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ORIGINAL RESEARCH

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Dental problems in children with autism: a 5-year study

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Abstract

Caries experience of children and complex clinical circumstances are an actual challenge for any healthcare professional. To investigate the early childhood caries (ECC) in autistic and non autistic children (≤4 years of age) evaluating the amount of dental damage and the treatments carried out in both groups. Data regarding the oral health status of 40 patients (≤4 years of age) were assembled. The sample group was constituted of 20 autistic children (12 males with a mean age of 2.5 years and 8 females with a mean age of 3.2 years) whereas 20 patients without the autistic spectrum represented the control group (11 males with a mean age of 3 and 9 females with a mean age of 3.3 years). There were no significant differences between the two groups as regards both the extent of dental damage and the treatments carried out. About the frequency, in the autistic group, the most frequent caries were the white spots and enamel proximal lesions (2.2%), followed by only white spots (1.2%) and brown-black cavities and root stumps (0.6%). In the control group, the brown-black cavities and root stumps represented the most frequent findings (2.2%), followed by white spots and enamel proximal lesions (1.4%) and white spots (0.4%). Regarding the treatments, the most repeated management of dental damage among autistic patients was composite restorations (2.2%) while in nonautistic patients were tooth extractions (2%).

Keywords

Autistim spectrum disorder; Dental care; Pediatric dentistry; Early childhood caries

1. Introduction

Early childhood caries (ECC) is an oral pathology which affect primary dentition of children younger than 6 years of age; primary upper incisors and primary upper and lower molars are severely decayed and disrupted [1–3]. Despite substantial improvements in preventive dentistry, ECC continues to affect very small children globally. In 4- to 6-year-old children, the prevalence generally ranges from 27% to 48% [1–3].

The aetiology is multifactorial and complex and can regard the interaction between cariogenic microbiota, vulnerable teeth and fermentable carbohydrates; in many cases, the children slept with honey on the feeding bottle at naptime and bedtime. The lactic acid, which reduces the intraoral pH and produces demineralization of tooth enamel, is generated by the bacteria that consume carbohydrates like sucrose, fructose and glucose [2–5].

A protracted demineralization can cause dentin's corrosion and cavitation [6]. Developmental enamel defects, such as enamel hypoplasia and children with juvenile diabetes mellitus or special needs, are described by the literature [7] as significant risk factors for developing early childhood caries.

A low socioeconomic background and prenatal and perinatal malnutrition influence the occurrence of caries in children; poor oral hygiene and the consumption of highly sugary foods are related to a lower level of education [7–10]. As contributory risk factors the literature describes caregiver psychosocial stresses [10]. As regards the most involved primary teeth, the upper central incisors are among the first to erupt, so, they will be exposed to the bacteria for longer (Figs. 1A,B,2A) [10]; most of the time, the primary lower incisors are totally healthy or slightly affected since they are protected by the

tongue's position. At the beginning, the maxillary incisors show a white demineralization spot near the gingival margin, generally unnoticed by the parents. The white spot slowly progresses to brown-black extensive cavities (Fig. 2A). In more severe cases (Fig. 2B,C), the crowns of the upper incisors appear destroyed and only the root stumps are present.

Some authors [9] showed that the enamel of the primary teeth can be demineralized much more rapidly since it is less structured and significantly thinner than in the permanent dentition.

The most common microorganisms associated with ECC were mutans streptococci (MS) bacteria, which included the species S mutans and S sobrinus [9]. Some investigations revealed that children with very high levels of MS presented additional cavities over time 6 times more than those without MS at first visit [10–13]. The treatment is very complex and often can be executed only under sedation or general anaesthesia. It depends on many factors, including the age of the children, their compliance and health state and the amount of dental damage.

Frequently, young children with the autistic spectrum are involved [11–14].

Autism or autistic disorder is a set of alterations in brain development, which vary from one subject to another, leading to impaired social and language skills, as well as various behavioural disorders [11–13]. The first symptoms of autism in children appear early in childhood [14]. The etiology of autism is still not clear, but it is generally classified as primary or idiopathic autism, which has a non-specific genetic base [13]. Mental retardation is described in 70% of the cases [13].

In small children, extensive dental decays represent a significant dentofacial health problem that can provoke medical, aesthetic and psychological consequences [15, 16].

To date, no studies described the different stages of early childhood caries both in children with and without the autistic spectrum during a period. The present study aimed to investigate the frequency of early childhood caries in autistic and non-autistic patients (≤4 years of age) pointing out the most frequent treatments carried out in both groups.

2. Materials and methods

The present retrospective study was conducted on all autistic and non-autistic patients (≤4 years of age) from November 2017 to November 2022.

The pathology of early childhood caries was retrieved from a database.

For all patients the data had been collected at the initial visit followed by the screening until the treatments were carried out. During the first visit, the parents were asked to sign an informed consent in order to record the data of their children.

From the first visit, the patients were recalled within a month to be able to carry out the treatment suitable for their needs. After treatment, they were recalled after 6 months for a follow-up.

When the collaboration of the children made it possible, along with dental examinations, intraoral periapical radiographs (Fig. 3) or a panoramic X-ray were performed.

One examiner grouped all data (intraoral and extraoral photos, periapical or panoramic X-ray). The sample group was constituted of 20 autistic children (12 males with a mean age of 2.5 years and 8 females with a mean age of 3.2 years) whereas 20 patients without the autistic spectrum represented the control group (11 males with a mean age of 3 years and 9 females with a mean age of 3.3 years).

As regards the autistic group, only patients with the diagnosis of mild or moderate autism were included.

The following parameters were considered for each patient of both groups:

- Age and gender;
- The dental damage;
- The treatments carried out (Chlorhexidine varnish, varnish topical fluoride with resin base, composite restoration, composite restoration technique and pulp treatment, stainless steel crowns and tooth extraction);

Syndromes, craniofacial anomalies, diagnoses of severe autism and convulsions represented the exclusion criteria.

The obtained data were coded and entered into Microsoft Excel which was then subjected to statistical analysis. Chi-square test and Yates' chi-square and Yates' p-value test were performed. The results were expressed in percentage. With the Chi-square test performed, significant data have been obtained according to Table 3. First of all, the Chi-square value performed at 2.857 with a degree of freedom of 5. The p-value is 0.722, so the previous assumption could be confirmed that the difference between groups is not significant with $p > 0.05$. Yates' chi-square is 5.681 and Yates' p-value is 0.338; data were analysed using the statistical package Statistical Package for the Social Sciences (SPSS Software, Version 14, IBM Corp., Armonk, NY, USA).

3. Results

Table 1 shows the age and sex distribution of the sample and control group. In the last 5-year findings, males presented more early childhood caries than females in the sample and control group; respectively, 2.4% and 2.2%.

There were no significant differences between the two groups as regards both the extent of dental damage ($p < 0.920$) as shown Table 2 and the treatments carried out ($p < 0.338$) as shown in Table 3.

This manuscript has been checked with the Fi-index tool and obtained a score of 0.86 on the date 16 November 2022. No according to Scopus® for the first author only [17, 18].

4. Discussion

Caries experience of children and complex clinical circumstances are an actual challenge for any healthcare professional. To date, very few dated articles [17–24] have dealt with this topic in very small children (≤4 years of age) and no articles analyzed the same oral health condition in children (≤4 years of age) with the autistic spectrum comparing them with an age-matched control group. It is very important to intercept these oral pathologies as early as possible, to allow children to eat, to decrease the pain and discomfort, and to avoid or limit repercussions on the permanent dentition as showed in

TABLE 1. Demographics of the sample group (autistic children) and control group (non-autistic children).

Sex	N	Age (yr) Mean ± SD
Sample group		
Males	12	2.5 ± 2.0
Females	8	3.2 ± 1.5
Control group		
Males	11	3.0 ± 3.5
Females	9	3.3 ± 2.0

SD: standard deviation.

TABLE 2. Distribution of the extent of dental damage in the sample and the control group.

	Autistic Group	Control Group
Extent of dental damage		
White spot	6 (1.2%)	2 (0.4%)
White spots and enamel proximal lesions	11 (2.2%)	7 (1.4%)
Brown-black cavities and root stumps	3 (0.6%)	11 (2.2%)

TABLE 3. Treatments were carried out in the sample and the control group.

Treatments	Autistic Group	Control Group
Chlorhexidine varnish		1 (0.2%)
Varnish topical fluoride with resin base		2 (0.4%)
Composite restoration	11 (2.2%)	2 (0.4%)
Composite restorative technique and pulp treatment		2 (0.4%)
Stainless steel crowns		3 (0.6%)

Figs. 1,2,3.

Some authors [21] showed that a significant number of parents, whose children had early childhood caries, knew about the damaging effects of putting sugary constituents on the baby bottle for a long time. Instead, according to our findings, another studies [24–26] concluded that the awareness of ECC was generally lower among parents of ECC children than among parents of children without ECC. Moreover, they found also that the percentage of babies with ECC weaned from the bottle after 14 months old was higher (36.8%) than babies without the condition (26.5%) Other authors [23] showed that babies born after maternal complications during pregnancy or who experienced a painful birth must be considered at risk of developing caries when exposed to disproportionate bottle nursing.

Some authors [27] investigated the factors related to the susceptibility of early childhood caries in 392 children; they found significant differences in three factors: eating too many sweets each day, brushing before and after sleeping, and parents helped to brush. However, they also found a significant relation between the parents' level of education and oral health understanding and the ECC. We agree with the findings of the authors [27], the patients with brown-black cavities and root stumps came from a poor background and their family were socially disadvantaged.

Otherwise from other authors [28–31], who found in autistic children a higher caries prevalence and poor oral hygiene reporting more invasive dental treatments carried out respect to non-autistic children, in our outcomes, we didn't find any significant differences among autistic and non-autistic children, probably because most of the patients' families came from disadvantaged backgrounds with a poor knowledge of the importance of oral hygiene.

Many studies [10–13] reported a higher prevalence in ECC in autistic patients with a higher age; in our case, since they were very young children, probably they were more monitored by the parents despite the disadvantaged social context.

According to the literature [32], the crowns are one of the most long-lasting, retentive and relatively inexpensive restorative materials that have shown good long-term retention and significant clinical success in the restoration of larger carious lesions [33–38].

Since preserving primary teeth is essential for maintaining maxillary growth [39–41], aesthetics, mastication function and speech [42–45], when possible, pulp treatments, composite restoration, chlorhexidine varnish and varnish topical fluoride with resin base were also performed in non-autistic group under sedation. Fluoride helps to remineralize the demineralized tooth surfaces injured by caries increasing the resistance. This study presents some limitations: the limited number of patients and no randomization was performed. Paediatricians have an essential role in intercepting these oral pathologies; they can teach parents to realize early oral and dental hygiene, adopt an appropriate diet, and show them how to recognize early signs of rampant caries, such as white spots.

5. Conclusions

The dentist and the paediatrician have to intercept oral problems in pediatric patients to avoid dental and psychological complications. The extent of dental damage and the treatments carried out were not statistically different between autistic and non-autistic group. The control and the management of ECC is arduous, due to the multifarious behavioral problems that derive from social, economic and environmental factors of the families. Preventive approaches should focus on early dental inspection, tooth brushing, limiting an excessive use of sugar and using topical fluoride.

FIGURE 1. Brown-black cavities. (A) Intraoral frontal view of 3-year autistic male who shows extensive decays of primary incisors. (B) Intraoral frontal and lateral views of 2.7-year female who shows brown-black cavities in the upper and lower arches except for the lower incisors that not present any caries.

FIGURE 2. Root stumps. (A) Intraoral frontal view of 3-year no autistic female who shows extensive decays of primary dentition and root stumps in the upper and lower arches; the lower primary incisors, except for the left lateral incisor, appear healthy. (B) Intraoral frontal view of 3-year female who shows root stumps in the upper and lower arches; the lower primary teeth are also affected. (C) Intraoral frontal view of 2.5-year autistic female showing root stumps and extensive decay in both arches.

FIGURE 3. Periapical radiograph showing tooth decay and a periapical lesion.

AVAILABILITY OF DATA AND MATERIALS

Not applicable.

AUTHOR CONTRIBUTIONS

PMM—conceptualization; LF—methodology, formal analysis; LF and AM—software; GC—validation, investigation; CDA—resources; LF, SC and AM—data curation; PMM and GM—writing–original draft preparation; CDA and GM—writing–review and editing; MC—supervision, project administration. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the ethics committee of the University of Aldent, Faculty of Oral Sciences (Reference number: 22/2; Date: 20 March 2023). Written informed consent has been obtained for all patients prior to the start of the study.

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CONFLICT OF INTEREST

The authors declare no conflict of interest. Giuseppe Minervini is serving as one of the Editorial Board members of this journal. We declare that Giuseppe Minervini had no involvement in the peer review of this article and has no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to APG.

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