

## Epidemiological aspects of a sample of Egyptian children with Attention deficit hyperactivity disorder in hospital setting

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### Abstract

**Background:** Although ADHD is a common childhood disease more research is needed to investigate the epidemiological aspects of this disease specially in Egypt where more research is essential to investigate the prevalence of such a disease in both community and hospital settings.

**Objective:** To study the different aspects of the epidemiology of Attention- deficit/ hyperactivity disorder (ADHD) in the clinic setting and compares that to community based sample.

**Methodology:** Design: cross sectional study. Over the period of six months from the start of June till the end of December 2012 patients between (4- 12) years were recruited from the outpatient clinic of the institute of post graduate childhood studies. Children were diagnosed with ADHD according to American Psychiatric Association: Diagnostic and statistical manual of mental disorders, 4<sup>th</sup> edition. All patients were subjected to: Full psychiatric history and mental status examination according to the psychiatric sheet of the institute of post graduate childhood studies, full medical history, complete clinical examination, including Intelligence quotient measures using Stanford Binet Fourth Edition.

**Results:** The prevalence of ADHD in hospital setting was 20% (39 out of 199 children) . In the diagnosed cases 67% were males and 33% were females, with a males to females ratio 2: 1. The Mean age of the diagnosed case in years was 6.97 years, The Mean IQ of the diagnosed cases was 98, The most common subtype was the predominant hyperactive- impulsive subtype with 39% followed by the combined subtype with 33% then the predominant inattentive subtype with 28%.

**Conclusion:** Pooled prevalence of ADHD in a community based sample was 6.5% and up to 20% in clinic based sample. This can help us to estimate the magnitude of the problem leading to proper design of a preventive and therapeutic intervention programs.

**Key words:** ADHD- Epidemiology- Hospital

### دراسة وبائية عن عينة من الأطفال المصريين المصابين باضطراب فرط الحركة ونقص الانتباه ببركز طبي

**الخلفية:** اضطراب فرط الحركة ونقص الانتباه هو من أمراض الطفولة الشائعة وعلى الرغم من هذا هناك حاجة إلى مزيد من الأبحاث لدراسة الجوانب الوبائية لهذا المرض وخاصة في مصر حيث المزيد من البحوث أمر ضروري للتحقيق في انتشار هذا المرض في المجتمع على حد سواء والمستشفيات.

**الهدف من الدراسة:** تقدير مدى انتشار اضطراب فرط الحركة ونقص الانتباه في عينة القائمة على العيادة. على مدى فترة ستة أشهر من بداية يونيو حتى نهاية شهر ديسمبر ٢٠١٢.

**نوع الدراسة:** دراسة مقطعية.

**العينة:** من شروط العينة أن يعاني الطفل بشكل اساسي من اضطراب فرط الحركة ونقص الانتباه على أساس شروط التشخيص الواردة بالدليل التشخيصي والإحصائي للأمراض النفسية الأمريكي في طبعته الرابعة، أن يكون الطفل بين (٦- ١٢) عاماً وأن يكون متردداً على العيادة الخارجية لمعهد الدراسات العليا للطفولة- جامعه عين شمس، ومن انطبق عليهم شروط التشخيص يخضعون للفحوصات الآتية (مقابلة الطفل وعمل فحص طبي شامل، عمل اختبار ذكاء لجميع الأطفال).

**النتائج:** تم تقييم المرضى من حوالي ١٩٠ التي تم تشخيص ٣٩ مريضاً باضطراب فرط الحركة ونقص الانتباه (معدل انتشار ٦,٥%) كفي الحالات التي تم تشخيصها كانت ٦٧% الذكور بينما الإناث ٣٣% من مجموع الحالات التي تؤدي إلى نسبة الذكور إلى الإناث بين الحالات التي تم تشخيصها ٢:١. وبلغ متوسط العمر للحالة بالسنوات ٦,٩٧ سنة. وكذا بلغ متوسط معدل الذكاء من الحالات التي تم تشخيصها ٩٨ وكان النمط الفرعي الأكثر شيوعاً هو مفرط والاندفاع ومع ٣٩% تليها النوع الفرعي المشترك مع ٣٣% ثم إلى النمط الفرعي عدم الانتباه ب ٢٨%.

**الخلاصة:** اضطراب فرط الحركة ونقص الانتباه هو واحدة من اضطرابات الطفولة الظهور الأكثر شيوعاً وظهرت النتائج أن لديهم معدل انتشار ٦,٥% في العينة القائمة على المجتمع وتصل النسبة إلى ٢٠% في العينة القائمة على العيادة. لهذا السبب هناك حاجة إلى مزيد من الأبحاث لتوفير المزيد من المعلومات حول انتشار هذا المرض، وكيف يختلف الانتشار مع المحددات المختلفة للمرض. ما هي عوامل الخطر فضلاً عن الأمراض المصاحبة لهذا الاضطراب.

## Introduction:

Attention deficit hyperactivity disorder ADHD is the most common, chronic, controversial neuro- developmental pediatric disorder, with symptoms of inattention, hyperactivity, and impulsivity, associated with dysfunctional social behavior, persists into adulthood in up to 60% of cases and usually associated with the presence of one or more major co morbid psychiatric disorders (APA, 2000).

There are predominant three subtypes of ADHD: Inattentive, hyperactivity- impulsive and combined subtypes. The diagnosis of ADHD is based on criteria specified by the DSM- IV. Diagnosis depends heavily on parent and teacher reports; no laboratory tests reliably predict ADHD (Rowland et al., 2008). Only three treatments have been validated as effective treatments: behavior intervention, central nervous stimulants, and a combination of these (Brown et al., 2008). ADHD has been a topic of intense scientific research in Western countries, but there is limited information about this phenomenon in the Arab region. The prevalence of ADHD is higher in some Arab region than the prevalence of ADHD in other parts of the world (Bener et al., 2006).

ADHD affects as many as 9% of school age children (Halperin& Healey, 2011). The variable incidence of ADHD which ranging from (2%- 16%) is depending on the diagnostic criteria and assessment tools (Cormier et al., 2008).

The presence of Attention- deficit/ hyperactivity disorder ADHD symptoms is associated with concurrent significant functional impairment in home, school, and peer domains (Murray et al., 2009) Thus, it is not surprising that a review by (Danckaerts et al., 2010) Concluded that ADHD has a significant negative impact on quality of life comparable to that of other mental disorders and severe physical disorders, particularly as reported from the perspective of parents.

In spite of decades of research, the prevalence of attention deficit/ hyperactivity disorder ADHD has been difficult to estimate and it is still a matter of controversy how frequent this phenotype is in a general population setting. Some of the discrepancies may be caused by cultural and social differences, acting on both the prevalence directly and on differences, acting on both the prevalence directly and on the reporting style (Anne Karin et al., 2011).

## Objective:

The study aims at studying the different aspects of the epidemiology of Attention- deficit/ hyperactivity disorder ADHD in the clinic setting and compares that to community based sample.

## Methodology:

Design: The study was designed as a cross sectional study, It involved collecting full history, examination, full epidemiological data from patients diagnosed with ADHD as well as standardized Intelligence quotient measures and comparing such data with the results of the Meta analysis of the community based sample. Over the period of six months from the start of June till the end of December 2012, assessment was done for about 190 patients.

Patients aged between (4- 12) years old were diagnosed with ADHD according to American Psychiatric Association: Diagnostic and statistical manual of mental disorders, 4th edition. Patients will be recruited from the psychiatric clinic of the institute of post graduate childhood studies.

✧ Inclusion criteria: Patients who are primarily diagnosed with ADHD according to the diagnostic and statistical manual of psychiatric disease in

DSM- IV- TR (American Psychiatric Association, 2000) . Boys and girls were included aging between (4-12) years.

✧ Exclusion criteria: Children who were primarily diagnosed with a learning disability, conduct disorder, oppositional and defiant disorder, anxiety, or depression or any other mental disorder.

All patients will be subjected to:

1. Full psychiatric history and mental status examination according to the psychiatric sheet of the institute of post graduate childhood studies laying stress on the occurrence of symptoms of different forms of ADHD by using explicit criteria for the diagnosis using the DSM- IV- TR criteria of diagnoses.
2. Full medical history.
3. Complete Clinical Examination.
4. Psychometric assessment including Intelligence quotient measures using Stanford Binet Fourth Edition (Thorndike, et al., 1986)
5. Written informed consent was obtained from the care giver after explanation of the aim and the procedures of the study.

Data will be collected, entered and analyzed on personal computer using SPSS software version 12, SPSS Corporation, 2004.

## Results:

Table (1) shows the prevalence of ADHD among he studied sample group (hospital based sample) showing that 39 patients was diagnosed as ADHD out of a total of 199 patients leading to a prevalence rate of about 20%.

The total number of screened males and female patients in the hospital based sample table (2) shows that the number of screened males was 62% of the studied samples while the screened females was 38%of the studied sample.

In the diagnosed cases 67% were males while diagnosed female cases were 33% of the total diagnosed cases leading to a ratio between males to females in diagnosed cases to be 2: 1 table (3).

Table (4) shows the distribution of ADHD subtypes among the studied sample in the hospital based population revealing that the most common subtype was the hyperactive- impulsive subtype with 39% followed by the combined subtype with 33% and lastly the inattentive Subtype with 28%.

In the hospital based sample first order of birth was the most common in the studied population with 49%, second order of birth was at 15% while being third born or more was the case in 36% of the affected cases as showed in table(5). The mean age of diagnosed cases was 6.97 table (6) while the mean IQ of the affected patients was 96.6 table (7).

Table (8) and figure (1) shows a comparison between the prevalence of ADHD in the community versus the prevalence of cases in hospitals based samples.

Comparison between the number of diagnosed male and female cases in community and hospital based samples is shown in table (9) which was not statistically significant.

Comparison between the prevalence of the different subtypes of ADHD table (10) and the mean IQ table (12) among the community and the hospital population was shown to be statistically insignificant.

Statistical significance was found between the mean age difference between the community and the hospital population as shown in table (11).

Table (1) Prevalence of ADHD in a Hospital Based Sample

Total Number Of Screened Cases	199
Total Number Of Diagnosed Cases	39

$$39/199=0.195 \times 100=19.59$$

Table (2) Number of Screened Males and Female children in the Hospital Based Sample

Number Of Screened Male Children	123
Number Of Screened Female Children	76
Total	199

Table (3) Number of Diagnosed Male and Female Patients

Number Of Diagnosed Male Patients	25
Number Of Diagnosed Female Patients	14
Total	39

Table (4) Comparison between ADHD Subtypes among the Studied Sample

Subtype	Number	Percentage
Predominant Hyperactive- Impulsive	15	39%
Combined	13	33%
Predominant Inattentive	11	28%
Total	39	100%

Table (5) Comparison between Sibling Orders among the Studied Sample in a Hospital Based Sample

Sibling Orders	Number	Percentage
First Born	19	49%
Second Born	6	15%
Third Born Or More	14	36%
Total	39	100%

Table (6) Mean Age of Diagnosed Cases by Sex

	Number	Mean Age (in years)	+S. D.
Mean Age Of Diagnosed Males	25	6.88	2.38
Mean Age Of Diagnosed Females	14	7.12	2.54

Mean age of diagnosed cases=6.9 7+SD= 2.41

Table (7) Mean IQ of Diagnosed Cases by Sex

	Number	IQ	+S. D.
Mean IQ Of Diagnosed Males	24	98.04	10.59
Mean IQ Of Diagnosed Females	14	94.07	7.00

Mean IQ of diagnosed cases= 96.62+ SD= 9.5

Table (8) Prevalence of ADHD in the Meta- analysis Community and Hospital Based Samples

	Meta- analysis of community based sample	Hospital Based Sample
Prevalence	6.5%	20%

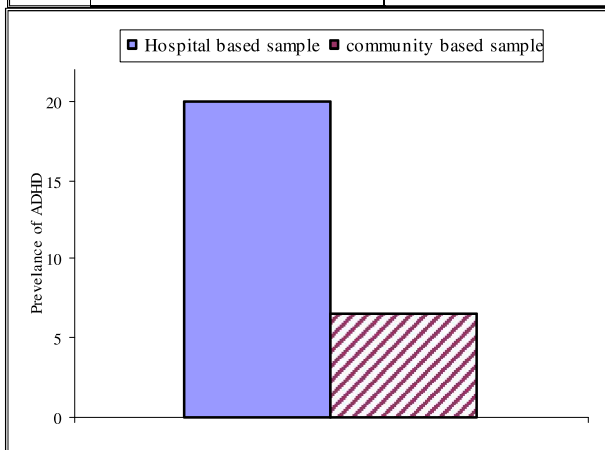


Figure (1) Comparison between the Prevalence of ADHD in Hospital and Community Based samples

Table (9) Number of Diagnosed Male and Female Cases in Community and hospital based samples

	Number Of Diagnosed Male Patients		Number Of Diagnosed Female Patients	
	N	%	N	%
Meta- analysis of community based sample	934	71%	387	29%
Hospital Based Sample	24	62%	15	38%

$X^2=1.53$ ,  $p=0.216$  (statistically insignificant)

Table (10) Prevalence of the Different Subtypes of ADHD among the Diagnosed Population.

	Predominant Hyperactive- Impulsive		Combined		Predominant Inattentive		Total	
	N	%	n	%	n	%	N	%
Meta- analysis of community based sample	413	42%	395	41%	166	17%	974	100%
Hospital Based Sample	15	39%	13	33%	11	28%	39	100%

$X^2=3.30$ ,  $p=0.192$  (statistically insignificant)

Table (11) Mean age of Diagnosed Cases in Community and Hospital Based Samples

	Mean Age Of Diagnosed Cases	±S.D
Meta- analysis of community based sample	9.45	1.61
Hospital Based Sample	6.97	2.41

$F=89.75$ ,  $p=0.0001$  (statistically significant)

Table (12) Mean IQ of Diagnosed Cases in Community and Hospital Based Samples

	Mean IQ Of Diagnosed Cases	±S.D
Meta- analysis of community based sample	97.3	9.4
Hospital Based Sample	96.62	9.5

$F=0.20$ ,  $P=0.65$  (statistically insignificant)

## Discussion:

- ✧ Prevalence: In the hospital based sample the prevalence of ADHD was 20% of the cases which sought medical attention which is similar to the results of D Foreman et al., 2005 which reported the prevalence at the clinic based sample to be 18.4%. But Prevalence of ADHD in a pediatric clinic setting varied widely, with few studies available for analysis (Michelle Green et al., 1999)
- ✧ Prevalence in relation to gender: It was also found that ADHD was 2.3 times more common in boys than girls (71% of the diagnosed cases were boys while only 29% of diagnosed cases were girls) Table (4) similar to many studies with male/ female ratio of approximately 3 to 1 (Bauermeister et al., 2007; Montiel- Nava et al., 2003; Cornejo et al., 2005; Abo- Elmakarem 2006; Elia et al., 2008). Indeed, girls are more often considered to be less overactive than boys and have higher rate of predominantly inattentive type where symptoms of inattention are more covert than those of hyperactivity and impulsivity, and therefore more likely to be underestimated and may also partially explain the markedly higher male- to- female ratios (Kashala et al., 2005; Biederman et al., 2002a)
- ✧ Distribution Of ADHD Subtypes: In this hospital based sample the most common subtype of ADHD was the predominant hyperactive impulsive subtype (ADHD- PHI) with 39% followed by the combined subtype (ADHD- C) with 33% then the predominant inattentive subtype (ADHD- PI) with 28%, showing that the clinic based sample had similar results to community based sample as regard the order of subtype's frequency. Higher distribution of hyperactive impulsive subtype in our study over the inattentive subtype are consistent with Pineda et al. (1999) , who conduct his study in Colombia and found a prevalence of 9.9% for ADHD- PHI and 5.1% for ADHD- PI and 4.8% for ADHD- C among boys and 7.1%, 3.4% and 1.9% respectively among girls, aged 4-18 yrs. Similar results were found study done in Ukraine based on 600 subjects aged 10-12 years that found a highest prevalence of ADHD- PHI (8.5%) followed by ADHD- PI (7.2%) then ADHD- C (4.2%) (Gadow et al., 2000).
- ✧ Relation of sib order to ADHD: In the hospital based sample first order of birth was the most common in the studied population with 49%, second order of birth was at 15% while being third born or more was the case in 36% of the affected cases in the clinic based sample. First order of birth showed to be the most common with 55% of the

affected children in the community based part of the study, which means that being ranked the first child in order is considered a risk factor for ADHD. Second order of birth in the studied group was at 20% of the affected population while being third born or more was 25% of the affected population.

Results of the current study are consistent with Sami (2006) who found that 66.7% of 30 ADHD children are the first born children and Barakat (2008) who found that 42% of ADHD subjects are the eldest among their sibs.

- ✧ Mean age of diagnosed cases: In the hospital based sample the mean age of diagnosed cases was 6.97 years which is near the results reported by Foreman et al. (2005) revealing the mean age of diagnosed cases 8.1.

In the community based sample of this study the mean age of diagnosed cases was 9.45 years which is similar to that reported by Tanya et al., 2007 in a study done to determine the national prevalence of attention-deficit/hyperactivity disorder ADHD in the United States which resulted in a mean age of 10 years.

Similar results was found by Jose Bauermeister et al. (2007) in a study among children aged 4 to 17 in a representative community sample (N=1896) in Puerto Rico which resulted a mean age of diagnosed cases to be 10.5 years.

- ✧ Mean IQ of diagnosed cases: In the Meta analysis of the community based sample and the clinic based sample the mean IQ of the diagnosed cases of ADHD was within average namely 97.1 and 96.6 respectively. These results are similar to the work of Antshel et al. (2008) who concluded in his study that ADHD children are within the province of normal IQ.

The results of this study goes within the same domain as a meta- analysis study done by (Frazier et al., 2004) which suggests that children with ADHD have an IQ about 9 points lower than typically developing peers and it is generally accepted that ADHD does not cause significantly lowered intellectual functioning. Moreover other studies suggest that the diagnosis of ADHD is valid among high IQ children and youths (as having a full scale IQ  $\geq 120$ ) and that children with a high IQ and ADHD showed a pattern of familiarity as well as cognitive, psychiatric and behavioral features consistent with the diagnosis of ADHD as those seen in children suffering from ADHD with average IQ (Antshel et al., 2007; Antshel et al., 2008). Other studies found that ADHD children suffer from less than average IQ in relation to similar control peers such as (Raslan et al., 2001; Kuntsi et al., 2004).

### Conclusion:

Attention- deficit/ hyperactivity disorder ADHD is one of the most frequently encountered childhood- onset neuro- developmental disorder and as shown by this study to have a pooled prevalence rate of 6.5% in a community based sample and up to 20% in clinic based sample that's why more research is needed to investigate and provides more comprehensive information about the prevalence of ADHD, how prevalence varies with different disease determinants. What are the risk factors as well as co morbid psychopathology of the ADHD disorder and which behavior interventions, medication interventions, or combination interventions (behavior and medication) are more effective for patients with ADHD.

### Recommendations:

1. Increasing awareness about ADHD is extremely important to target

intervention programs for prevention and early recognition of ADHD disorders for those with little or no education who are considered as high risk groups. This may be achieved by:

- a. At the level of General practitioners:
  - ✧ Training of general practitioners for screening of ADHD disorder in adolescents and raising their clinical attention and surveillance for more early and rapid referral for psychiatric assessment and treatment.
  - ✧ Collaboration between psychiatrists and general practitioners aiming to develop comprehensive management including early prevention, or intervention, diagnosis and treatment.
- b. At the level of Schools:
  - ✧ Reconsideration of school mental health programs by increasing availability of psychiatric service and awareness of ADHD.
  - ✧ Educational program on adolescent mental health should be provided to students, teachers and parents for early detection of risk factors, ADHD symptoms and associated co morbidities.
  - ✧ Collaborative system should be built between school teachers, parents and school mental health professionals for better detection, assessment and referral of ADHD cases.
  - ✧ Extensive substance abuse educational programs are required for better evaluation of associated co morbidity with ADHD among adolescents.
2. At the level of Parents:
  - ✧ Increasing acceptance, awareness and understanding of ADHD so people with the disorder have the necessary care, service and support to manage their problems.
  - ✧ Due to high prevalence rates of ADHD and as schools play an important role in ADHD identification; specialized programs and training courses for teachers and school- personnel to give them the opportunity to identify and deal with ADHD pupils should be encouraged. Incorporation of classroom strategies; as small class size can help teachers and pupils.
  - ✧ Proper diagnosis, actual assessment of risk factors, and appropriate treatment of ADHD in children is recommended to decrease the long- term prognosis when ADHD is unrecognized and untreated in the adolescent and adult life
  - ✧ Careful screening of inattention subtype of ADHD is important as underestimation is common and many cases are misdiagnosed as shyness or academic underachievement.

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