

AWARENESS, EXPERIENCE, AND KNOWLEDGE OF DENTISTS TOWARDS DENTAL PRACTICES IN INDIVIDUALS WITH AUTISM SPECTRUM DISORDER

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ABSTRACT

INTRODUCTION: Autism spectrum disorder (ASD) is a neuro-developmental disorder characterized by persistent impairment in social communication and interaction, limited interest areas, and restricted and repetitive behaviors.

OBJECTIVES: The aim of the present study was to evaluate the awareness, experience, and knowledge of dentists towards dental practices in individuals with ASD.

MATERIAL AND METHODS: An online questionnaire consisting of 22 questions and three parts was prepared. Part 1. Demographic characteristics; Part 2. Awareness and experience of dentists about dental practices in individuals with ASD; Part 3. Knowledge of dentists regarding dental practices in individuals with ASD. The questionnaire link was sent to 1,204 potential participants via e-mail. Data were compared using Mann-Whitney *U* test and Kruskal-Wallis test taking into account specialties and professional experience of participants.

RESULTS: In the study, 356 (29.6%) volunteer dentists, including female ($n = 110$, 30.9%) and male doctors ($n = 246$, 69.1%) participated. The mean age was 37.38 ± 9.726 years (range, 23-68 years). Of the participants, 52.2% reported that they have previously examined and/or treated an individual with ASD. Most of the participants (95.2%) stated that they were not aware of special arrangements made for individuals with ASD in dental clinic. Statistically significant differences were found between knowledge scores of dentists about dental practices in individuals with ASD, and specialization areas and professional experience of participants.

CONCLUSIONS: It was found that dentists' awareness about dental practices in individuals with ASD was at very low level. The knowledge level of pediatric dentists regarding dental practices in individuals with ASD were better than the knowledge of general dentists and other specialists.

KEY WORDS: autism spectrum disorder, dentist, awareness.

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INTRODUCTION

Autism spectrum disorder (ASD) is a neuro-developmental disorder characterized by persistent impairment in social communication and interaction, limited interest areas, and restricted and repetitive behaviors [1]. The incidence of ASD is reported to be increasing gradually. According to estimates by the Centers for Disease

Control and Prevention (CDC), and Autism and Developmental Disabilities Monitoring (ADDM) network, about 1 in 44 children have ASD. ASD affects all racial, ethnic, and socio-economic groups, and is four times more likely to develop in boys than girls [2].

Many conditions are associated with ASD, such as sleep, eating and sensory integration disorders, speech, language and behavior problems, epilepsy, depression,

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anxiety, psychosis, immune system, and gastrointestinal system diseases. Because of the multiple and various problems in ASD, an inter-disciplinary approach is required with a team of many different experts and sub-experts. The involvement of psychologists, psychiatrists, dietitians, special educators, social workers, speech and language therapists, audiologists, and oral health professionals in an inter-disciplinary team has an important role in minimizing symptoms of the disease and increasing quality of life of these patients [3]. Therefore, all experts working in these fields should present a high awareness of ASD and receive adequate training on this subject [4]. Classification of ASD has been previously done, but due to various difficulties, ASD has been classified as a single category according to the latest update (diagnostic and statistical manual of mental disorders, 5th edition; DSM-5) [1]. Among these challenges, the main are clinicians' interpretation of diagnostic criteria and variation in an individual's diagnosis of ASD over lifetime. In addition, DSM-5 present a classification system that vary from level 1 (requiring support) to level 3 (requiring very substantial support) [1]. These ASD severity levels can affect social communication as well as change dental treatment process. At level 3, treatment procedures may be more difficult.

When ASD is evaluated in terms of dentistry, due to various drugs (antipsychotic, antidepressant, anti-convulsant, etc.) used in the treatment, these individuals experience an increase in dry mouth, caries, and periodontal diseases [5]. In addition, behavioral disorders, such as bruxism, lip biting, dysfunctional chewing, self-mutilation and tantrums, nutritional problems, inadequacy in motor skills, and orthodontic problems, are all common in individuals with ASD [6]. These factors lead to several oral health problems, including poor oral hygiene, increase in caries and periodontal diseases, and teeth loss. In order to prevent these issues, dental check-ups at an early age, early treatments, and comprehensive preventive approaches are needed. However, it is stated that individuals with ASD have difficulties in accessing dental treatments, as in many health services. Individuals with ASD have difficulties in finding a dentist who will be able to treat them as well as communication and behavioral problems [7, 8]. Dentists are generally concerned about providing the treatment to ASD patients because they do not have enough knowledge on how to approach such patients. Unfortunately, this situation adversely results in the oral health of individuals with ASD, in addition to the above-mentioned problems. Researchers state that when a qualified teaching about ASD in undergraduate education of dental students is provided, dentists will not have to worry about treating these patients [9-11].

The high prevalence of ASD underscores the importance in dentists to be knowledgeable about various health problems these patients may present, and to have the competence to treat them in clinical practice [2]. There

is a limited number of studies in dental literature on this subject; therefore, the aim of the present study was to evaluate the awareness, experience, and knowledge of dentists towards dental practices in individuals with ASD.

OBJECTIVES

The aim of the present study was to evaluate the awareness, experience, and knowledge of dentists towards dental practices in individuals with ASD.

MATERIAL AND METHODS

DATA COLLECTION

This study was approved by the Gazi University Ethics Committee (approval No.: 2021-816, issued on May 18, 2021), and all stages of the study were conducted in accordance with the Declaration of Helsinki. Considering previous studies, a questionnaire was prepared by a public health specialist and two maxillofacial radiologists [12-14]. The first version included total of 20 questions. It was then evaluated by a pediatric dentist and a special educator who were blind to previous procedures, and two questions were added in line with their recommendations. The questionnaire was carefully verified to ensure that it did not contain any question that contradict with other question, or misdirect the participants. The final version of the questionnaire consisted of 22 questions and three parts: Part 1. Demographic characteristics of the participants – five questions; Part 2. Awareness and experience of the dentists about dental practices in individuals with ASD – seven questions; Part 3. Knowledge of the dentists regarding dental practices in individuals with ASD – 10 questions (Table 1).

The questionnaire was prepared using Google Forms (Alphabet Inc., Mountain View, California, USA), and its link was sent to potential participants via e-mail. The questionnaire was sent to 1,204 dentists between July 26, 2021 and March 24, 2022. All responses were collected anonymously, and all participants provided informed consent before completing the survey.

DATA ANALYSIS

Data analyses were conducted using IBM SPSS Statistics version 23.0. For descriptive statistics, percentage, mean \pm standard deviation, and minimum and maximum values were evaluated. Due to the negatively skewed distribution of scores, non-parametric tests, i.e., Mann-Whitney *U* and Kruskal-Wallis tests were applied. Cronbach's α coefficient was calculated for internal consistency reliability of scores in part 3. Statistical analyses were carried out within 95% confidence interval, with 5% significance level ($p < 0.05$).

TABLE 1. Questionnaire used in the study

Part 1. Demographic characteristics of participants						
Age						
Sex	Male					
	Female					
Professional experience	≤ 10 years					
	> 10 years					
Institution	Private clinic					
	Oral and dental health center/state hospital					
	University					
	Other					
Specialties	No specialties (general dental practitioner)					
	Pediatric dentistry					
	Specialties, except for pediatric dentistry	Oral and maxillofacial surgery				
		Oral and maxillofacial radiology				
		Endodontics				
		Oral pathology				
		Orthodontics				
		Periodontology				
		Prosthetic dentistry				
Restorative dentistry						
Part 2. Awareness and experience of dentists regarding dental practices in individuals with ASD						
Have you previously examined and/ or treated a patient with ASD?			Yes			
			No			
			It was not possible because I could not communicate			
Do you know about special arrangements made for individuals with ASD in dental clinic?			Yes			
			No			
In your opinion, should there be more detailed information in dental curriculum for individuals with ASD?			Yes			
			No			
			Specialized training is required to treat ASD patients			
Would you like to attend a scientific event (congress/ symposium, etc.) on dental practices in individuals with ASD?			Yes			
			No			
Part 3. Knowledge of dentists about dental practices in individuals with ASD						
	Question			Response		
1	Consumption of sugary foods and beverages is often higher in individuals with ASD			True	False	Indecisive
2	Drugs used by individuals with ASD cause dry mouth. Therefore, more caries and periodontal diseases are seen			True	False	Indecisive
3	Bruxism can be seen in individuals with ASD			True	False	Indecisive
4	Maxillofacial and dental traumas are more common in individuals with ASD			True	False	Indecisive
5	Oral care of individuals with ASD is usually done by their parents			True	False	Indecisive
6	Individuals with ASD may not like the smell/ taste of toothpaste			True	False	Indecisive
7	Individuals with ASD may be disturbed by the reflector light during dental examination, and natural light should be used			True	False	Indecisive
8	Individuals with ASD may be disturbed by the sound of aerator			True	False	Indecisive
9	Dental treatments of individuals with ASD should be performed under sedation or general anesthesia instead of clinical conditions			True	False	Indecisive
10	Regardless of age, pediatric dental specialists treat individuals with ASD			True	False	Indecisive

RESULTS

In total, 356 dentists participated voluntarily in the study. The age of the participants ranged between 23 and 68 years (mean ± standard deviation, 37.38 ± 9.72 years). Demographic characteristics of the participants are shown in Figure 1. Of the dentists, 52.2% reported that they had previously examined and/or treated an individual with ASD. Most of the participants (95.2%) stated that they were not aware of special arrangements made for individuals with ASD in dental clinic. The majority of the dentists (91.3%) agreed that more detailed education should be provided on individuals with ASD in dental curriculum. Of the participants surveyed, 84.6% expressed interest in attending a scientific event focused on dental procedures for individuals with ASD (Table 2). The knowledge scores of the dentists about dental practices in individuals with ASD ranging from 0 to 10 were obtained, with a score of 1 for the true answer, and 0 for the false or I don't know answer, provided to each of the items. Cronbach's α coefficient was 0.78 for internal consistency reliability of the knowledges scores of the dentists about dental practices in individuals with ASD. The item-total correlations ranged from 0.214 and 0.590. Cronbach's α coefficient did not increase if any item was deleted, and the scores were found reliable for the study sample (Table 3).

Statistically significant difference was found between the knowledge scores of the dentists about dental practices in individuals with ASD according to professional experience (Table 4). The mean score of the dentists with professional experience of 10 years and more were higher than those with professional experience of less than 10 years. Statistically significant difference was found in

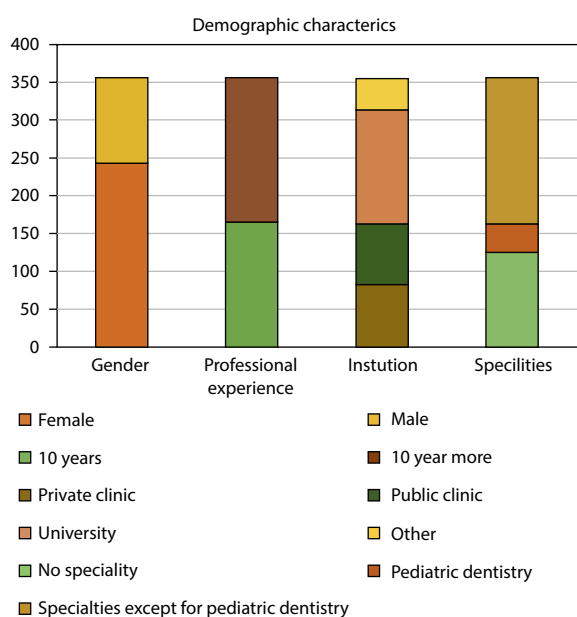


FIGURE 1. Distribution of demographic characteristics of the participants

the knowledge score about dental practices in individuals with ASD according to specialties of the participants (Table 4). The knowledge score of pediatric dentists was higher than another dentists ($p < 0.001$).

DISCUSSION

Due to the limited access of ASD patients to all health services, and the lack of sufficient knowledge and experience of healthcare professionals, the careless approach to these patients negatively affects quality of life of both ASD patients and their relatives. Nowadays, due to the significant prevalence of ASD, dentists are likely to encounter these individuals during routine clinical practice. It is inevitable to have a dentist in the necessary interdisciplinary team to minimize various problems experienced by persons with ASD. This situation requires professional responsibility of all healthcare providers, including dentists, in treating these individuals. It is very important for dentists to be aware about the general health, behavioral, sensory, and oral health problems of individuals with ASD. It can be said that the questionnaires used in previous studies varied widely, and that there is no generally accepted scale that includes den-

TABLE 2. Distribution of responses to questions about awareness and experience regarding dental practices in individuals with ASD, *n* (%)

Awareness and experience of dentists regarding dental practices in individuals with ASD		<i>n</i> (%)
Have you previously examined and/ or treated a patient with ASD?		
Yes		
No specialty	65 (18.2)	
Pediatric dentistry	32 (8.9)	
Specialties, expect for pediatric dentistry	89 (25)	
No		
It was not possible because I could not communicate	17 (4.8)	
Are you aware about special arrangements made for individuals with ASD in dental clinic?		
Yes		
	17 (4.8)	
No		
	339 (95.2)	
In your opinion, should there be more detailed information in dental curriculum about individuals with ASD?		
Yes		
	325 (91.3)	
No		
	3 (0.8)	
Must have special expertise		
	28 (7.9)	
Would you like to attend a scientific event (congress/ symposium, etc.) on dental practices in individuals with ASD?		
Yes		
	301 (84.6)	
No		
	55 (15.4)	

TABLE 3. Distribution of correct responses and internal consistency reliability of the knowledge scores of dentists about dental practices in individuals with ASD

Question	Correct response	Correct response, n (%)	Item-total correlation	Cronbach's a coefficient if question deleted
Consumption of sugary foods and beverages is often higher in individuals with ASD	True	117 (32.9)	0.320	0.752
Drugs used by individuals with ASD cause dry mouth. Therefore, more caries and periodontal diseases are seen	True	156 (43.8)	0.431	0.736
Bruxism can be seen in individuals with ASD	True	261 (73.3)	0.475	0.730
Maxillofacial and dental traumas are more common in individuals with ASD	True	229 (64.3)	0.509	0.724
Oral care of individuals with ASD is usually done by their parents	True	228 (64.0)	0.468	0.730
Individuals with ASD may not like the smell/taste of toothpaste	True	263 (73.9)	0.521	0.723
Individuals with ASD may be disturbed by the reflector light during dental examination, and natural light should be used	True	302 (84.89)	0.582	0.720
Individuals with ASD may be disturbed by the sound of aerator	True	319 (89.6)	0.590	0.724
Dental treatments of individuals with ASD should be performed under sedation or general anesthesia instead of clinical conditions	False	87 (24.4)	0.254	0.763
Regardless of age, pediatric dental specialists treat individuals with ASD	False	224 (62.9)	0.214	0.767

TABLE 4. Relationships between the knowledges scores of dentists about dental practices in individuals with ASD and their specialties and professional experience

Variables	Knowledge scores of dentists about dental practices in individuals with ASD				p-value
	n (%)	Mean ± standard deviation	Median (first and third quarter)	Range (minimum-maximum)	
Professional experience					
≤ 10 years	166 (46.6)	6.93 ± 2.23	7.00 (6-9)	0-10	< 0.0001 ^b
> 10 years	190 (53.4)	5.95 ± 2.68	6.00 (5-8)	0-10	
Specialties					
General dental practitioner	126 (35.4)	5.85 ± 2.66	6.00 (4-8)	0-10	< 0.0001 ^a
Pediatric dentistry	36 (10.1)	8.02 ± 1.59	8.00 (7-9)	2-10	
Specialties, except for pediatric dentistry	194 (54.5)	6.47 ± 2.44	7.00 (5-8)	0-10	

^aKruskal-Wallis test; ^bMann-Whitney U test

tists' attitudes, behaviors, experiences, knowledge level, and awareness towards ASD [10, 15-18]. In the present study, the questionnaire was prepared by the researchers based on previous studies, and the internal content reliability was statistically analyzed for the study sample. In a study conducted in the UK in 2019 among 482 dentists, it was reported that 60.5% of them have previously provided dental treatment to a child or adult with ASD. Considering the number of patients per month in the related study, it was shown that special care dentists (mean, 20.6) and pediatric dentists (mean, 14.9) treated more patients with ASD than general dental practitioners (mean, 6.2) [15]. In a study conducted among 374 dentists in the USA in 2010, it was reported that 32% of general dental practitioners and 89% of pediatric

dentists performed a dental treatment of patients with ASD. It was determined that pediatric dentists have more information than general dental practitioners about special dental office arrangements for individuals with ASD [10]. In the present study, 52.2% of the participants have examined or treated an individual with ASD, and 88.9% of the pediatric dentists mentioned that they have examined or treated an individual with ASD. Moreover, most of the participants (95.2%) stated that they were not aware of special arrangements needed for individuals with ASD in dental clinic. Studies show relatively similar results as well as outcomes that differ significantly from each other. This is because the questions are not the same, which may be related to the use of different surveys.

While the dental treatments of children with ASD are often carried out by pediatric dentists, the treatment of adults with ASD is performed by special care dentists, which is a separate specialty in some countries, such as the UK, Brazil, and New Zealand [19, 20]. However, in many countries, including Turkey and Iran, there is no such specialization, and the treatment of adults with ASD poses a greater challenge. In this case, adults with ASD have to be treated either by general dental practitioners with no training in this field, or by other specialist dentists from a multi-disciplinary approach. The situation is not at the desired level for both dentists and patients, since the number of specialist dentists often cannot meet the need, and dental treatments are performed in a limited number of centers that require special equipment (sedation or general anesthesia conditions). In our country, there is no special care dentistry, so the difficulties experienced are valid for our country as well as for many other countries in the world. Since the fields of specialization of dentistry vary from country to country, the fields of specialization are categorized differently in the studies. Here, we divided the specialties into three categories, including general dental practitioner, pediatric dentists, and other specialties. Taryn *et al.* divided them into two groups (general dental practitioner and pediatric dentistry), and Eades *et al.* classified them into three categories (general dental practitioner, special care dentists, and pediatric dentists) [10, 15].

Pediatric dentists are more experienced, knowledgeable, willing, and competent compared with general dental practitioners in dental treatment of children with ASD and special needs [9, 10, 15, 18]. On the other hand, in a study investigating the awareness of dental students about the general characteristics of ASD, it was found that their awareness was at a very high level [16]. However, in that study, dental students were asked only about the general characteristics of ASD, and no inquiries were made about dental treatments in individuals with ASD. In the present study, the knowledge scores of pediatric dentists regarding dental practices in individuals with ASD were found to be statistically significantly higher than other dentists. For all ratings, general dental practitioners' scores were the lowest, and pediatric dentists scores were the highest in this study. This finding is consistent with previous studies in the literature [9, 10, 15, 18]. Currently, given the substantial number of individuals with ASD globally, relying solely on pediatric and/or specialist dentists to address this burden is challenging [10]. Therefore, there is a need for general dental practitioners to include adequate training on dental treatment of individuals with ASD in the curriculum of the faculty of dentistry.

In individuals with ASD, both communication and behavioral problems as well as difficulty in finding a dentist to provide treatment are very important issues [21], especially that 67% of dentists are reluctant to treat individuals with ASD [9]. Previous studies have

reported that this attitude of dentist results from various problems encountered in individuals with ASD, and situations that should be considered during dental treatment of ASD patients are not sufficiently included in the education curricula [10, 15, 17, 22]. Researchers emphasized that there is a need for more training on this subject. In the current study, 91.3% of the participants thought that there should be more detailed information in the dental curriculum for individuals with ASD in accordance with previously published studies. Additionally, 84.6% of the participants stated that they would like to attend a scientific event related to ASD.

Children with ASD face more oral pathology than typically developing children [23]. This is because individuals with ASD lack the skills to brush their teeth properly, and they are less cooperative with their parents in daily tasks. Also, there is an increase in caries and periodontal diseases as a result of drugs used for ASD symptoms, leading to dry mouth [24, 25]. In addition, individuals with ASD prefer cariogenic and sugary foods, keeping food in their mouths for a long time, and sugary snacks are often used as a reward in individualized instructions [25]. Individuals with ASD are more difficult to accept oral and dental healthcare than healthy individuals. Of the individuals with ASD, 90% have difficulty in tolerating sensory stimuli, such as smell, taste, sound, and touch, known as sensory integration disorder. Tooth brushing includes stimuli of smell, sound, taste, and touch. The taste and smell of toothpaste and the contact of toothbrush bristles with the cheek and tongue of an individual can be very disturbing, especially for individuals with hypersensitive sensory integration disorder [19, 26]. It has been shown in previous studies that these oral health problems encountered by individuals with ASD are better known by pediatric dentists than general dental practitioners [18, 25]. However, no statistical difference was observed in a research [15]. In another study investigating the relationship between professional experience and conditions to be considered during dental treatment in individuals with ASD, a negative correlation was found with professional experience [10]. In the present study, it was concluded that the conditions to be considered during dental treatment in individuals with ASD are better known by pediatric dentists and dentists with less professional experience. Part of this finding is consistent with a previous study [10]. In this study, the correct responses given to the knowledge scores of dentists about dental practices in individuals with ASD ranged from 32.9 and 89.6.

Some limitations of the present study need to be mentioned. The study includes the results of the answers given by a certain number of dentists in a single country. Moreover, it was not possible to use a generally accepted scale measuring the knowledge, attitude, behavior, awareness, and experience of the dentists about dental practices in individuals with ASD, whose validity and

reliability could be measured. To the best of our knowledge, there is currently no such scale. For this reason, not all the findings may have been discussed and interpreted. There is a need for further studies to develop a standard scale with validity and reliability studies on this subject.

CONCLUSIONS

It was found that dentist awareness about dental practices in individuals with ASD is at very low level, and only half of the participants encountered an individual with ASD in their clinical practice. It was determined that the knowledge level of pediatric dentists regarding dental practices in individuals with ASD is better than general dentists and other specialists.

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CONFLICT OF INTERESTS

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