



# Oral Health Awareness and Practices of Special Needs Caregivers in Qatif, Saudi Arabia

Khalifa S. Al-Khalifa <sup>1,\*</sup> and Amal Alfaraj <sup>2</sup>

<sup>1</sup>Department of Preventive Dental Sciences, College of Dentistry, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia

<sup>2</sup>Department of Prosthodontics, School of Dentistry, Indiana University, Indiana, IN, USA

\*Corresponding author: Department of Preventive Dental Sciences, College of Dentistry, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia. Email: kalkhalifa@iau.edu.sa

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## Abstract

**Background:** Adequate oral health awareness and practices of special needs caregivers play a pivotal role in maintaining the optimal oral health of their dependents.

**Objectives:** The current study aimed at assessing the level of oral health awareness and practices of special needs caregivers in Qatif, the Eastern Province of Saudi Arabia.

**Methods:** The current cross-sectional descriptive study collected information by a self-administered questionnaire about awareness and practices of oral health in caregivers. The questionnaire consisted of four parts covering the caregiver demographic information, the awareness of oral health habits and conditions, awareness of dental visits and treatments, and knowledge and sources of information. Statistical analyses included descriptive and bivariate analysis using the Chi-square test, where P-values < 0.05 were considered statistically significant.

**Results:** There was an overall response rate of 27% (n = 186 out of 700). The majority (64.5%, n = 120) of the caregivers were female, 70.4% (n = 121) were educated up to a minimum of high school level. Up to 81.2% (n = 151) of the caregivers reported that dependents routinely brushed their teeth. Also, 84.9% (n = 158) of the caregivers knew about fluoride, and 77.8% (n = 123) understood that it helps prevent tooth decay. About three-quarters of the caregivers (n = 142) had taken their dependents to the dentist; 35.9% (n = 51) reported dental visits within the last six months. The most predominant information resources were dentists (54.6%, n = 83), TV and media (47.4%, n = 72), and the Internet (46.1%, n = 70). Caregivers' level of education was the only factor that had a significant relationship with oral health awareness (P = 0.018).

**Conclusion:** The majority of the caregivers have a good awareness of proper oral health practices. Given the significant influence of the educational level of caregivers in oral health awareness, it is essential to ensure that they have any relevant education to improve their dependents' oral health.

**Keywords:** Caregivers, Awareness, Dental Care for Individuals with Disabilities, Oral Health, Saudi Arabia

## 1. Background

Over the past few years, emerging data from Saudi Arabia show that 4%-8% of the population have special needs, and only a small percentage receive health services (1). Dental care for individuals with disabilities requires specialized knowledge and skills in addition to heightened community awareness of proper oral health practices (2). Studies show that individuals with special health needs are more vulnerable to oral diseases throughout their life (2-11). Compromised oral health often leads to serious health issues, which can significantly affect the individual quality of life. Hence, more attention should be paid to improve the oral health of individuals, especially those with special health needs. However, many parents/caregivers of

individuals with special needs do not have adequate background or awareness of special care dentistry and home-care regimens in such individuals, putting them at higher risk of poor oral health outcomes (11, 12).

Evidence of global literature indicates that good oral health awareness and positive attitudes of parents/caregivers toward it play a role in maintaining optimal oral health in such children or dependents (13-20). Caregivers of individuals with special needs should take special care of their dependents due to their oral health peculiarities (i.e., impaired oral hygiene), poor neuromuscular coordination, inadequate intellectual development, and use of sweetened foods and medicines (10, 11, 21). Multiple studies from Saudi Arabia on this

subject report that caregivers of individuals with special needs have adequate awareness of the control of sugar consumption and general oral hygiene measures but have limited understanding of the significance of fluoridation and the time of the first dental visit (22-28).

Ignorance of oral health by caregivers of individuals with special needs, especially those from low socioeconomic families, is an issue documented in the literature (27, 28). Poverty and literacy are the factors influencing caregiver awareness of the need to monitor children's oral health (29-31), and these factors compromise children's oral health. Since individuals with special needs are virtually perennially dependent on caregiver assistance, it is important to clearly define factors significantly influencing oral health-related awareness and practices among such caregivers.

## 2. Objectives

In Saudi Arabia, studies targeting individuals with special needs are limited to major cities, the point necessitating further exploration in other regions of the country. The current study aimed at assessing the level of oral health awareness and practices of special needs caregivers in Qatif, the Eastern Province of Saudi Arabia. The null hypothesis was that there is no relationship between the level of awareness and practices of special needs caregivers and their sociodemographic characteristics.

## 3. Methods

### 3.1. Study Design and Population

The current cross-sectional, descriptive study was conducted in Qatif City, the Eastern Province of Saudi Arabia, with a population of approximately 98,000. Participants were recruited from 11 locations, including centers affiliated to the Ministry of Social Affairs, public schools with integrated special needs education, and charity organizations housing children with special needs. Participants meeting the inclusion criterion (i.e., any caregiver of an individual with special needs in Saudi Arabia) were recruited using a convenience sampling method where every participant across the 11 centers was found eligible for the study and interested in providing informed consent.

### 3.2. Data Collection

A self-administered questionnaire in Arabic was distributed from February to April 2019 among all caregivers at each center. The questionnaire was adapted from previously validated surveys (13, 24, 27) and was pilot tested on a sample of 10 caregivers to ensure it is appropriate,

easy to understand, and feasible to be completed in a reasonable time by the target group. A Cohen's kappa coefficient reliability of 80% was achieved before the launching of the study. The questionnaire included five items on demographic information of both the caregiver and dependent (individuals with special healthcare needs who received care at the time of the study), eight on caregiver awareness of oral health habits and conditions, five on caregiver awareness of dental visits and treatments, and seven on caregiver knowledge and sources of information. The type of disability that the caregiver dependents had was grouped into four categories according to the International Classification of Functioning, Disability, and Health (17) as follows: (i) behavioral and emotional (attention-deficit/hyperactivity disorder and autism/pervasive developmental disorder), (ii) developmental disability (cerebral palsy, developmental delay, Down syndrome, epilepsy, intellectual disability, and learning disabilities), (iii) physically disabled/others (severe and/or multiple disabilities, and traumatic brain injury), and (iv) sensory impairment (blindness/visual impairment, and deafness and hearing loss).

### 3.3. Statistical Analysis

The collected data were transferred into a Microsoft Excel spreadsheet, sorted, and organized in a database, using SPSS software version 20 (Chicago, IL, USA). Descriptive analyses were carried out, and the results were summarized using frequency distribution tables. Bivariate analyses using the Chi-square test were performed to test the presence and magnitude of relationships between demographic factors, and oral health awareness, and practice-related items. All the tests were performed at a 0.05 level of significance.

### 3.4. Ethical Considerations

Ethical approval was obtained from the Institutional Review Board at the Imam Abdulrahman Bin Faisal University in Dammam, the Eastern Province of Saudi Arabia (reference number EA:2014040). Informed consent was obtained from all eligible participants prior to enrollment. The study was performed in line with the principles of confidentiality, anonymity, and beneficence, as outlined in the Declaration of Helsinki.

## 4. Results

In line with the methodology, as defined in the preceding section, 700 questionnaires were distributed across eight special needs centers and three schools in Qatif, out of which 186 caregivers (35.5% males and 64.5% females)

provided complete responses in the survey, amounting to an overall response rate of 27% (n = 186/700). As summarized in [Table 1](#), the majority of the caregivers were within the age range of 25 - 44 (58.6%), with almost similar proportions under 25 (21.0%) and above 45 years (20.4%). About 70.0% of the caregivers had at least a high school degree, and 34.4% had a college/university education. The individuals with special needs taken care of by caregivers included 67.2% males and 32.8% females. They had varying conditions, and the most predominant one was developmental disabilities (44.6%), followed by sensory impairment (26.9%), physical disabilities (18.3%), and behavioral/emotional disorders (10.2%).

**Table 1.** Demographics of the Study Participants

Variable (N = 186)	No. (%)
<b>Gender</b>	
Male	66 (35.5)
Female	120 (64.5)
<b>Age, y</b>	
< 25	39 (21.0)
25 - 34	52 (28.0)
35 - 44	57 (30.6)
> 45	38 (20.4)
<b>Level of Education</b>	
Under high school	55 (29.6)
High school	67 (36.0)
College and higher	64 (34.4)
<b>Special needs type</b>	
Behavioral and emotional	19 (10.2)
Developmental disability	83 (44.6)
Physically disabled/others	34 (18.3)
Sensory impairment	50 (26.9)

More than half of the caregivers reported that the individuals they cared for had at least one type of oral health condition. More specifically, 65.6% reported that the conditions they noticed in their dependants were teeth-related, 47.3% noticed that they were soft tissue-related, and 37.1% reported they were related to poor oral habits ([Table 2](#)). One out of five individuals with special needs did not routinely brush the teeth noted by the caregivers. The majority of the 151 caregivers reported that their dependents brushed their teeth regularly or twice daily (in the morning and evenings, 34.4%), and 17.2% reported brushing only once a day in the mornings.

The most commonly used method of tooth brushing was the use of a soft toothbrush and fluoridated tooth-

paste (55.0%). About 45.7% of the caregivers reported that their dependents used any toothbrush and toothpaste. The use of Miswak by dependents was reported by only 2.6% of the caregivers. Interestingly, 84.9% of the caregivers had heard about fluoride, of which 77.8% knew that it helps prevent tooth decay while another 10.8% thought it only helps make teeth whiter. The sources of fluoride that the caregivers knew included toothpaste (84.8%), fluoride therapy by dentists (31.0%), fluoride in drinking water (25.3%), and fluoride in tea (1.9%). On the other hand, caregivers also noted that drinks, such as soft drinks (89.2%), packed juices (44.6%), and sweetened milk (45.7%), can cause tooth decay.

The summary of caregivers' responses to awareness of dental visits and treatments is presented in [Table 3](#). Accordingly, 76.3% of the caregivers noted that the individuals with special healthcare needs under their care visited a dentist, of which 35.9% did it within the last six months, 27.5% within the past year, and 31.0% more than two years before the study. Roughly half of the individuals with special needs (50.7%) visited a dentist only when faced with painful or emergency conditions. Dentist appointment for dental treatments and routine check-up was reported by 29.6% and 19.7% of the caregivers, respectively. In the current study, the most common dental treatment received by individuals with special needs was extraction (36.0%), followed by preventive (30.6%) and endodontic therapies (21.5%). Slightly more than half of the caregivers (51.6%) agreed that one must visit the dentist once every six months. On the other hand, nearly one-third (31.2%) did not know what timing is best for a routine dental check-up.

The study also assessed caregiver knowledge and sources of information about proper oral health ([Table 4](#)). The majority of them (81.7%) reported that they were informed about dental care and their main information resources were dentists (54.6%), TV and media (47.4%), and the Internet (46.1%). Approximately half of the caregivers (50.5%) reported that the dentists informed them about the dental health status of the individuals they care for, and the majority of the informed caregivers (84.9%) could understand the information and instructions given by the dentist. Furthermore, 64.5% of them could read and understand medical documents and reports related to the individual they cared for. However, about half (46.2%) of them reported it was not easy to find information about special dental care, and 76.9% wished to attend or be involved in educational dental programs/studies on individuals with special needs.

Besides describing caregiver knowledge of dental health, the current study evaluated the relationship between each of caregivers' age, gender, and educational level and oral health awareness and practices ([Table 5](#)). Bivariate analyses, using the Chi-square test, yielded a statis-

**Table 2.** The Caregivers Awareness of Oral Health Conditions

Oral Health Conditions (n = 186) (Multiple Choice)	No. (%)
<b>Teeth-related</b>	122 (65.6)
<b>Soft tissue-related</b>	88 (47.3)
<b>Oral habits-related</b>	69 (37.1)
<b>Does the person you care for brush his/her teeth? (n = 186)</b>	
Yes	151 (81.2)
No	33 (17.7)
I do not know	2 (1.1)
<b>If "Yes", how frequently does he/she brush a day? (n = 151)</b>	
Once a day in the morning	32 (17.2)
Once a day before bedtime	21 (11.3)
Twice a day (morning and night)	64 (34.4)
After each meal	9 (4.8)
He/she does not brush his/her teeth regularly	26 (14.0)
<b>What is the method he/she uses to brush or clean his/her teeth? (n = 151)</b>	
Miswak	4 (2.6)
A soft toothbrush and fluoridated toothpaste	83 (55.0)
Any toothbrush and any toothpaste	69 (45.7)
Dental floss	4 (2.6)
Mouthwash	14 (9.3)
<b>Have you heard about fluoride? (n = 186)</b>	
Yes	158 (84.9)
No	28 (15.1)
<b>What does fluoride do? (n = 158)</b>	
It makes teeth whiter	17 (10.8)
Helps prevent tooth decay	123 (77.8)
It makes teeth grow	4 (2.5)
I do not know	12 (7.6)
<b>What are the various sources of getting fluoride? (multiple choice)</b>	
Drinking water	40 (25.3)
Toothpaste	134 (84.8)
Tea	3 (1.9)
From the dentist	49 (31.0)
I do not know	14 (8.9)
Soft drinks	166 (89.2)
Packed juices	83 (44.6)
Sweetened milk	85 (45.7)

tically significant relationship only between caregiver's educational level and their understanding of what fluoride does. Caregivers with high school education (84.2%) had

**Table 3.** The Caregivers Awareness of Dental Visits and Treatments

Dental Visit and Treatment	No. (%)
<b>Has the person you care for been to the dentist before?</b>	
Yes	142 (76.3)
No	44 (23.7)
<b>If "Yes", when was the last visit? (n = 142)</b>	
Within the past 6 mo	51 (35.9)
Within the past 12 mo	39 (27.5)
Within the past 24 mo	8 (5.6)
More than 2 y	44 (31.0)
<b>What was the reason for the last visit to the dentist? (n = 142)</b>	
Routine check-up	28 (19.7)
Dental treatment	42 (29.6)
Emergency/pain	72 (50.7)
<b>If any treatment was provided, what was the type? (multiple responses)</b>	
Extraction	67 (36.0)
Preventive treatment	57 (30.6)
Endodontics treatment	40 (21.5)
Restorative treatment	33 (17.7)
No treatment	26 (14.0)
Prosthetic treatment	16 (8.6)
<b>How often should an individual visit his/her dentist?</b>	
Every 3 mo	20 (10.8)
Every 6 mo	96 (51.6)
Every 12 mo	12 (6.5)
I do not know	58 (31.2)

a better understanding of what fluoride does than their counterparts without high school education (64.3%) ( $P = 0.018$ ). According to the results, it seems that the caregiver education did not have any significant effect on any other aspect of awareness of dental health as there were insignificant differences between those who did and did not complete high school or university ( $P = 0.063$ ).

Concerning caregiver age, younger ones apparently had a better awareness of proper oral health practices even though the difference between them and older caregivers was not statistically significant ( $P = 0.182$ ). For instance, younger caregivers (aged 12 - 34 years; 83.5%) were more likely to have their dependents brush their teeth than their older counterparts ( $\geq 35$  years; 78.9%). Also, 70.3% of younger caregivers could read and understand medical documents and reports on the oral health of their dependents; it was only 58.9% in the older ones ( $P = 0.105$ ).

Also, there was no statistically significant difference

**Table 4.** The Caregivers Knowledge and Sources of Information

The Caregivers Knowledge and Sources of Information (n = 186)	No. (%)
<b>Do caregivers have any knowledge/information about dental care?</b>	
Yes	152 (81.7)
No	34 (18.3)
<b>Sources of information for those who had knowledge of dental care (multiple choice)(n = 152)</b>	
Doctors/dentists	83 (54.6)
Internet	70 (46.1)
TV and media	72 (47.4)
Books and printed media	56 (36.8)
Other people	50 (32.9)
Lectures and educational materials	35 (23.0)
Social media	28 (18.4)
<b>Dentists educated/informed caregivers about the dental health status of the individuals they cared for during visits (n = 185)</b>	
Yes	94 (50.5)
No	91 (48.9)
<b>Do caregivers understand information and instructions given to them by the dentist? (n = 186)</b>	
Yes	158 (84.9)
No	28 (15.1)
<b>Caregivers can read and understand medical documents and reports related to the individual they care for. (n = 186)</b>	
Yes	120 (64.5)
No	66 (35.5)
<b>It is easy for caregivers to find information about special dental care. (n = 186)</b>	
Yes	86 (46.2)
No	100 (53.8)
<b>Caregivers are interested in attending or being involved in educational dental programs/studies on individuals with special needs. (n = 186)</b>	
Yes	143 (76.9)
No	43 (23.1)

in caregiver awareness in terms of gender. Both males and females had comparable knowledge and perceptions of brushing, the role of fluoride in oral health, visiting (appointment schedule and purpose) the dentist, understanding of information presented by dentists, and interest in attending or getting involved in dental health programs for individuals with special needs.

## 5. Discussion

In line with earlier studies, the need to maintain proper oral health care is critical to ensure optimal health outcomes (4-11). In Saudi Arabia, poor oral hygiene is a growing concern across the population strata, especially preventive behaviors that primarily depend on caregiver awareness and attitudes toward oral health preven-

tive measures and practices (12, 32, 33). Previous studies pointed to a lack of awareness among caregivers of children with disabilities in Saudi Arabia (22, 23). Poor awareness of proper oral health practices is a major predictor of poor oral health behavior. The same can be said about adequate awareness of oral health to promote positive behavior and attitudes in caregivers, observed by previous studies worldwide and in Saudi Arabia (13-20, 22).

Regarding oral health awareness, a large proportion of the caregivers were aware of proper practices concerning their dependent oral health. For instance, 81.2% of the caregivers got their dependents to routinely brush their teeth, and 34.4% got their dependents to brush twice daily. It is similar to findings by Liu et al. (20), in which 84% of Chinese caregivers got their dependents to clean their teeth twice daily. In addition, the results of the current

**Table 5.** Bivariate Relationships Between Caregivers Gender, Educational Level, Age, and Oral Health Awareness and Practices

Variable	Caregiver Age, y, No. (%)			P-Value	Caregiver Gender, No. (%)			P-Value	Caregiver Education, No. (%)			P-Value
	N	12-34	≥ 35		N	Male	Female		N	Below High School Education	High School Graduate and Above	
<b>Question: Does the person you care for brush his/her teeth?</b>												
Yes	151	76 (83.5)	75 (78.9)	0.182	151	55 (83.3)	96 (80.0)	0.542	151	40 (72.7)	111 (84.7)	0.063
No	33	13 (14.3)	20 (21.1)		33	11 (16.7)	22 (18.3)		33	15 (27.3)	18 (13.7)	
Don't know	2	2 (2.2)	0 (0.0)		2	0 (0.0)	2 (1.7)		2	0 (0.0)	2 (1.5)	
<b>Frequency of brushing by their dependents</b>												
Once a day in the morning	32	20 (26.0)	12 (16.0)	0.150	32	13 (23.2)	19 (19.8)	0.528	32	12 (30.0)	20 (17.9)	0.390
Once a day before bedtime	21	8 (10.4)	13 (17.3)		21	9 (16.1)	12 (12.5)		21	5 (12.5)	16 (14.3)	
Twice a day	64	36 (46.8)	28 (37.3)		64	20 (35.7)	44 (45.8)		64	14 (35.0)	50 (44.6)	
After each meal	9	4 (5.2)	5 (6.7)		9	2 (3.6)	7 (7.3)		9	1 (2.5)	8 (7.1)	
Doesn't brush teeth regularly	26	9 (11.7)	17 (22.7)		26	12 (21.4)	14 (14.6)		26	8 (20.0)	18 (16.1)	
<b>Caregivers heard about fluoride</b>												
Yes	158	80 (87.9)	78 (82.1)	0.268	158	56 (84.8)	102 (85.0)	0.978	158	43 (78.2)	115 (87.8)	0.095
No	28	11 (12.1)	17 (17.9)		28	10 (15.2)	18 (15.0)		28	12 (21.8)	16 (12.2)	
<b>Caregivers' understanding of what fluoride does</b>												
It makes teeth white	17	8 (10.1)	9 (11.7)	0.744	17	5 (9.1)	12 (11.9)	0.225	17	6 (14.3)	11 (9.6)	0.018 <sup>a</sup>
Helps prevent tooth decay	123	64 (81.0)	59 (76.6)		123	41 (74.5)	82 (81.2)		123	27 (64.3)	96 (84.2)	
Makes teeth grown	4	1 (1.3)	3 (3.9)		4	3 (5.5)	1 (1.0)		4	3 (7.1)	1 (0.9)	
I don't know	12	6 (7.6)	6 (7.8)		12	6 (10.9)	6 (5.9)		12	6 (14.3)	6 (5.3)	
<b>Question: Has the individual you care for ever visited a dentist?</b>												
Yes	142	72 (79.1)	70 (73.7)	0.383	142	53 (80.3)	89 (74.2)	0.346	142	42 (76.4)	100 (76.3)	0.997
No	44	19 (20.9)	25 (26.3)		44	13 (19.7)	31 (25.8)		44	13 (23.6)	31 (23.7)	
<b>Time of the last visit if "Yes"</b>												
Within the past 6 mo	51	23 (31.9)	28 (40.0)	0.579	51	14 (26.4)	37 (41.6)	0.183	51	15 (35.7)	36 (36.0)	0.302
Within the past 12 mo	39	22 (30.6)	17 (24.3)		39	19 (35.8)	20 (22.5)		39	9 (21.4)	30 (30.0)	
Within the past 24 mo	8	3 (4.2)	5 (7.1)		8	4 (7.5)	4 (4.5)		8	1 (2.4)	7 (7.0)	
More than 2 y	44	24 (33.3)	20 (28.6)		44	16 (30.2)	28 (31.5)		44	17 (40.5)	27 (27.0)	
<b>Reason for the last visit to the dentist</b>												
Routine check-up	28	18 (25.0)	10 (14.3)	0.133	28	9 (17.0)	19 (21.3)	0.357	28	4 (9.5)	24 (24.0)	0.063
Treatment	42	23 (31.9)	19 (27.1)		42	13 (24.5)	29 (32.6)		42	11 (26.2)	31 (31.0)	
Emergency/pain	72	31 (43.1)	41 (58.6)		72	31 (58.5)	41 (46.1)		72	27 (64.3)	45 (45.0)	
<b>Caregivers perception of the timeline of periodic dental visits</b>												
Every 3 min	20	6 (6.6)	14 (14.7)	0.298	20	6 (9.1)	14 (11.7)	0.107	20	10 (18.2)	10 (7.6)	0.093
Every 6 min	96	50 (54.9)	46 (48.4)		96	28 (42.4)	68 (56.7)		96	22 (40.0)	74 (56.5)	
Every 12 min	12	5 (5.5)	7 (7.4)		12	4 (6.1)	8 (6.7)		12	4 (7.3)	8 (6.1)	
Don't know	58	30 (33.0)	28 (29.5)		58	28 (42.4)	30 (25.0)		58	19 (34.5)	39 (29.8)	
<b>Have any knowledge/information about dental care?</b>												
Yes	152	76 (83.5)	76 (80.0)	0.535	152	55 (83.3)	97 (80.8)	0.673	152	44 (80.0)	108 (82.4)	0.694
No	34	15 (16.5)	19 (20.0)		34	11 (16.7)	23 (19.2)		34	11 (20.0)	23 (17.6)	
<b>Does the dentist educate/inform caregivers about the dental health status of individuals they care for during dental visits?</b>												
No	91	50 (54.9)	41 (43.6)	0.123	91	32 (48.5)	59 (49.6)	0.887	91	29 (52.7)	62 (47.7)	0.531
Yes	94	41 (45.1)	53 (56.4)		94	34 (51.5)	60 (50.4)		94	26 (47.3)	68 (52.3)	
<b>Caregivers ability to understand information and instructions given by the dentist</b>												
Yes	158	79 (86.8)	79 (83.2)	0.486	158	54 (81.8)	104 (86.7)	0.376	158	46 (83.6)	112 (85.5)	0.746
No	28	12 (13.2)	16 (16.8)		28	12 (18.2)	16 (13.3)		28	9 (16.4)	19 (14.5)	
<b>Caregivers ability to read and understand medical documents and reports about the individual being cared</b>												
No	66	27 (29.7)	39 (41.1)	0.105	66	26 (39.4)	40 (33.3)	0.408	66	19 (34.5)	47 (35.9)	0.862
Yes	120	64 (70.3)	56 (58.9)		120	40 (60.6)	80 (66.7)		120	36 (65.5)	84 (64.1)	
<b>Have any access to information about special dental care?</b>												
Yes	86	43 (47.3)	43 (45.3)	0.786	86	32 (48.5)	54 (45.0)	0.648	86	27 (49.1)	59 (45.0)	0.613
No	100	48 (52.7)	52 (54.7)		100	34 (51.5)	66 (55.0)		100	28 (50.9)	72 (55.0)	
<b>Are you interested in attending or getting involved in educational dental programs/studies on individuals with special needs?</b>												
Yes	143	71 (78.0)	72 (75.8)	0.718	143	48 (72.7)	95 (79.2)	0.319	143	39 (70.9)	104 (79.4)	0.211
No	43	20 (22.0)	23 (24.2)		43	18 (27.3)	25 (20.8)		43	16 (29.1)	27 (20.6)	

<sup>a</sup> P-values are significant

study indicated that 84.9% of the caregivers knew about fluoride, and 77.8% knew that fluoride helps prevent tooth decay. Other dental information assessed in the current study supported this finding, suggesting that the awareness level of proper oral-health practices was high in the study population.

Given the sources of information about oral health, the majority of the caregivers obtained oral healthcare knowledge from their dentists, the Internet, television, and books. A large number of caregivers relied on dentists for the information, which supported the findings of previous studies by Al-Hussyeen (25) and Murshid (34). Nowadays, social media has infiltrated into people's lives and is becoming the prime source of information for many individuals (35). It is recommended to utilize and support social media for proper oral health education for general and special needs.

In addition to awareness of oral health, results of the current study showed that caregivers exhibited a generally positive attitude towards dental treatment. It contrasts with a previous Saudi study reporting poor attitudes of caregivers towards their children's dental visits (27). In the present study, about 80% of the caregivers reported a history of dental visits and treatment in the individuals they care for. Despite the frequency of dental visits reported by caregivers, a routine check was the least reported reason for seeking these dental visits suggesting that caregivers had inadequate awareness of the importance of regular check-ups as the primary preventive measure of dental diseases. Among the treatments reported, extraction was the most common one. It can be explained by poor compliance with preventive measures in caregivers that exacerbated the dental issues and ultimately led to tooth extraction. It is noteworthy that caregivers complained that they could not treat their dependents efficiently since there was no nearby dental specialty to deal with the cases. This could also be another explanation for the increased number of extractions observed in the current study.

Going further to probe into factors influencing the level of awareness of proper oral health practices among the study population, only the level of education of the caregivers had significant bearing specifically on caregivers' understanding of what fluoride does. It was in line with a Chinese study that identified caregivers' level of education as a significant determinant of favorable oral health awareness and practice (20). In this study, the researchers observed that caregivers with high school education more likely had 1.56 times better oral health behaviors than those not formally educated. It was similar to the findings of the current study in which 84.2% of caregivers with high school education were significantly more likely to have the correct understanding of what fluoride

does than their counterparts without high school education (64.3%) ( $P=0.018$ ). This finding was also in line with another study performed in Riyadh, showing that caregivers of individuals with special needs with higher educations practiced proper oral hygiene (22). Caregiver level of education defines his/her overall oral health knowledge. Caregivers with higher levels of education are more likely to demonstrate good oral health awareness and practice (13, 24, 32, 33).

Caregiver gender and age did not appear to significantly influence oral health awareness and practice in the current study. Unlike other studies reporting these two factors as key influencers, there was no evidence to substantiate these associations in the current study (20, 26). However, a closer look at the results showed that younger caregivers had slightly better awareness of proper oral health practices since those in the age range of 12-34 years were more likely to have their dependents brush their teeth than the ones aged 35 years or older (83.5% vs. 78.9%). Similarly, almost two-thirds of younger caregivers had higher abilities to read and understand medical documents and reports about their dependents' oral health, opposed to about half of the older caregivers ( $P=0.105$ ). Potential reasons for this include the fact that more than two-thirds of the entire study population involved their dependents in proper oral health practices and over 80% of them knew the right thing to do.

Although not statistically significant, the results of the current study showed that age influenced the ability of caregivers to understand and follow oral health instructions given by the dentist. As age increased above 35 years, caregivers were less likely to read and understand medical documents and information relating to their dependents' oral health provided by dentists (58.9% of older caregivers vs. 70.3% of younger ones). This finding was in line with previous studies showing that caregivers had a lot more comprehensive challenges as they got older; therefore, the obtained results pointed at the need for extra communication support to reinforce caregivers' ability to understand and comply with health instructions towards enhancing patient safety (36, 37).

A few limitations were encountered in the course of performing the current study, including the use of self-report survey questionnaires in data collection, which might introduce bias to the results. The respondents might not have provided accurate data due to personal desirability. It was natural to have doubts about the obtained information since the caregivers might have had other responsibilities or were preoccupied when giving their responses. Since the study was conducted among the caregivers of special school children, generalizing the results to home-based individuals with disabilities might not be

applicable. Also, the study faced obstacles to data collection with a low response rate of caregivers, which may be explained by potential lack of awareness of these types of surveys, lack of incentives to fully participate, and/or lack of time, which also might affect the generalizability of the study results. Future studies are required to investigate the role of interventional educational programs on oral health care, as well as how motivational interviewing and training in caregivers may positively influence the oral health of individuals with special needs. In addition, there is a need for more studies assessing the awareness and practice of caregivers of such individuals in home-based care, which the current study was not able to do.

Although the current study was conducted among residents of a single province in Saudi Arabia, its findings may have implications for other countries and settings with features similar to those of Qatif. In cities and regions similar to Qatif, a large proportion of caregivers of individuals with special healthcare needs may not have a good awareness of proper oral health practices, and deliberate actions may be required to optimize it. Also, considering the influence of the caregivers' level of education on the oral health outcomes of their dependents, it is important to consider potential literacy improvement approaches or at least provide necessary oral health education for caregivers in an understandable manner regardless of literacy levels.

### 5.1. Conclusion

The current study showed that most caregivers of individuals with special health care needs had a good awareness of proper oral health practices. The caregiver level of education was a key factor influencing oral health awareness and, ultimately, practices. It might be a target of interventions aimed at improving the oral health of individuals with special healthcare needs; since ensuring that their caregivers have the proper education can make a difference in their oral health and improve their dental health outcomes. Also, caregiver general positive attitude towards oral health can be optimized further, leading to proper oral health behaviors.

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### Footnotes

**Authors' Contribution:** Study concept and design: KK and AF; acquisition of data: AF; analysis and interpretation of data: KK; drafting of the manuscript: KK and AF; critical revision of the manuscript for important intellectual content: KK; statistical analysis: KK; administrative, technical, and material support: KK and AF; study supervision: KK.

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