



Prevalence of Medically Compromised Children Among Dental Patients: A 10-Year Retrospective Study

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ABSTRACT

Aim: Medical conditions can affect oral health status as well as directly affecting dental treatment planning and patient management. The purpose of this study is to evaluate the prevalence of various medical conditions of those children in a community-based dental hospital.

Materials and Methods: In this study, the anamnesis forms of 30,161 children aged 0-15 who were referred to a university dental hospital from a defined geographical area in southeastern Turkey between 2010 and 2020 were evaluated. Patients who had a medical risk and chronic/systemic/genetic diseases were included in this study. Those medical records for acute conditions, cooperation problems and isolated tooth anomalies not associated with any syndrome or genetic disease were excluded from this study.

Results: 1,619 (5.36%) of the patients included in the study had at least one systemic disease. According to the medical conditions which were examined and categorized, the most common disease group was neurological disorders (17.1%) and the most common disease was epilepsy (11.7%). It was followed by Congenital/chromosomal malformations (14.8%), while autism was the most common in this group with a rate of 36.7%.

Conclusion: Obtaining a detailed medical history of every patient who is referred to the dental clinic is very significant in terms of treatment planning, non-routine required protocols and complications. Dentists and pediatricians should evaluate more frequently and more rigidly, using a multidisciplinary approach, children with systemic diseases whose oral and dental health is at greater risk as a result of their medical condition.

Keywords: Chronic diseases, medical records, pediatric dentistry, medically compromised children, prevalence

Introduction

The human body is a whole which consists of organs and systems which affect each other. There is a direct or indirect relationship between systemic diseases and oral/dental health (1). Sometimes, a change in the oral cavity can be a manifestation of a systemic disease.

Furthermore, a medical condition can affect dental treatment planning, risks of complication occurrence, the

drugs which can be prescribed, and the health of patients and dentists (2,3). Additionally, in the presence of certain diseases, bacteremia may occur due to dental infection or invasive dental procedures and it can pose serious risks such as endocarditis (3). Therefore, it is very important for dentists to obtain a detailed anamnesis record containing the past medical history of their patients giving their diseases, surgeries, and usage of medications (4).

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In previous studies on the medical profiles of patients who were referred to dentists, it was observed that fewer systemic diseases were determined in pediatric patients compared to adults, and their common disease profiles differ from those of adults (5-7). It is remarkable that most of these studies on the prevalence of systemic diseases and medical records in dentistry focused on adult patients (5,8,9). Some systemic diseases can cause changes in the oral cavity. Even the first symptom may occur in oral tissues and the disease can be diagnosed by means of these symptoms. Therefore, dentists' detailed anamnesis records and detailed examinations can help to identify the underlying etiology of oral changes, and so enable early intervention (10). The aim of this study was to determine the prevalence of systemic diseases and medical profiles in pediatric patients referred to a dental clinic by means of a retrospective evaluation of 10 years' worth of patient records.

Materials and Methods

In this study, the medical records of 30,161 children aged 0-15 who had visited a university dental hospital between January 2010 and June 2020 were included in the evaluation. A detailed consent form is routinely obtained from all patients/parents who are refer to our clinic before their examination. In this form, it is stated that "medical/dental records and oral photographs can be used for diagnostic, scientific, educational or research purposes while keeping any identifying information of the patients confidential" and written consent of the parent is obtained. These consent forms are stored in the department archive. Therefore, an additional consent form was not created for this retrospective study.

The patients' medical records, which were created electronically by dentists, were analyzed. Children with a medically compromised condition or a chronic/systemic/genetic disease in their records were included in this study. Anamnesis records containing non-cooperation without mental retardation, acute conditions (trauma, extraoral dental abscess, etc.) and isolated dental anomalies which are not associated with any syndrome or genetic disease (gemination, fusion, turner hypoplasia, MIH, etc.) were excluded.

The medically compromised conditions were classified into 17 subgroups as follows: neurological disorders, congenital/chromosomal malformations, cardiac diseases, respiratory diseases, allergy, endocrine disorders, hematological diseases, mental retardation, psychiatric disorders, oncological diseases, autoimmune diseases,

gastroenterological diseases, renal diseases, physical disabilities, dermatological diseases, metabolic diseases and others. FMF and celiac disease were included in the Autoimmune diseases and all cancers were collected in the Oncological diseases group. If a patient had more than one disease in the same group, the disease was recorded as singular. The data of the patients were collected and encoded by their category using a Microsoft Excel spreadsheet (Microsoft, Redmond, Washington, USA). The coded data were analyzed using SPSS (version 23.0; SPSS Inc., Chicago, Illinois, USA). The values obtained were calculated in terms of frequency and percentage. Pearson's chi-square test was applied to verify the association between the disease groups and the patients' age and gender, separately.

Results

1,619 (5.36%) of the 30,161 patients whose anamnesis forms were examined had at least one systemic disease or medical record that required attention. 60% of these 1,619 patients were male. In this study, the patients had an age range of 0-15 years with a mean age of 7.61 ± 3.16 years (Figure 1).

1,852 systemic diseases/medical conditions were detected in 1,619 patients. 207 patients had more than one medical condition which belonged to different disease groups (Table I).

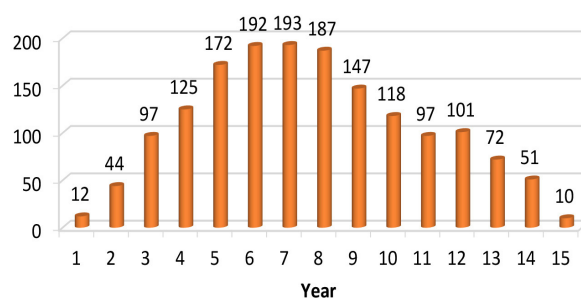


Figure 1. The age distribution of patients

Groups	N
Patients with 1 disease group	1,412
Patients with 2 disease group	182
Patients with 3 disease group	24
Patients with 4 disease group	1
Patients without disease group	28,542
Total	30,161

In the current study, the most prevalent medical condition was neurological disorders (17.1%), and the most common disease was determined to be epilepsy (11.6%). Congenital/chromosomal malformations (14.8%) were the second most common group, and autism constituted 36.7% of this group. The third most common disease group was cardiac diseases with a rate of 13.9%, followed by respiratory system diseases with a rate of 13.4% (Table II). The comparison of the prevalence of diseases by age

groups is given in Table II. The prevalence of cardiac diseases between 0-5 years of age was statistically significantly higher than 5-10 years. Hematological diseases and Congenital/chromosomal malformations were significantly higher in the 0-5 age group than in the 10-15 age group.

Asthma accounted for 85.1% of this group, and was the second most common disease among all diseases with 11.4% (Table II and Figure 2). The 5 most common diseases are given in Figure 2.

Table II: Disease categories and frequencies

Medical condition	Type of disease	Age group						n	%
		0-5 y		5-10 y		10-15 y			
		n	%	n	%	n	%		
Neurological disorders	Epilepsy, CP, hydrocephaly...	87 ^a	16.4%	166 ^a	17.5%	64 ^a	17.2%	317	17.1
Congenital/chromosomal malformations	Autism, Down syndrome, apert synd., ectodermal dysplasia...	94^{a*}	17.8%	138 ^{a,b}	14.5%	43^{b*}	11.6%	275	14.8
Cardiac diseases	Congenital/acquired heart diseases and surgeries	89^{a*}	16.8%	115^{b*}	12.1%	54 ^{a,b}	14.5%	258	13.9
Respiratory diseases	Asthma, bronchitis, dyspnea...	68 ^a	12.9%	130 ^a	13.7%	51 ^a	13.7%	249	13.4
Allergy	Drug and food allergies...	36 ^a	6.8%	81 ^a	8.5%	29 ^a	7.8%	146	7.8
Endocrine disorders	Diabetes mellitus, hypothyroidism, rickets...	29 ^a	5.5%	65 ^a	6.8%	23 ^a	6.2%	117	6.3
Hematological diseases	Anemia, hemophilia, thalassemia...	35^{a*}	6.6%	48 ^{a,b}	5%	11^{b*}	3%	94	5
Mental retardation	Isolated mental retardation without a diagnosed disease	11^{a*}	2.1%	27 ^{a,b}	2.8%	19^{b*}	5.1%	57	3
Psychiatric disorders	Attention deficit disorder, hyperactivity, anxiety...	12 ^a	2.3%	29 ^a	3%	16 ^a	4.3%	57	3
Oncological diseases	Type of leukemias, neuroblastoma...	10 ^a	1.9%	30 ^a	3.2%	13 ^a	3.5%	53	2.8
Autoimmune diseases	Immune deficiency, FMF, celiac disease...	8^{a*}	1.5%	25 ^{a,b}	2.6%	17^{b*}	4.6%	50	2.6
Gastroenterological diseases	Gastric and liver diseases	14 ^a	2.6%	20 ^a	2.1%	5 ^a	1.3%	39	2.1
Renal diseases	Kidney failure, kidney transplantation...	10 ^a	1.9%	21 ^a	2.2%	5 ^a	1.3%	36	1.9
Physical disabilities	Blind, deaf and mute...	9 ^a	1.7%	15 ^a	1.6%	6 ^a	1.6%	30	1.6
Dermatological diseases	Urticaria, epidermolysis bullosa...	0^{a*}	0%	11 ^b	1.2%	5 ^b	1.3%	16	0.8
Metabolic diseases	Phenylketonuria, mucopolysaccharidosis...	6 ^a	1.1%	5 ^a	0.5%	3 ^a	0.8%	14	0.7
Others	Vomiting reflex, zinc deficiency...	11 ^a	2.1%	25 ^a	2.6%	8 ^a	2.2%	44	2.3
Total		529	100%	951	100%	372	100%	1852	100%

Age groups with the same letter mean "no significant difference", while age groups with different letters mean "there is a significant difference" (*p<0.01).
CP: Cerebral palsy, FMF: Familial Mediterranean Fever, y: Year

When patients with mental or physical disabilities were collected in a special category, it was determined that autism was the most common medical condition among these patients (28.1%). Autism was followed by cerebral palsy, Down's syndrome and mental retardation not associated with any syndrome (Figure 3). The rate of mental or physical disabilities among all diseases was determined to be 19.4%.

The gender distribution of medically compromised dental patients is given in Table III. Respiratory diseases had significantly higher prevalence in male patients than in female patients. Endocrine disorders were found to be significantly more common in female patients than in male patients (Table III).

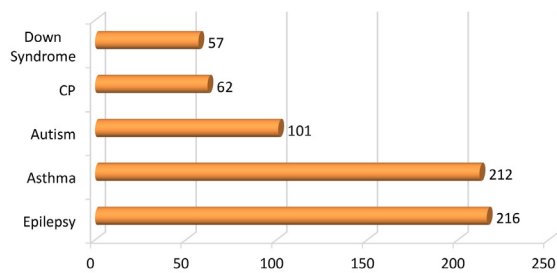


Figure 2. Most frequent diseases

One hundred and ninety-four (11.98%) of the 1,619 patients were treated under general anesthesia. These patients mostly had congenital or chromosomal malformations (34.2%). This was followed by neurological disorders (23.9%), cardiac diseases (10.7%) and isolated mental retardation (9.5%), respectively.

Discussion

Oral care is part of parental responsibility in medically compromised children (MCC), as in all children aged 0-6 years. However, after the age of 6 years, the child, who needs to gradually take an active role in his/her self-care, may be passive due to common psychosocial and educational

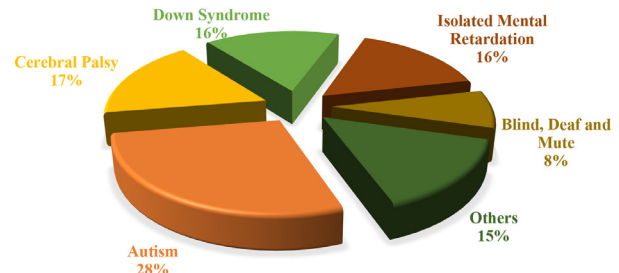


Figure 3. Mental or physical disabilities

Table III. Gender distribution of medically compromised dental patients

Medically compromised condition	Number of female/male	Frequency of female/male (%)	Chi-square for gender difference (p-value)*
Neurological disorders	130 : 187	20.1% : 19.3	0.635
Congenital/chromosomal malformations	99 : 176	15.3% : 18.1	0.114
Cardiac diseases	114 : 144	17.6% : 14.8	0.137
Respiratory diseases	78 : 171	12.0% : 17.6	0.002*
Allergy	67 : 79	10.3% : 8.1	0.129
Endocrine disorders	60 : 57	9.3% : 5.9	0.010*
Hematological diseases	36 : 58	5.6% : 6.0	0.725
Mental retardation	23 : 33	3.5% : 3.4	0.871
Psychiatric disorders	18 : 39	2.8% : 4.0	0.185
Oncological diseases	21 : 32	3.2% : 3.3	0.952
Autoimmune diseases	24 : 26	3.7% : 2.7	0.242
Gastroenterological diseases	18 : 20	2.8% : 2.1	0.350
Renal diseases	13 : 24	2.0% : 2.5	0.539
Physical disabilities	14 : 16	2.2% : 1.6	0.454
Dermatological diseases	6 : 10	0.9% : 1.0	0.836
Metabolic diseases	4 : 10	0.6% : 1.0	0.380
Others	12 : 32	1.9% : 3.3	0.080

*p<0.05

secondary handicaps caused by their medical condition (11). Additionally, parents focus more heavily on the follow-up and care of the chronic disease. Chronic diseases can lead to negligence on behalf of the parents with regard to oral/dental health and thus, these issues can be ignored until dental problems become acute (11,12). However, the body is a whole and one malfunction can affect the whole systems. Aggarwal's (6) "The dentist does not treat 'teeth in patients' but 'patients who have teeth.'" statement supports the importance of this study. Therefore, dentists should obtain detailed information about the medical conditions of their patients and have knowledge about an appropriate treatment approach in light of their disease.

In previous epidemiological studies conducted in the general pediatric population, the prevalence of MCC was reported to be between 1.06% and 44% (13-15). In studies analyzing the medical profiles of patients visiting dentists, there were few prevalence studies focusing on pediatric patients, as there were more medical conditions in adults compared to children. Brown reported 211 of 386 patients were MCC (54.66%) in his study in 2009 (7). However, it was stated by the author that the hospital provides services to patients, 50% of whom are MCC requiring specialist care. In another study conducted on the pediatric population, the "report sensitivity" of the families was examined and it was determined that the MCC prevalence was 66% since the sample was mostly chosen from MCC (16). In the current study, the prevalence of MCC was 5.46%, which is considerably lower than the dentistry studies in the literature. However, it is consistent with studies conducted in the general pediatric population. It is clear that this important difference is related to the inclusion criteria of the studies. In addition, this difference can be explained by the different sample sizes, ethnic/socio-demographic reasons, and misreporting. Schwarz et al. (16), in their study comparing medical records with dental records, found that the sensitivity rate varied between 16% and 100% according to the disease groups (16). One reason for the low prevalence in this study may be misreporting.

In the current study, the higher incidence of medical conditions in males (60%) was found to be consistent with studies in pediatric patients in the literature (7,11,17). However, the prevalence of women was higher in studies conducted on adults (5,6,9).

In this study, neurological disorders were the most common disease group (17%). Although there are studies with the high rates of neurological disorders in the literature (11,16), it is difficult to certainly compare these findings

because different categorizations and definitions are used in many studies. Since the number of studies on pediatric patients who were referred to dentists in the literature is limited, more studies are needed to get a clearer idea about prevalence. According to this study, epilepsy, which affects 7 out of every 1,000 children, is the most common disease in pediatric dental patients. Seizures in epileptic children can cause soft tissue injuries, facial fractures, dental trauma, and TMJ disorders. Furthermore, one of the most common reasons of gingival hypertrophy is phenytoin which is an antiepileptic drug (18). Therefore, dentists should inquire about the drugs used by their patients as well as the medical conditions of their patients. In patients who have oral manifestations, pediatric neurology should be consulted and a modification/change of medication should be requested. These patients should be followed up with a multidisciplinary approach.

Congenital/chromosomal malformations were the second most prevalent group among all (14.8%). The frequency of consanguineous marriages in the region where the study was conducted may have affected this result. It has been reported that consanguineous marriages increase the risk of various multifactorial diseases, mental retardation, developmental disorders, congenital, neurological and chromosomal malformations (19).

Of the 258 heart diseases detected in this study, 104 were congenital, 36 were acquired, and the rest were of unknown cause. The incidence of heart disease in children aged 0-5 years was significantly higher in this sample compared to the 5 to 10-year-old group ($p < 0.01$). The reason for this may be that congenital heart diseases were detected more in this study. Nevertheless, no statistically significant difference was found when children aged 0-5 years and 10-15 years were compared. Acquired heart diseases is more prevalent in older children (20). This may explain the increased rate of heart disease in children aged 10-15 years. From the dentist's perspective, infective endocarditis, which carries a high risk of mortality, is the most important risk to consider in these patients. There is strong evidence that untreated dental/periodontal diseases and some invasive treatments are an important etiological factor for endocarditis (21). The ideal dental care approach in high-risk patients is for them to receive preventive dental care before dental problems occur, and to follow a prophylactic antibiotic procedure during the treatment phase (21). Preventive dental care applications include procedures such as performing routine check-ups more frequently and re-mineralizing early caries lesions before cavitation. In addition, increasing routine check-ups makes it possible to detect and treat risky teeth that may be

the source of focal infection. Both dentists and pediatricians should take extra care with a multidisciplinary approach to oral health in children with heart disease.

In this study, mental and physical disabilities are evaluated in Figure 3 as a special subgroup of medical conditions in terms of having unique difficulties in dental care and treatments. Children with disabilities have poorer oral health and more unmet dental treatment. The underlying causes may be barriers to access dental services, poor oral hygiene, and disability-related factors (22).

Unlike respiratory diseases, which were statistically significantly higher in males, endocrine disorders were more prevalent in females. The gender distribution in the two disease groups in our study is also consistent with some adult studies (5,6). In this study, asthma which accounts for 85.1% of respiratory diseases, is significantly more common in males, which is consistent with the literature. Asthma and drugs such as inhaled corticosteroids used in its treatment have been blamed for increasing the prevalence of dental caries, causing erosion and periodontal problems in many studies (23). The dentist should consider these risks, and evaluate the patient within the scope of preventive treatment.

Study Limitations

Within the limits of this study; some information may be incomplete due to its retrospective nature. The standardization of the information may have been affected since it covers a long period and therefore data was not recorded by a single dentist. These problems encountered due to the design of retrospective studies could not be minimized as more detailed information about medical conditions could not be evaluated within the scope of the study. The lack of specific records on the American Society of Anesthesiologists classification or medications in most patients resulted in not being able to collect data on this issue. Another problem with categorizing medical information was that some diagnoses did not belong to an existing category. This information was collected in the "others" category in order not to increase the possible relative agreement between records incorrectly. This category accounted for only 2.3% of all medical conditions (n=1,852). Creating 17 disease groups in the study was also a factor designed to reduce this rate.

Conclusion

Although the prevalence of medical conditions in children is much lower than in adults, sometimes this

information can be crucial. Preventive dentistry practices are very important in all children, but these practices should be applied more frequently and rigidly in children whose oral and dental health is compromised as a result of their medical condition. The types of medical conditions and how often they are detected in pediatric patients who are referred to the dentist is valuable data as it allows dentists to review this information so that they can plan, treat and manage complications with regards to dental health services. Dentists and pediatricians should collaborate in a multidisciplinary approach in MCC.

Ethics

Ethics Committee Approval: Ethics committee approval for the study was obtained from the Non-Interventional Clinical Research Ethics Committee of the İnönü University (number: 2020/1075).

Informed Consent: Retrospective study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Data Collection or Processing: Ş.N.Ö., Analysis or Interpretation: Ş.N.Ö., Writing: P.D., Ş.N.Ö.

Conflict of Interest: No conflict of interest was declared by the authors.

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