The level of knowledge about autism spectrum disorders among a university hospital healthcare professionals in Turkey

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SUMMARY

Objective: Autism Spectrum Disorder (ASD) is a mental disorder with an increasing prevalence in recent years. In this study, the autism knowledge level of healthcare professionals from different occupational groups and the factors affecting the knowledge level were evaluated.

Method: A total of three hundred and seventeen (317) healthcare professionals working in tertiary health institutions in Turkey were included in the study. Participants completed both the "Health Workers Information Form" and the "Knowledge about Childhood Autism Among Health Workers" (KCAHW) questionnaire. Knowledge about childhood autism (KCA) as measured by scores in the KCAHW questionnaire.

Results: The total mean score of participated healthcare professionals on KCAHW questionnaire was 12.62 ± 2.80. Physicians' KCAHW test scores were significantly higher than other healthcare professionals (p<0.001). KCA was significantly associated with the age of healthcare professionals, had a higher mean score with increasing age (r=0.139, p=0.013). As the education level of the healthcare professionals and the time spent in the profession increased, the KCA also increased (respectively, p=0.002, p=0.043). KCA of doctors who were residency students were statistically significantly lower than those of specialist doctors (p=0.008). KCA was found to be significantly higher in healthcare professionals who had training on autism (p=0.001) and those who worked with a child with autism (p=0.009).

Discussion: In this study, it was found that healthcare professionals' knowledge about ASD is poor. Although physicians were more aware of the diagnostic criteria, their awareness of autism and its associated disorders was low, as were other healthcare professionals. Healthcare professionals should receive regular training. Specially, it should be targeted from physicians to residents and non-physician healthcare professionals.

Key Words: Autism , Autism knowledge level, Physicians, Nurses, Physical therapists

INTRODUCTION

Autism Spectrum Disorder (ASD) is a serious mental disorder with an increasing prevalence in recent years. The Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) defines ASD as the emergence of permanent impairment in social communication and interaction, the presence of restricted interests, and repetitive behavior patterns (1). According to data from the United States Centers for Disease Control and Prevention, the prevalence of autism was reported to be 1 in 150 children at the beginning of the millennium, while it was reported to be 1 in 36 children in 2020. Although the increase in prevalence is mostly explained by the change in the definition of ASD and the increase in awareness and ease of access to health services, some of the reasons still cannot be explained (2).

With the increase in prevalence, a rapidly growing field of research has emerged on the life experiences of individuals with ASD. It is observed that one of these areas is the health problems that indi-

viduals diagnosed with ASD may encounter and the quality of the health service received. It has been reported that individuals with ASD have a higher probability of having mental disorders than the general population (3,4). In addition, it is stated that they also have a higher rate of physical health problems compared to the general population (5). For example, autistic adults are reported to be more likely to be diagnosed with epilepsy, cardiovascular disease, and diabetes compared to non-autistic adults (3). In a study conducted in Sweden, it was reported that for all categories of diseases except infectious diseases, autistic individuals were at a higher risk of death compared to the general population (6).

Considering these findings, it can be predicted that the need for access to health services individuals will be higher in individuals with ASD than in the general population. The studies conducted on this issue have reported that individuals with ASD admit to emergency services and outpatient services more frequently than the general population (7,8). Besides, another study reported that individuals with ASD reported lower satisfaction with the health service they received and had higher unmet healthcare needs than those without ASD (9).

In a recent review, it has been reported that healthcare workers have a moderate level of knowledge about ASD and they lacked education about ASD. It has been stated that one of the impediments to the access of individuals with ASD to health care is caused by the inadequate expertise and self-efficacy of health workers in interacting with autistic individuals (10). To better provide the medical treatments needed by those with ASD, it is important to comprehend the diversity of symptoms connected to the autism and the comorbid medical disorders. The multidimensional assessment required by the autistic individuals can be made easier by enhancing the health workers knowledge and experience of ASD. Communication deficiencies and sensory sensitivities, which are the main symptoms of ASD can also complicate medical diagnosis and management. So, healthcare workers may have difficulties in providing health services to autistic individuals (11). In order to provide care at high standards, regarding the needs of individuals with ASD,

it is necessary for health professionals to have sufficient knowledge about the basic features of ASD and how the symptoms occur (12). In the literature, it is seen that knowledge and awareness are variable among health workers in different occupations and cultures for ASD (10).

In our study, we aimed to evaluate the knowledge level of ASD in healthcare workers from different occupational groups and the factors affecting the level of knowledge. Our study's hypothesis is that healthcare workers with low educational levels and limited expertise in ASD will have poor knowledge about ASD.

METHOD

This study was carried out in Afyonkarahisar Health Sciences University Hospital between April 2022 and May 2022. We formed the sample of our study from a hospital that provides tertiary healthcare services to which individuals with ASD frequently admit with various health problems. The participants were professionals such as physicians, nurses and physiotherapists. Children and adolescent mental health specialists and adult psychiatrists, who have a primary role in diagnosing ASD and following up individuals with ASD, were excluded in the study. The sample size was not calculated in the study because it was tried to reach the entire universe. Ethical approval for the study was obtained from the Afyonkarahisar Health Sciences University Ethics Committee on 01.04.2022 (2022/182).

In our study, the "Knowledge about childhood autism among health workers" (KCAHW) in collecting the data that will be used to evaluate the ASD knowledge and awareness level of health workers and the "Health Workers Information Form" in which we questioned the sociodemographic data and the experiences of the health workers on ASD. The total number of the distributed questionnaires is 350. Of these, 317 were evaluated with a response rate of 90.5%.

The KCAHW used in our study was developed by Bakare et al. (13). It measures the knowledge level about autism with 19 items in four areas. The first

domain, which consists of eight items, is focused on the social interaction deficit seen in autistic children. The second domain only has one item, the communication and language development symptom. The third domain, which has four items, describes the repetitive, stereotyped, and compulsive behaviors seen in autism. The fourth domain consists of six items and questions whether or not autism is a neurodevelopmental disorder, examines possible comorbid conditions, and explores the ages at which it emerges.

The possible total score that can be obtained from the questionnaire is between 0 and 19. Each item is answered as "yes", "no" or "don't know". Correct answers are calculated as 1 point and other answers as 0 points. The Turkish validity and reliability of the scale were performed by Özgür et al. in 2019 and it was reported that it was reliable in terms of test-retest and internal consistency, and its construct validity was satisfactory according to confirmatory factor analysis (comparative fit index= 0.79) (14).

Statistical analysis

A statistical program (SPPS for Windows, v21.) was used for data analysis. The normal distribution of the data was evaluated with the Kolmogrov-Smirnov test, histogram, and Skewness-Kurtosis coefficients. Nominal and ordinal variables were compared with the Pearson chi-square test. These data are given with numbers and percentages. KCAHW scores measuring the knowledge level of autism and the relationships between different parameters were analyzed using the Spearman correlation test, Student's t-test, and ANOVA test where appropriate. The independent effects of different predictors on KCAHW were examined by using a multivariate linear regression model. The model of fit was examined using the required residual and fit statistics. A value of $p < 0.05$ was accepted as statistically significant.

RESULTS

Sociodemographic information

As the targeted participants, 90.5% agreed to participate in the study by completing the questionnaires, of whom 61.5% (n=195) were women. The mean age of the participants was 29.4±6.1 years. The youngest participant was 18 years old and the oldest was 51 years old. Of the participants, 35.3%

Table 1. Comparison of the sociodemographic features and KCAHW score of the participants

Sociodemographic characteristics (n=317)	n (%)	KCAHW total score	
		Mean – SD	p
Age groups (years)*			
18-25	87 (27.5)	11.90 – 2.91	
26-35	180 (56.7)	12.69 – 2.76	0.008
36 ≥	50 (15.8)	13.42 – 2.85	
Gender **			
Male	122 (38.5)	12.05 – 3.06	
Female	195 (61.5)	12.92 – 2.66	0.008
Education level **			
High-school/Undergraduate	89 (28.1)	11.85 – 2.74	
Graduate /Postgraduate	228 (71.9)	12.87 – 2.84	0.004
Occupation **			
Physician	112 (35.3)	13.54 – 2.35	
Other healthcare workers	205 (64.7)	12.06 – 2.90	0.000
(Nurse, Physiotherapist)			
Work experience*			
0-1 year	69 (21.8)	12.51 – 3.00	
1-5 years	119 (37.5)	12.09 – 2.71	
5-10 years	66 (20.8)	13.27 – 2.76	0.043
>10 years	63 (19.9)	12.88 – 2.90	
Worked experience with ASD**			
Yes	153 (48.3)	13.01 – 2.55	
No	164 (51.7)	12.19 – 3.06	0.009
Got training on ASD**			
Yes	158 (49.8)	13.12 – 2.63	
No	159 (50.2)	12.05 – 2.97	0.001
Having children with ASD **			
Yes	41 (12.9)	13.22 – 2.58	
No	276 (87.1)	12.49 – 2.88	0.127

KCAHW: Knowledge about childhood autism among health workers questionnaire. Significicant differences were shown in bold in the tables.
*ANOVA test, **t test.

Table 2: Percentage of correct answers to the information survey about childhood autism among health workers (n=317).

	Physician (n=112)	Nurse (n=168)	Physiotherapist (n=37)
	% (n)	% (n)	% (n)
Domain 1- Reciprocal social interactions			
Apparent deterioration in some non -verbal actions such as eye -to-eye contact, facial expressions, body posture and hand -arm movement during social interaction?	94.6 (106)	92.9 (156)	86.5 (32)
Inability to develop a friendship appropriate for the age of development?	97.3 (109)	85.7 (144)	94.6 (35)
Absence of willingness to share spontaneous liking, interest or activities?	85.7 (96)	77.4 (130)	86.5 (32)
Lack of social and emotional reciprocity?	84.8 (95)	85.7 (144)	81.1 (30)
Staring into space for long time and not being able to concentrate on a certain thing?	84.8 (95)	81.5 (137)	91.9 (34)
The child may appear as deaf or mute?	74.1 (83)	62.5 (105)	78.4 (29)
Loss of interest in around and people?	93.8 (105)	82.1 (138)	86.5 (32)
Social smile is usually not found in a child with autism?	53.6 (60)	44.4 (74)	70.3 (26)
Domain 2- Impairment in communication			
Delay in speech or not development or speech?	78.6 (88)	75.6 (127)	73.0 (27)
Domain 3- Restricted repetitive interests and behaviours			
Stereotyped and repetitive movement (such as flapping wings or flexing hand or fingers)?	76.8 (86)	79.8 (134)	81.1 (30)
Could be related with abnormal eating habits?	39.3 (44)	36.3 (61)	37.8 (14)
Being preoccupied with parts of objects?	81.3 (91)	74.4 (130)	75.7 (28)
Interest in regular routine activities?	46.4 (52)	45.2 (76)	45.9 (17)
Domain 4- Common associations			
Autism is childhood schizophrenia?	76.8 (86)	57.7 (97)	43.2 (16)
Autism is an autoimmune condition?	67.9 (76)	35.7 (60)	40.5 (15)
Autism is a neurodevelopmental disorder?	70.5 (79)	80.4 (135)	67.6 (25)
Mental retardation may be co-diagnosed in autism?	50.9 (57)	36.3 (61)	54.1 (20)
Autism may be co-diagnosed with epilepsy?	48.2 (54)	21.4 (36)	29.7 (11)
Autism usually starts in this era: Newborn/ Infancy/ Childhood	49.1 (55)	42.9 (72)	40.5 (15)

were doctors and 64.7% were other health workers (nurses and physiotherapists). When their professional experience was evaluated, there were 63 (19.9%) people with 10 or more years of experience, while 69 (21.8%) had less than 1 year of experience. The demographic characteristics of the participants are shown in Table 1.

Autism knowledge level

The ASD knowledge level of the participants was evaluated with KCAHW. The mean KCAHW score of all participants was 12.62/19 (SD=2.807). The knowledge level was related to the deterioration in social interaction and communication at the hig-

Table 3. KCAHW total scores by doctors' specialties

Specialties of doctors (n=112)	KCAHW total score	
	Mean – SD	Min-Max
Urology (12)	14.8 – 2.1	9-18
Obstetrics (12)	12.5 – 2.0	9-16
Brain surgery specialist (4)	13.0 – 5.3	7-18
Otolaryngologist (3)	12.3 – 2.0	10-14
Cardiovascular surgeon (1)	10.0	10
General surgery (10)	13.5 – 2.0	10-17
Orthopedic specialist (1)	15.0	15
Plastic surgery (3)	14.0– 1.7	12-15
Anesthesia (17)	12.8 – 2.4	8-16
Emergency specialist (4)	13.2 – 2.2	10-15
Internal medicine specialist (8)	13.8 –2.8	10-17
Family physician specialist (5)	15.0 – 1.2	14-17
Physical therapy and rehabilitation specialist (16)	13.9 – 2.1	10-18
Infectious disease specialist (2)	12.5 – 2.1	11-14
Pathology specialist (4)	15.5 – 1.7	14-18
Neurology specialist (5)	14.8 – 2.4	11-18
Pediatrics (5)	14.0 – 1.5	12-16

S.D.: Standard deviation; KCAHW: Knowledge about childhood autism among health workers questionnaire.

hest level (77.7%) (percentage of correct answers by participants in areas 1 and 2). The lowest level of information was the correct answer rate (50.8%) in field 4, which questioned ASD-related comorbidities. Only 31.8% (n=101) of the participants were aware that ASD could be associated with epilepsy, and 43.5% (n=138) knew that autism could be associated with mental retardation. It was also determined that the knowledge about limited interest and repetitive behaviors, which were symptoms of ASD, were also low (59.7%) (area 3 correct answer percentage). Of the participants, 37.5% (n=119) were aware that ASD could cause atypical eating habits, and 45.7% (n=145) were aware that ASD may have an interest in routine daily activities. The percentage of correct answers to the questions evaluating the knowledge and awareness level about ASD of the participants is given in Table 2 according to the occupational groups.

Physicians' KCAHW test scores were statistically significantly higher than other healthcare professionals (df=2, F=11.3, p<0.001) (Table 1). When the doctors' knowledge level of autism according to their residencies was compared with the univariate ANOVA analysis, no significant difference was found in the ASD knowledge level between the residencies (df=16, F=0.972, p= 0.493). KCAHW's total scores of doctors according to their residencies are given in Table 3. Doctors were divided into two groups as residency students and specialists,

15

Table 4. Comparison of KCAHW total scores of assistant and specialist physicians

Physician (n=112)	KCAHW total score	
	Mean – SD	p*
Assistant doctor (88)	13.2 – 2.2	
Specialist doctor (24)	14.6 – 2.3	0.008

S.D.: Standard deviation; KCAHW: Knowledge about childhood autism among health workers questionnaire. *t test.

and KCAHW scores were compared. KCAHW total scores of doctors who were residency students were statistically significantly lower than those of specialist doctors (p=0.008) (Table 4). The comparison of variables such as gender and education level according to the occupations of the participants is given in Table 5. The education level of doctors was higher than that of other health workers and there was more ASD-oriented education in their education (Table 5).

When the effect of the sociodemographic characteristics of the participants on the knowledge level of ASD was evaluated, it was determined that female health workers had a higher ASD knowledge level than men (p=0.008) and that there was a positive and significant correlation between age and ASD knowledge level (r=0.139, p=0.013). It was found that the level of knowledge about ASD was higher in healthcare professionals who had a higher education level and received training on ASD. The KCAHW scores of the participants according to the groups and variables are given in Table 1.

Multiple linear regression analyses (with the enter method) were used to evaluate the predictors of the participants' ASD knowledge level. Age, gender, occupation, education level, professional experience, training for ASD, working with an individu-

al with ASD, and having a friend with ASD were used as predictors. The model was statistically significant (F =7.06, p=0.000) and could explain 13.3% of the variance in KCAHW scores without significant auto-correlation problems (Durbin–Watson=1.9). No multi-colinearity problems were detected in the model (VIF between 1.0 and 2.4) (Table 6). In linear regression analyses, it was determined that the variables of participants' gender, occupation, and having trained for ASD were significant predictors of KCAHW scores. It was determined that the gender of the healthcare worker increases the standard deviation of 0.22 units in the KCAHW score, being a doctor in profession increases the KCAHW score by 0.26 units, and being trained for ASD increases by 0.11 units.

Finally, the participants were asked, "Which department would you refer a patient with suspected ASD to?" question has been asked and 59% of the participants answered that they would refer them to a child psychiatrist, 30% to a child neurologist, 8.2% to a psychiatrist and 2.8% to a psychiatrist.

DISCUSSION

Although the incidence of ASD in the population is increasing day by day, it has been reported in studies that health professionals have limited knowledge about ASD and that the unmet healthcare needs of individuals with ASD are higher than the general population (2,10). This study, it was aimed to examine the knowledge levels of healthcare pro-

Table 5. The relationship of the participants occupation with the variables

	Physician (n=112)	Other healthcare workers (Nurse,Physiotherapist) (n=205)	p
Age*	30.8–6.0	28.7–6.0	0.516
	n (%)	n (%)	
Gender**			
Male	64 (57.1)	58 (28.2)	0.000
Female	48 (42.9)	148 (71.8)	
Education level**			
High-school/Undergraduate	0 (0.0)	88 (42.9)	0.000
Graduate /Postgraduate	112 (100.0)	117 (57.1)	
Got training on ASD**			
Yes	71 (63.3)	87 (42.4)	0.001
No	41 (36.7)	118 (57.6)	
Worked experience with ASD**			
Yes	59 (52.6)	94 (45.8)	0.242
No	53 (47.4)	111 (54.2)	
Having children with ASD**			
Yes	12 (10.7)	28 (13.6)	0.393
No	100 (89.3)	177 (86.4)	

Significicant differences were shown in bold in the tables.
** Pearson chi-square test, *t test.

Table 6. Significant predictors of autism knowledge level scores obtained by KCAHW.

	Beta	p	95% Confdence Interval	VIF
Age	0.1	0.12	-0.01 to 0.13	2.4
Gender	0.2	*0.00*	0.6 to 1.9	1.1
Occupation	0.2	*0.00*	-2.3 to -0.8	1.4
Education level	0.01	0.95	-0.7 to 0.7	1.3
Work experience	0.05	0.52	-1.4 to 0.7	2.3
Worked experience with ASD	0.08	0.10	-0.09 to 1.1	1.0
Got training on ASD	0.1	*0.04*	0.009 to 1.2	1.1
Having children with ASD	0.07	0.17	-0.2 to 1.5	1.0

Italic values indiacte p < 0.05

Beta standardized regression coefcient, VIF variance nfation factor, linear regression with enter method (only signifcant predictors shown)

fessionals about ASD, who were working in a hospital that provides tertiary health care.

In a recent review, it was reported that mean KCAHW scores ranged from 9.01 to 13.5 in studies evaluating the level of ASD knowledge in healthcare professionals using KCAHW. In that review, it was stated that most of the healthcare professionals reported only moderate knowledge and self-efficacy in their practice and that they generally lacked ASD-specific training in their professional training (10). Similarly, in our study, the level of ASD knowledge in healthcare workers was evaluated using the KCAHW questionnaire. The mean KCAHW score of the healthcare professionals participating in our study was 12.62 ± 2.80. In a study examining the psychometric properties of the Turkish version of the KCAHW questionnaire, the mean KCAHW questionnaire score of healthcare professionals was reported as 13.83 ± 2.55 (14). Unlike the aforementioned study, the knowledge level of the participants was measured in a university hospital providing tertiary health care, in our study. In the aforementioned study, it is seen that the level of ASD knowledge is evaluated in family physicians and family health workers in institutions providing primary health care services. In this study, it is seen that KCAHW scores are relatively high compared to our study. In another study in Turkey, that 278 nurses participated, the KCAHW total score used to measure the level of ASD knowledge was reported as 12.29 ± 3.19 (15). No study has been found in Turkey that compared the ASD knowledge level of nurses and doctors. Our study will also contribute to the literature in this respect. In one of the studies evaluating the ASD knowledge level of healthcare professionals in other countries, it was reported that the mean KCAHW total score was 9.80±3.44 among doctors from different specialties (16). In another study conducted with a study sample of pediatricians and psychiatrists, the KCAHW total score was found to

be 12.4±4.4 (17). Although there were no psychiatrists in our study and pediatricians constituted 4.4% of the physicians, the KCAHW total score was found to be 12.62 ± 2.80.

In a recent systematic review, it was examined whether there was a change in knowledge, self-efficacy, and attitudes towards ASD in studies conducted before and after 2013, in which the diagnostic criteria of ASD were changed with the DSM-5 (1). Regarding the studies that measured the level of ASD knowledge using KCAHW, the mean score of KCAHW was 11.86 (min: 10.67, max: 12.56) from 1994 to 2013, while the average score was found to be 12.04 (min: 9.8, max: 13.5) from 2013 to present, and only small improvement was detected in the scores (10). Based on this review, it can be said that the ASD knowledge level of health professionals working in a center providing tertiary health services in Turkey has not increased significantly despite the increase in ASD incidence. However, in our study, we found that while 77.7% of healthcare professionals knew that inability to socially interact and communicate, which are the main symptoms of ASD, could be seen, 31.8% had true knowledge about ASD and its accompanying diseases. Considering that individuals with ASD often admit to the hospital providing tertiary health care due to comorbid medical and mental illnesses, we predict that this inadequate knowledge may cause difficulties in providing health services to individuals with ASD.

In our study, we created a regression model in which we evaluated the factors that could predict the level of ASD knowledge. According to this model, we found that being a female health worker, being a doctor, and having ASD -oriented training are factors that increase the level of ASD knowledge.

In our study, we found that 50.2% of health workers did not receive training on ASD. We found that the level of ASD knowledge was significantly hig-her in healthcare workers who received training. In the relevant literature, it is also observed that the majority of studies show a positive relationship between the completion of ASD-specific training or programs and ASD knowledge scores (10,18-20).

In the literature, among the studies investigating the relationship between ASD awareness and gender, it is mostly reported that there is no significant relationship between gender and knowledge level (10,17,21). In addition, it is seen that there are studies reporting that ASD awareness and positive attitudes toward individuals with ASD are higher in girls than in boys (22,23). Similar to these studies, we found that the level of ASD knowledge was higher in females in our study.

When the studies comparing the ASD knowledge level in different occupational groups are examined, it is seen that the autism knowledge level and awareness of doctors are higher in the majority of the studies. In a study conducted in this direction, the ASD knowledge level of senior medical students, nursing, and psychology students was compared and it was reported that the ASD knowledge level of medical students was higher than other students. This difference is explained by the absence of pediatric and psychiatry internships in the education of nursing and psychology students (24). In a similar study conducted in Turkey, it was reported that there is no difference in ASD awareness between medical students and nursing students (22). In a study examining whether the level of ASD knowledge changes with the residencies of doctors, it was stated that the level of ASD knowledge was higher in psychiatry, child psychiatry and neurology, and pediatric neurology physicians, which were considered as neuropsychiatric groups, compared to other branches (25). In another study evaluating the ASD knowledge level regarding the branches of physicians, it has been reported that psychiatrists had the highest ASD knowledge level, and general practitioners have the lowest level of knowledge (16). In our study, similar to previous studies, we also found that the ASD knowledge level of doctors was higher than that of other

healthcare professionals. We observed that the education level of doctors was higher than that of other health workers and there was more autism-oriented education in their education. It can be said that this difference increases the knowledge of ASD. In addition, we found that there was no difference when the ASD knowledge level of the doctors was compared according to their specialty. However, we found that the ASD knowledge level of the doctors who were residency students was lower than the specialist doctors. These findings suggest that it would be useful to include teaching on autism into medical student training programs.

It is seen that there are conflicting results in previous studies evaluating the relationship between age and ASD knowledge level. In addition to a study reporting that the level of ASD knowledge increases with age (26) there are also studies (27,28) reporting that the level of ASD knowledge is higher in younger health workers. In our study, we found an increase in the scores on the scale evaluating the level of ASD knowledge with the increase in the age of the participants. The increase in professional experience with increasing age may explain this result. Because, we also found that with the increase in professional experience, the level of ASD knowledge also increased. In the literature, it is seen that the findings report that the level of knowledge and awareness about ASD increase with increasing experience is common (10). However, there are studies reporting that professional experience and ASD knowledge level are not related (10,29).

In our study, we found that knowing someone with autism did not affect the level of ASD knowledge. There are studies in the literature reporting that knowing someone with ASD is a factor that increases the level of ASD knowledge, contrary to our findings (19,29). The fact that this finding in our study does not agree with the literature can be explained to the small percentage of healthcare workers who are knowing someone with ASD.

In the literature, there are studies reporting that healthcare professionals who have experience with autistic individuals have higher ASD awareness compared to those who do not follow them (16,19).

In contradiction, there are studies reporting that the level of ASD knowledge is better in newly graduated health workers who do not have experience with individuals with ASD, or that there is no relationship between the level of ASD knowledge and the experience with individuals with ASD (27,29). In our study, the level of ASD knowledge was found to be higher among healthcare professionals who had experience with individuals with ASD.

With the national action plan for ASD in Turkey, health professionals working in primary health care services or community organizations were provided with training to increase the level of ASD knowledge and awareness. The fact that the level of ASD knowledge among health workers working in primary health care services or community organizations in Turkey is higher than in our study may be due to this national action plan (30). Considering that secondary and tertiary healthcare institution are centers that provide primary healthcare services for children with developmental disorders such as childhood autism, improving the ASD knowledge level of healthcare professionals in these centers will increase the quality of healthcare services. In this direction, it is necessary to provide training on ASD to health workers in secondary and tertiary health institutions and to develop policies to increase the quality of health services. Based on the findings of our study, it may be beneficial to plan training primarily for non-physician healthcare professionals in secondary and tertiary healthcare institutions and to update the information deficiencies.

Limitations

The strength of our study is that a standardized scale was used to evaluate the level of ASD knowledge. Since this scale is a self-reporting scale, it was applied under the supervision of a practitioner, considering that there was a risk of not reflecting the real data of the participants. Another strength is the large sample size compared to previous studies. The most important limitation of our study is that although the general knowledge level of the participants about the basic symptoms of ASD was measured, their knowledge of the conditions that occur with ASD or their knowledge in the context of the health care system could not be evaluated.

Childhood autism and other neurodevelopmental disorders require a multidisciplinary approach due to their nature. Apparently, there is a need for a special health service system to cover the current unmet needs of these children and their parents. Considering that the secondary and tertiary health institutions are the centers that provide primary health services for children with ASD, improving the ASD knowledge level of health workers in these centers will increase the quality of the health service provided. However, in order to achieve this, it is necessary to constitute policies and plan for the needs. There is a need for basic epidemiological data and studies that will provide these data that will guide the policies and planning to be constituted in this regard. These studies should focus on identifying the unmet needs of children with ASD in the current healthcare system and evaluating the current intervention and education facilities.

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