International Journal of Pediatrics and Adolescent Medicine 4 (2017) 91–94

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International Journal of Pediatrics and Adolescent Medicine

journal homepage: http://www.elsevier.com/locate/ijpam

Original research article

Prevalence of attention deficit hyperactivity disorder among primary school-children in Riyadh, Saudi Arabia; 2015–2016

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ARTICLE INFO

Article history:
Received 24 October 2016
Received in revised form
7 February 2017
Accepted 14 February 2017
Available online 25 October 2017

Keywords:
ADHD
Prevalence
Socio-demographics
Children
Saudi Arabia

ABSTRACT

Objectives: The aim of the study was to 1) determine the prevalence of Attention Deficit Hyperactivity Disorder (ADHD) among both governmental and private primary Saudi school children, 2) measure the gender difference of ADHD prevalence, and 3) determine any association between the socio-demographic characteristic of the parents of children with ADHD.

Methods: This is an observational cross-sectional study of 1000 primary school children belonging to 1st, 2nd and 3rd grade. The selected students were screened by the ADHD rating scale using multistage sampling technique. The first stage was selection of 20 schools from all Riyadh regions by simple randomization. The second stage was choosing children whom serial numbers were multiples of five in each class. The ADHD rating scale was filled by both parents and teachers along with a socio-demographic questionnaire for the parents.

Results: The estimated prevalence of ADHD was 3.4%. ADHD manifestations affect boys more than girls. In addition, ADHD was more frequent among children of illiterate mothers. Finally, ADHD was significantly more prevalent among first grade children.

Conclusion: This epidemiological study filled the data gap of ADHD prevalence in Riyadh. The study's findings go in line with many nearby and global studies.

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1. Introduction

Attention-deficit and hyperactivity disorder (ADHD) is one of the most common neurodevelopmental disorders among children. It was estimated that every classroom has at least one child suffering from this developmental disorder [1,2]. People with ADHD classically have trouble getting organized, keeping focused, making practical plans and thinking before acting. They may be jittery, noisy and unable to get accustomed to changing situations [3]. This disorder is a behavioral condition that makes concentrating on everyday requests and routines challenging [3]. It is described as a chronic impairing disorder that negatively affects many aspects of a child's life including academic attainment, social skills, difficult child-parent relationship, and the well-being of the entire family [4]. A population-based cohort study on 4880 persons found that ADHD medical costs were $ 4306 compared to $ 1944 for non ADHD individuals [4,5].

Additionally, if the child continues to suffer from this disorder until adulthood, they will most likely be dismissed from employment many times until they settle down and succeed [4,6]. Another effect of ADHD that becomes apparent during adulthood if they were not subjected to medication is drug abuse [4,7]. Not only that, but ADHD symptoms will continue into adulthood in 30–60% of the affected children [4,8]. This certainly will have a negative impact on the child's educational outcome and employment attainment [4,6]. Due to these disastrous effects, and in order to avoid them, we must estimate the size of this problem locally, before deciding how to approach it.

An investigation of 17,461 children was directed in Germany, demonstrating a 4.8% prevalence of ADHD [9]. Furthermore, 71 published studies from January 1997 to June 2007 had shown that there is a wide variation in its prevalence from 0.2% to 26.8% [1,10]. Arab world epidemiological studies conducted on this disorder

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Peer review under responsibility of King Faisal Specialist Hospital & Research Centre (General Organization), Saudi Arabia.

http://dx.doi.org/10.1016/j.ijpam.2017.02.003
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among children showed that its prevalence was between 2.7 and 20.5% on school aged Arab students [1,11–19].

However, only a few studies were conducted to investigate this disorder all over Saudi Arabia, and none of them were conducted in Riyadh although it is the capital city of Saudi Arabia with a huge number of elementary schools. That is why we aim to find out what is the prevalence of this disorder among primary school-children in Riyadh city.

Some socio-demographic factors may play a major role, such as parent's relationship and educational attainment, family's income, and the affected child's gender.

2. Methods

After obtaining the ethical approval from the Institutional Review Board (IRB), an observational cross sectional study was conducted. The study covered 20 randomly selected primary governmental and private schools from all Riyadh regions in Saudi Arabia, during 2015–2016. It has been conducted among first, second, and third grade children. We have included Saudi boys and girls attending primary schools. Children who are foreigners were excluded. Two questionnaires are needed to be filled for each child since the diagnosis of ADHD requires the subject to show the symptoms in at least two different settings as the Diagnostic and Statistical Manual requires. Due to that, those whom teachers or parents refused to fill the ADHD rating scale were also excluded. The study sample size was calculated to be 1000 and instead of making it 50% girls and 50% boys, we decided to gender adjust it to 60% girls and 40% boys. The education system in KSA dictates that there are separated schools for girls and boys, and as female researchers, it was considerably easier for us to access girls' schools. The multistage sampling technique was applied; the first stage was choosing 20 schools by simple randomization using a list of all Riyadh primary schools that had been provided by the Ministry of Education. The second stage was systematic-randomization, from each class we chose children whom serial numbers were multiples of five in the pattern of (5, 10, 15, 20 ...) and so on. Recruitment of the subjects was conducted by the researchers along with a group of male volunteers according to the inclusion and exclusion criteria. Data distribution and collection took time between December and February. We choose this specific time because it was the end of the first semester and the teachers have spent enough time to pay attention to their students' behavior. We gained a letter of permission from the Ministry of Education to allow us entry to the schools. As we are a group of female researchers, we had no trouble entering girls' schools; therefore we recruited male volunteers to collect data from boys' schools. Each school provided us with their list of students who belong to the first, second, and third grades. After that, subjects were selected according to our sampling technique. An informed consent signed by the participants was obtained prior to the questionnaires distribution. It had the study purpose clearly explained. The participants' right to withdraw at anytime without any obligation was mentioned as well. Furthermore, for each subject a single code was prepared to ensure their confidentiality. We distributed two copies of the ADHD rating scale for each subject; both were labeled with the subject's code. One of the two copies was filled by the class pioneer (main teacher), and the other copy was sent home with the child along with the socio-demographics questionnaire to be filled by the parents. The selected study participants were given 5 days to fill the questionnaires. After that, the questionnaires were collected by the researchers and the volunteers, and later handed to the Principal Investigator to be held in his constant care. The collected data were revised to exclude any unfilled questionnaires. Subjects who had only one ADHD rating scale filled by either their teachers or parents were labeled incomplete and were also excluded. Later on, data were sorted out into 6 groups depending on the gender and grade (3 females' groups, 3 males' groups, according to their grades).

The ADHD rating scale is a screening tool of ADHD symptoms. It is not sufficient to diagnose a child with ADHD, and an expert opinion should be sought out. We used the Arabic version that has been validated in 2009 [20]. The used scale is based on the criteria of the Diagnostic and Statistical Manual revised 3rd version (DSM-III-R). It contains 14 questions, and each question has 4-point scale (from 0 to 3), in the following pattern (not at all, just a little, pretty much, very much). Any child who scores 23 or more in this scale is considered to have ADHD symptoms and should be seen by a psychiatrist for further evaluation. There are many updates made in the DSM 5 but in regard to the ADHD section, the new DSM-5 broadens the ADHD diagnosis, allowing for adult-onset and relaxing the strictness of the criteria to more accurately reflect new research on this disorder. Given that adults have more developed brains and generally greater impulse control, adults can now be diagnosed with ADHD if they have fewer signs and symptoms than children, although this does not affect our study as the targeted sample was children. Another questionnaire, which is self-developed by the research group, was sent alongside the ADHD scale to the parents, it contains 10 questions, regarding the socio-demographics, in order to assess correlation between ADHD and the socio-demographics of the affected children families'.

Data were extracted from the hard copies of the filled questionnaires into an SPSS 21.04 form built specifically for the used scale. Each item in the scale has four options on the SPSS form. Data are presented in the frequency table as percentages. Statistical analysis was performed according to the scoring technique of the written scale. Prevalence has been calculated as a percentage using the study sample as the denominator and the number of the affected children as the nominator (Chi-square) was preformed to test the association between ADHD and the socio-demographics.

3. Results

Out of the 1000 subjects that we distributed the questionnaire to, 646 returned complete questionnaires. The rest (354) were either incomplete or were not returned at all. The overall ADHD prevalence was found to be 3.4% since 22 children were reported to have ADHD symptoms by both their parents and teachers. From them, 13(5.9%) were males, while 9(2.1%) were females, with a ratio of 3:1. Gender was shown to be associated with ADHD ($p = 0.013$) as shown in (Table 1). More than half of the 22 children who has ADHD symptoms, 12 belonged to the first grade; so 5.7% of first grade children had ADHD symptoms compared to 2.2% for the other two grades. This concludes that being in a lower grade is affiliated with ADHD ($p = 0.048$), also shown in (Table 1). Demographics that showed to be associated with the presence of ADHD were the level of maternal education ($p = 0.033$), as ADHD was more common among children whom mothers' were illiterate (Table 2). There was no association between ADHD and marital status, paternal education level, number of siblings, child's school-type, the family's level of income, nor the parents' occupation.

4. Discussion/limitations

The aim of our study was to fill the data gap of ADHD studies in Riyadh, Saudi Arabia. The study showed a prevalence of 3.4% which goes in line with the most recent local study that has been conducted in Assir [1]. The previously mentioned study used Vanderbilt ADHD rating scale. It covered 708 primary school-children and showed an ADHD prevalence of 2.7%. This difference can be explained by the use of different diagnostic criteria, since some are

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