A study of perceptions, attitudes, and level of knowledge among pediatricians towards attention-deficit/hyperactivity disorder

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The study aimed to evaluate the level of perception, attitude, and knowledge of pediatric residents to attention-deficit/hyperactivity disorder (ADHD) by a questionnaire based on the Diagnostic and Statistical Manual of Mental Disorders (4th ed) diagnostic criteria. One hundred and fifty-six pediatric residents from university and state hospitals answered a four-step Likert type questionnaire form consisting of 43 questions regarding sociodemographic features, age, duration of residency, marital status, and general knowledge of ADHD, differential diagnosis, coexisting conditions, and management of ADHD. Of the residents, 127 (81.4%) stated that their knowledge on ADHD was deficient, and 123 (85.2%) reported that they did not know the protocol used in establishing the diagnosis. There was no statistically significant difference with respect to differential diagnosis and co-morbid conditions of ADHD between the two groups (university and state hospital) ($p>0.05$). 60.9% of the residents were aware of the adverse effects. We believe that pediatric resident education programs must include more intensive focus on the topics of behavioral and developmental neurology as well as common neuropsychiatric disorders, and that child psychiatry and child neurology rotations, within our current rotation systems in pediatric residency training, should be extended.

Key words: attention-deficit/hyperactivity disorder, perception, attitude, knowledge, pediatricians.

Given its high prevalence (between 3-5% in the general population and 5-7% among school-age children), attention-deficit/hyperactivity disorder (ADHD), which consists of three cardinal components of inattention, hyperactivity, and impulsivity[1-3], has had a great impact on the field of child psychiatry throughout the past century[4] and represents one of the most commonly seen disorders of childhood[5,6]. The diagnosis requires the coexistence of a certain number of signs reflecting hyperactivity/impulsivity and inattention[2,3].

In our country, there are 16 provinces where child psychiatry outpatient clinics are present, employing approximately 130 child psychiatrists. This situation increases the responsibility of pediatricians during the stage of diagnosis. In children younger than three years of age, the symptoms of delayed speech without hearing loss, regression in executing fine motor abilities, clumsiness despite fine gross motor activity, and repeated history of injury, accidents or burns all appear to be manifestations of a forthcoming ADHD in the following years. Hence, as suggested by the American Academy of Pediatrics, pediatricians have a great role in the diagnosis and treatment of the condition[7].

This study was conducted among pediatric residents employed in various university and state hospitals of Ankara in order to evaluate their level of perception, attitude, and knowledge related to the diagnosis and management of ADHD utilizing a questionnaire based on the Diagnostic and Statistical Manual of Mental Disorders (4th ed) (DSM-IV) diagnostic criteria.

Material and Methods

A total of 156 pediatric residents [81 (51.9%) from university hospitals (UH) and 75 (48.1%) from state hospitals (SH)] comprised the study

group. Between March 2005 and May 2005, the pediatric residents were given a four-step Likert-type questionnaire consisting of 43 items developed on the basis of DSM-IV diagnostic criteria[2], which were rearranged to assess their competence, attitude, and knowledge regarding ADHD and their level of competence in its diagnosis and management; some questions were related to common myths about the disease widely known among the public. General questions in this arrangement are those related to DSM-IV criteria. The issues concerning the differential diagnosis of ADHD were also evaluated. The answers included: 1- I definitely disagree, 2- I disagree, 3- I agree, 4- I definitely agree.

Questions in the first part of the questionnaire were related to sociodemographic features, age, duration of residency, marital status and whether or not the participants had children other than the patients. In the second part, questions addressed general knowledge of ADHD, the differential diagnosis, as well as coexisting conditions. The third part was related to knowledge about the management of ADHD, and the last part to the attitudes of the residents towards the management of the disease. The residents had been meeting children with ADHD in general pediatric outpatient clinics during their training periods as well as during their rotations in pediatric neurology departments. Prior to the study, the residents were informed about the study, were assured of anonymity, and only those who were willing to participate were included in the study, with their consent.

For the statistical evaluation, SPSS 10.0 was used. The numerical values, age of the doctors and the time of residency were expressed as mean ± standard deviation (SD). Chi-square analysis was used in testing the differences between physician responses according to their institution (UH or SH), and private office. Overall assessment of each division was carried using the independent t test.

Results

Of the residents participating in our study, 88 (56.4%, SH: 47.7%, UH: 52.5%) were female and 68 (43.5%, SH: 48.5%, UH: 51.4%) were male, and the mean age was 27.78 ± 2.24 years. Forty-five (28.8%, SH: 35.5%, UH: 64.4%) were married, and 14 (9%, SH: 35.7%, UH: 64.2%) had children. The time of residency varied between 2 and 168 months (mean: 32.88±20.33 months). Seventy-seven (49.3%) residents had been working for 2-32 months and 79 (50.6%) for 33 months or longer.

Generally, 102 (65.3%) of the residents gave correct answers to the questions aimed at testing their knowledge of ADHD (SH: 62.1%, UH: 68.2%). The questions and the rates of correct answers are given in detail in Tables I and II.

Of the residents, 127 (81.4%, SH: 86.6%, UH: 76.5%) stated that their knowledge of ADHD was deficient, and 123 (85.2%, SH: 78.6%, UH: 91.3%) reported that they did not know the protocol used in establishing the diagnosis. There was no difference between the responses given by the residents working in the two different hospitals ($p>0.05$).

One hundred and six (67.9%) of the residents stated that a gender difference was present in ADHD (SH: 66.6%, UH: 69.1%), and 120 (76.9%, SH: 76%, UH: 77.7%) stated that the condition was more frequent among males. When results were compared according to employment in SH or UH and to the duration of their residency, no difference was detected between the rates of correct answers ($p>0.05$). Generally, the rate of recognizing ADHD as a lifelong disease was low (35.2%), the rate being significantly lower in residents working in SH (25.3%) compared to those working in UH (44.4%) ($x^2=6.231$, $p=0.013$).

When means of the given correct answers with respect to differential diagnosis of ADHD were compared between the two groups, there were no statistically significant difference (for SH mean: 5.81±1.66; for UH mean: 5.90±1.42) (t: -0.355, df: 154, p: 0.723). When the questions were evaluated by individual residents, 63.4% (SH: 64%, UH: 62.9%) were aware that genetic predisposition had a role in ADHD, and 83.9% (SH: 86.6%, UH: 81.4%) knew that it should be differentiated from some of the inherited metabolic diseases; 57.6% (SH: 54.6%, UH: 60.4%) found epileptic disorders to be essential in the differential diagnosis. No difference was found between the correct answer rates with respect to institution type or duration of the residency ($p>0.05$). Fifty-three residents reported that a differential diagnosis with specific learning

Table I. Responses of the Residents to Questions about their Knowledge of ADHD

ADHD is.../ Children with ADHD...	Total no. of correct answers (%)	No. of correct answers-SH (%)	No. of correct answers-UH (%)	P
associated with poor health condition	120 (76.9)	59 (78.7)	61 (75.3)	p>0.05
associated with false parental attitudes	53 (34)	23 (30.7)	30 (37)	p>0.05
can concentrate on their interest issues	65 (41.6)	34 (45.3)	31 (38.2)	p>0.05
engage in more than one activity at once	99 (63.4)	41 (54.7)	58 (71.6)	p>0.05
fail to finish a started task	140 (89.7)	65 (86.7)	75 (92.6)	p>0.05
do not like burdensome task	97 (62.1)	50 (66.7)	47 (58)	p>0.05
should be supported by private education	123 (78.8)	54 (72)	69 (85.1)	p: 0.044[a]
parents may have psychiatric disorders	73 (46.7)	33 (44)	40 (49.4)	p>0.05
have slow reading speed	94 (60.2)	47 (62.7)	47 (58)	p>0.05
have low level of arithmetic ability	83 (53.2)	38 (50.7)	45 (55.5)	p>0.05
more common among males	120 (76.9)	57 (76)	63 (77.7)	p>0.05
no gender differences	106 (67.9)	50 (66.7)	56 (69.1)	p>0.05
Investigation of behaviors in the school is sufficient for diagnosis	150 (96.1)	72 (96)	78 (96.2)	p>0.05
Symptoms begin before 7 years of age	87 (55.7)	32 (42.6)	55 (67.9)	p: 0.002[b]
Symptoms should appear in whole life field at least 6 months	136 (87.1)	66 (88)	70 (86.4)	p>0.05
most are left-handed	124 (79.4)	61 (81.3)	63 (77.7)	p>0.05
may become a lifelong disease	55 (35.2)	19 (25.3)	36 (44.4)	p: 0.013[c]
may also be seen during adulthood	63 (40.3)	35 (46.6)	28 (34.5)	p>0.05
parents have high level expectation from teachers	126 (80.7)	57 (76)	69 (85.1)	p>0.05

a: $x^2=4.059$
b: $x^2=10.053$
c: $x^2=6.231$
SH: State hospital. UH: University hospital.

Table II. Responses of the Residents to Questions about Differential Diagnosis of ADHD and Coexistent Conditions

ADHD.../ Children with ADHD...	Total no. of correct answers (%)	No. of correct answers-SH (%)	No. of correct answers-UH (%)	P
Differential diagnosis				
is a hereditary disease	99 (63.4)	48 (64)	51 (62.9)	p>0.05
is associated with any level of intelligence	130 (83.3)	58 (77.4)	72 (88.8)	p>0.05
the level of intelligence is lower than normal	128 (81.1)	62 (82.7)	66 (81.5)	p>0.05
the level of intelligence is higher than normal	127 (81.4)	58 (77.4)	69 (85.1)	p>0.05
may be confused with some metabolic disorders	131 (83.9)	65 (86.6)	66 (81.4)	p>0.05
may be confused with epilepsy	90 (57.6)	41 (54.6)	49 (60.4)	p>0.05
may be confused with specific learning difficulties	53 (34)	33 (44)	20 (24.6)	p: 0.011[a]
may appear in infants with undeveloped fine motor skills and delayed speech	75 (48)	39 (52)	36 (45)	p>0.05
a higher possibility of occurrence among premature and low birth weight babies	81 (51.9)	32 (42.6)	49 (60.4)	p: 0.026[b]
Co-existent conditions				
may be associated with anxiety and depression	118 (75.6)	57 (76)	61 (75.3)	p>0.05
learning difficulties are frequent	133 (85.2)	68 (90.6)	65 (80.2)	p>0.05
may be associated with oppositional defiant disorder	100 (64.1)	44 (58.6)	56 (69.1)	p>0.05
have high inclination for participating in mobs	67 (42.9)	34 (45.3)	33 (40.7)	p>0.05
Have an increased tendency for addiction to alcohol and substance abuse	68 (43.5)	34 (45.3)	34 (41.9)	p>0.05

a: $x^2= 6.472$
b: $x^2= 4.958$
SH: State hospital. UH: University hospital.

difficulty (SpLD) is important, the rate being significantly higher in SH residents (x^2=6.472, p=0.011), but it had no relation with the duration of residency. The only statistically significant differences between the answers of the SH (42.6%) and UH (60.4%) residents were regarding the questions of whether prematurity and low birth weight (LBW) are risk factors for ADHD (x^2=4.958, p=0.026). Forty-eight percent of the residents agreed on the follow-up of children who had poor speech and fine motor development in the early childhood period, in the event they were the early signs of ADHD in those children. This opinion, regardless of institution type, was higher in residents with residency duration ≥33 months (x^2=8.357, p=0.004). The rate of recognizing that ADHD may be associated with any level of intelligence was considerably high (SH: 77.4%, UH: 88.8%) in residents of both types of hospitals (p>0.05).

When the mean of the correct answers given to the questions concerning ADHD and co-morbid conditions was evaluated, there was no significant difference between the responses of the two groups of residents according to institution type (for SH, mean: 3.16±1.35; for UH, mean: 3.06±1.26) (t: 0.468, df: 154, p: 0.641). When the questions were individually evaluated, 75.6% of the residents accurately chose the group of psychiatric disorders (SH: 76%, UH: 75.3%); 85.2% of them indicated learning difficulties (SH: 90.6%, UH: 80.6%), 64.1% oppositional defiant disorder (SH: 58.6%, UH: 69.1%), 43.5% drug and alcohol addiction (SH: 45.3%, UH: 41.9%), and 42.9% an inclination for participating in mobs (SH: 45.3%, UH: 40.7%) as co-morbid conditions. More residents of the UHs were aware that ADHD children should receive special education when compared to the SH residents (85.1% vs. 72%) (x^2=4.059, p=0.044).

The answers to the questions relating to management skills and adverse effects of the treatment showed that 60.9% of the residents were aware of the adverse effects (Table III). When the responses in this part were evaluated, no difference was found in terms of gender, marital status, having children or not, or duration of the residency (p>0.05). In addition, neither residency duration nor the type of institution had any effect on the answers of the residents in this regard [mean of correct answers for SH: 2.21±1.06, for UH: 2.32±1.04; t: -0.635, df: 154, p: 0.526; for duration of residency (≤32 months, correct answer mean: 2.16±1.04, and for ≥33 months, correct answer mean: 2.36±1.05, t: -1.174, df: 154, p: 0.242)]. 41.6% of the residents stated that management of ADHD is not the responsibility of the pediatrician (SH: 44%, UH: 39.5%), but 67.3% (SH: 64%, UH: 70.4%) claimed the opposite, and 74.3% (SH: 65.3%, UH: 82.7%) denoted that a pediatrician can play an important role in management. Furthermore, the future role of pediatricians in the management of ADHD

Table III. Attitudes of the Residents to the Management of ADHD and Adverse Effects of Methylphenidate (MP)

	Total no. of correct answers (%)	No. of correct answers-SH (%)	No. of correct answers-UH (%)	P
MP is widely used in treatment	120 (76.9)	58 (77.3)	62 (76.5)	p>0.05
MP may lead to addiction	70 (44.9)	38 (50.7)	32 (39.5)	p>0.05
MP may lead to appetite and sleep disturbance	95 (60.9)	43 (57.3)	52 (64.2)	p>0.05
MP may lead to osteoporosis	70 (44.9)	27 (36)	43 (53.1)	p: 0.032[a]
Pediatricians have an active role in management (agree)	105 (67.3)	48 (64)	57 (70.4)	p>0.05
Management of ADHD is not a job for pediatricians (agree)	65 (41.6)	33 (44)	32 (39.5)	p>0.05
Pediatricians will play an active role in ADHD management in the future (agree)	116 (74.3)	49 (65.3)	67 (82.7)	p: 0.013[b]

a: x^2=4.596
b: x^2=6.171
SH: State hospital. UH: University hospital.

was significantly more frequently denoted by UH residents than by SH residents ($x^2=6.171$, $p=0.013$). When the answers to the questions in this part were evaluated, no difference was found in terms of gender, marital status, having children or not, or duration of the residency ($p>0.05$).

Discussion

The frequency of occurrence of chronic diseases among children aged between 6 and 12 is 4-12%, and among these disorders, ADHD is one of the most commonly encountered. As consanguineous marriage is frequent, neuro-metabolic diseases and especially genetic diseases are inevitably prevalent in our country. ADHD may appear as a manifestation of these diseases, but as well exhibits a genetic character by itself. Therefore, the combined efforts of experienced child psychiatrists, child neurologists, and pediatricians are necessary in accomplishing the differential diagnosis[5,8]. Since the number of child psychiatrists is few in number in Turkey, it appears that the role of pediatricians is even more important. Among the studies reflecting the situation in Turkey is one that presented the results of the evaluation, according to the DSM-IV diagnostic criteria, of 1556 patients who presented to Gazi University Medical Faculty child psychiatry outpatient clinic during a period of 22 months[9]. In that research, the prevalence of ADHD was determined to be 8.6% (121 subjects), and was six times more common in boys than girls. It was also detected that after anxiety and depression, ADHD represented the third most common reason for application to the outpatient clinics[9]. In our study, a great majority of the residents (72.4%) recognized that there was a gender difference and that the disorder was more commonly seen among males. In recent years, there has also been a steady increase, of 2.5-3 fold[5,8], in the frequency of diagnosing ADHD among females[8].

In recent years, there has been an increase in presentation to physicians and pediatricians for ADHD diagnosis and treatment. As it constitutes an issue requiring time, interest, and knowledge, pediatricians should have a special interest in ADHD in addition to devoting their time and acquiring adequate knowledge[5,8]. In our study, a great majority of the residents were found to have an inadequate level of knowledge (81.4%), and were unaware of the algorithms for the diagnosis (78.8%). Hence, it is clear that more education programs regarding ADHD are vital for pediatric residents.

The early and correct diagnosis and treatment of ADHD is essential, as it favorably affects the future life of the children[6,7]. Our study revealed that a minority of the residents recognized that the disorder may become a lifelong disease (35.2%), and that it may be seen during adulthood (40.3%).

Attention-deficit/hyperactivity disorder is characterized by inattention, hyperactivity, and impulsivity[1]. These components act in concert to generate the symptoms of the disorder, including failure of completing a started task, being engaged in several activities at once, dissatisfaction, low frustration threshold, poor social judgment, fine motor abilities below the level of competence expected for the age group despite extreme gross motor activity, and low concentration capacity with difficulty in focusing on an issue. In our study, when the residents were queried as to their knowledge on this subject, most (89.7%) knew that the patients failed to finish a started task, and 63.4% knew that the patients were mostly engaged in more than one activity at the same moment. In those patients, inattention, lack of interference, slow reaction time, and failure in situations that require sustained attention are the most serious impacts[10]. Moreover, weaknesses in information processing speed of speech and arithmetic performance were also noted[11]. In our study, 53.2% of the residents stated that the patients with ADHD displayed a low level of arithmetic ability, and 60.2% indicated the presence of a low reading speed.

Eighty-five point two percent of the residents were aware that children with ADHD might have difficulties in learning; 78.8% indicated that there was a need for supportive special and private education; and nearly 50% noted that the patients had an inclination for being engaged in mobs and a predisposition to alcohol and drug addiction. As a result, ADHD unfavorably affects the social, occupational, and academic life of individuals[7,8,12]. Therefore, necessary measures should be taken with respect to these children to prevent development of such problems later in life. The question on this issue was more frequently answered correctly by the UH versus SH residents.

Furthermore, in a study investigating which group initially considered the diagnosis of ADHD, it was reported to most frequently be the teachers, thereafter referring them to child psychiatrists or pediatricians. Nonetheless, as teachers may confuse ADHD with low IQ, SpLD, or another psychiatric disorder, it has been suggested that experienced child psychiatrists/pediatricians and pediatric neurologists take active roles in both the education of teachers and particularly on how to differentiate between ADHD and other conditions resembling the clinical picture of ADHD[8]. For the diagnosis and management of ADHD, the American Academy of Pediatrics indicates pediatricians as having an active role in identifying the cases with underlying genetic and metabolic diseases that initially suggest ADHD during regular pediatric examinations, but additionally displaying speech, hearing, and vision problems unlike ADHD[6,7]. In our study, when we inquired whether or not metabolic or epileptic disorders, SpLD, and low IQ should be considered in the differential diagnosis, 65% and 62% of UH and SH residents, respectively, recognized that it may coexist with co-morbid conditions. In their study, Kwasman et al.[5] stressed that although children with ADHD should be evaluated by psychologists/psychiatrists prior to and during the therapy course for co-morbid conditions and learning disabilities, a collaboration with pediatricians should also be undertaken for identifying a possible organic etiology[5].

The frequency of using drugs for ADHD management shows a steady increase, influenced by the preferences of both teachers and families and recommendations of physicians, psychiatrists, and psychologists. Therefore, the knowledge of current therapeutic options as well as their effects and adverse effects has become an important issue[5,8]. Methylphenidate represents the most commonly used therapeutic agent. The most frequent adverse effects include appetite and sleep disturbances[5,13]. The profile of the answers given by residents suggests that this drug is the most frequently prescribed agent for this disorder, and that they have adequate information on its adverse effects. In our study, while 67:3% (both UH and SH) of the residents believed that the pediatricians must have an active role in management, 41.6% (both UH and SH) stated that the pediatricians may not necessarily be involved in the management of these children. This led us to consider that they lack information on this issue and should receive appropriate training.

Although the pediatric residents recognized that pediatricians will play an active role in ADHD management in the future, it is quite worrisome that their knowledge deficit reached a rate of 81.4% (both UH and SH), and that 85.2% (both UH and SH) of them were unaware of the algorithm used in establishing the diagnosis of ADHD. The disease is characterized by a partial persistence in adulthood, thereby leading adult neurologists and psychiatrists to face a variety of diagnostic difficulties. Such adults generally have behavioral disorders, may have a predisposition to alcohol and substance abuse or more frequent divorces, impairments in social interactions, and a more delinquent character, which undoubtedly further increase the critical role of pediatricians in early recognition of the condition. In the meantime, the number of child psychiatrists should be increased, since the psycho-social therapy is important as well as the medical treatments.

In conclusion, we believe that more intensive focus must be given to the topics of behavioral and developmental neurology as well as common neuropsychiatric disorders in pediatric resident education programs, which could be in the form of separate lessons at least for a semester. Periods of child psychiatry and child neurology rotations within our current rotation systems in pediatric residency training should also be extended.

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