complexity of factors influencing oral health outcomes, including geographic location, cultural practices, and socioeconomic status. Further research is warranted to elucidate the underlying mechanisms and identify effective interventions to improve dental health outcomes in children and adolescents with autism spectrum disorder.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Copyright:

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