Detection and Evaluation of Attention Deficit Hyperkinetic Disorder (ADHD) in Adult Indian Students Of Different Programmes Using Adult Self Report Scale v1.1

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Abstract: Introduction: ADHD is a pervasive complex and an under-recognized heterogenous neurodevelopmental disorder. Of its two major components, inattentiveness and hyperactivity, the latter is diagnosed early on, but inattentiveness is perceived as a lack of focus and tends to be diagnosed late. Worldwide prevalence of ADHD is between 5.29% to 7.1% in children and adolescents, of which upto 60% persist into adulthood. Only one study has been published on adult ADHD, in India, and that too in an outpatient psychiatric setting. Objectives: Study the epidemiological presence of ADHD in Indian Adult Undergraduate students using the ASRS v1.1 score. Conduct a comparative analysis of ADHD prevalence amongst Students in different vocations. Inform the study subjects about the scores obtained in ADHD and guidance given thereby. Method: After obtaining Institutional Ethics committee approval, 300 undergraduates from diverse educational programmes (100 from medicine, 100 from Engineering and 100 from other courses) were approached over a six-month period from March to August 2018. Subjects, irrespective of gender or ethnicity, after providing informed consent, attempted ASRS-v1.1. This was followed by an audiovisual presentation to impart knowledge of ADHD to the subjects. Data was entered into MS Excel 2016[®] and was analyzed using SPSS software 23.0 version[®] (Armonk, NY, IBM corporation). P value less than 0.05 was considered statistically significant. Result:. Out of 300 Indian under-graduates, only 3.33% were in the high risk group (2B). In both Medicine and law, over 75% of the students fall into the no risk Group 1. 4% of Law students, 6% of medical, 7% of Engineering and 8% of Commerce, Nursing and Arts students were in the high risk Group 2B. Mean score was 10.02±3.967 for Medical students, 11.86±3.698 for Engineering students and 11.68±3.321 for Others. Medical students had the lowest Inattentiveness Trait Score (ITS) scores amongst the three groups and the p value for Engineering versus Medical was 0.0001 and that of Medical versus Others was 0.0007. The study was limited by its small sample size and larger studies are needed to accurately evaluate the true incidence of Adult ADHD in India. As of now, no such study exists and hence our study shall prove to be a pilot study for all future projects on this subject. Conclusion: Adult Indian Medical students have the lowest ITS scores and are least likely to have persistent ADHD symptoms in adulthood. Only 3.33% of Indian University Undergraduates show high level ADHD symptoms, compared to higher numbers in other countries. [Jhaveri S Natl J Integr Res Med, 2019; 10(5):28-34]

Key Words: ADHD, Adult, ASRS, Students

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Introduction: ADHD is a pervasive complex and under-recognized heterogenous an neurodevelopmental disorder. It is a chronic condition marked by persistence of symptoms into adolescence, and often into adulthood for a majority of children.¹ First recognized over 100 years ago as hyper activity, this abnormal disorder was found to be a result of biology rather than bad parenting² At its core, ADHD is believed to be a product of dopaminergic destruction, thereby causing a cohort of disorders of the prefrontal cortex, the basal ganglia and the cerebellum. As the name suggests, this disorder has manifestations of both; inattention and hyperactivity including problem solving, planning, orienting, alerting, cognitive flexibility, sustained attention, response inhibition, and working memory ^{3,4.} It has 2 major presentations - Inattentiveness and Hyperactivity.

Patients exhibiting hyperactivity tend to be diagnosed early on. On the other hand, inattentiveness is commonly mistaken for a lack of will to focus. This wide array of complications is matched only by its equally diverse etiology. It is believed today, that multiple genetic and environmental factors, as opposed to a single predisposing culprit as seen in many diseases, act Pre, in concert. peri and post-natal environmental factors influence the pathogenesis as well. For instance, prenatal alcohol exposure is known to induce brain structural anomalies, especially in the cerebellum^{5.} Maternal smoking produces a 2.7-fold increased risk for ADHD ⁶.

More-over Adults with ADHD are more likely to exhibit anxiety, mood disorders and substance abuse than the general population^{7,8,9,10}.

In the absence of global consensus, metaanalyses have regression estimated the worldwide ADHD prevalence between 5.29% ¹¹ and 7.1% ¹² in children and adolescents. However, ADHD is a grossly underdiagnosed entity and a common misconception is that it is endemic to children, atleast in India. This is further elucidated by the lack of studies regarding ADHD in adults. However, it is known to persist into adult life in 10 to 60% of cases ^{13,14.}. The true population prevalence of the disorder is likely to be higher since under-reporting of symptom severity is common and also due to problems with current diagnostic practices applied to adults' 15,16

Moreover, the cases that have been screened positive may be rooted to 2 sources. Cases in which ADHD symptoms developed in childhood but were never diagnosed due to a lack of awareness of both the symptoms and the prevalence of the disease. The other source would be cases of Adult onset ADHD (late onset ADHD). Classically defined as a neuro developmental disorder, adult onset ADHD is a little bit of an enigma. There are theories regarding adult ADHD, some calling it a symptomatic expression of a separate comorbid disorder while others say it is the surfacing of previously repressed ADHD symptoms.

Only one other study has been conducted for adult ADHD in India and that too on psychiatric subjects in an out-patient setting¹⁷. No other study has been done to attempt screening of the normal adult population in India. In the wake of paucity of Indian studies regarding this subject, this study aims to contribute to the Data pool and help in developing a better understanding of Adult ADHD, beginning with screening of Indian university undergraduates. This study was carried out using the ASRS v1.1 scale published in the WHO Composite International Diagnostic Review. ASRS v1.1 is a universally accepted scale and has been used in scores of studies relating to adult ADHD in the West.

OBJECTIVES: To Study the incidence of ADHD in Indian Adult Undergraduate students using the ASRS v1.1 scores. To Conduct a comparative analysis of ADHD prevalence amongst Students in diverse educational programmes. To Inform the study subjects about the scores obtained in ADHD and guidance given thereby. **Materials and Methods:** This study was initiated after obtaining permission from the Institutional Ethics Committee. Before participation, the subjects were informed about the study's aim and implications and they attempted the said questionnaire only after an informed consent was formally obtained. The participants were informed that their participation was voluntary and that they can withdraw at any given point. Patient confidentiality was maintained at all times.

Inclusion criteria

- Age equal to or more than 18 years
- Subjects were enrolled irrespective of their gender or ethnicity
- Participating subjects at the time of assessment were free of any neurological diagnosis.

Exclusion criteria

- Previous history of neurological disease or psychological disorder
- Subjects other than Indian University Undergraduates

Study size: 300 students from diverse educational programmes were enrolled. The study was conducted at out parent Institute over a period of 6 months from March to August 2018.

The Adult Self-Report Scale-V1.1 (ASRS-V1.1) Screener was used to screen the study subjects. The ASRS was developed by the World Health Organization and the screener consists of a checklist of eighteen questions regarding symptoms of ADHD based on the diagnostic criteria of DSM-IV-TR^{18,19.} Using the Part A section of the scale, which compromises of six questions; as the threshold to indicate a positive screening test, the developers of the ASRS-v1.1 reported moderate sensitivity (68.7%), along with excellent specificity (99.5%) and total classification accuracy (97.9%) when assessing symptoms among a community sample^{20.} This part has been considered in this study.

Part B consists of an additional 12 questions that serve as additional cues in Adult ADHD diagnosis. However, considering the goal as well as the scale of this study, Part B was excluded from the screening protocol.

Scoring system: Each item requires subjects to rate on a five-point response scale from "never"

[0] to "very often" [4] how frequently a symptom of ADHD occurred over the past six months. A summary score with a theoretical range of 0-24 as an equally weighted sum of response scores for all questions. Higher scores indicate increased risk of ADHD. The first 4 questions explore the Attention Deficit fragment of ADHD and the score is labelled as the Inattention Trait Score (ITS) The last 2 questions similarly explore the Hyperactivity fragment of ADHD and hence the score is labelled as the Hyperactivity Trait Score (HTS).

It is to be noted that when the ASRS v1.1 scale was introduced, the original screening was not score based. It defined a threshold for each of the 6 questions. If the subject screened for 4 or more symptoms above the threshold, the subject was screened positive. However, the 0-24 scoring system substantially outperformed the 0-6 scoring system²¹.

The results obtained were analyzed on the basis of the following criteria : Based on the classification methods recommended by Kessler et al (2005, 2007) ^{22,23}participants were grouped into 2 categories using a cut-off score of 13 (scores 14–24 being indicative of possible ADHD) The subjects are classified into binary groups based on their answers(Figure 1).

Figure 1- Grouping of subjects on the basis of scores on the ASRS v1.1 screener



Subjects in Group 1 were at minimal risk and exhibit some symptoms of ADHD, which are most likely consequences of stress or anxiety. Subjects belonging to Group 2a, with scores between 14-17 may or may not have ADHD, however the symptoms of inattentiveness and hyperactivity do prevail. Group 2b subjects, scoring more than 18, fall in the highest risk category and exhibit symptoms that are consistent with adult ADHD. *Counselling session:* After attempting the questionnaire, the subjects were given a short audio-visual presentation regarding ADHD, its symptoms, global prevalence and certain obvious recognizable signs of ADHD. Moreover, as part of the presentation, basic remedies to help cope with inattentiveness or hyperactivity that may be stress related were included. In addition to this, a basic plan of action was outlined for any subject that scored in the Group 2b without counselling them selectively. This was done in order to maintain confidentiality of the patients and their respective scores.

Results: Of 300 students who participated in this study, 100 were from Medicine, 100 from Engineering, and 25 each from Arts and Humanities, Law, Nursing and Commerce programmes of various Universities.

Table 1 demonstrates the distribution of students in the 3 groups outlined above based on their scores on the ASRS v1.1 scanner. In both Medicine and law, over 3/4th of the students fall into the no risk Group 1, whereas Commerce, Nursing and Arts students have around 8% of their students in the high risk Group 2B. Moreover, due to limitations in the study size, the importance of scores on the individual questions is superseded by the differences that we observe in the ITS and HTS scores.

In table 2, E= Engineering, M-=Medical and O= Others. This table demonstrates the mean score of students from each programme along with the standard deviations. The Questions are marked 1-6 as in the ASRS v1.1. ITS- Inattention Trait Score is derived from the summation of the answers to Q1-4. HTS- Hyperactivity Trait Score is derived from the summation of the answers to Q5-6

Table 3 demonstrates the p values obtained fromthe Mean scores and standard deviations. HereE=EngineeringM=Medicalprofessions. The p values that are less than 0.05have been considered statistically significant

In Q1 and Q4 which deal with wrapping up final details of a project as well as readiness to tackle difficult problems, differences among E and M students were found to be statistically significant (p values 0.001 and 0.0001 respectively). In Q2 and Q3 which deal with organizing and planning as well attention to detail, differences among E and M students were found to be statistically

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Table 1- Distribution Of Study Population Based On Programmes (N=300)								
Programmes		Group 1 Scores		Group 2a Scores		Group 2b Scores		
	N = 300	0-13	%	14-18	%	18-24	%	
Medical	100	75	75	19	19	6	6	
Engineering	100	65	65	28	28	7	7	
Commerce	25	18	72	5	20	2	8	
Nursing	25	12	48	11	44	2	8	
Arts And Humanities	25	16	64	7	28	2	8	
Law 25	25	19	76	5	20	1	4	

Students Q1 Q2 Q3 Q4 Q5 Q6 ITS HTS TOTAL Mean 1.92 1.88 1.75 8.17 3.69 11.86 2.13 1.87 1.82 Е Std. Deviation 1.186 .998 .925 1.012 1.169 1.114 2.854 1.619 3.698 Mean 1.42 1.46 1.36 1.78 2.13 1.83 6.05 3.97 10.02 Μ Std. Deviation 1.055 2.955 .923 .968 1.168 1.142 1.178 1.738 3.967 Mean 1.99 1.67 1.50 2.23 2.18 2.13 7.37 4.31 11.68 0 Std. Deviation 1.050 1.049 1.290 2.436 1.857 .835 1.118 1.060 3.321

Table 2- Mean and Standard deviation of scores.

Table 3- P Values. Highlighted Boxes Show Values Of Statistical Significance. P Value<0.05 Has Been</th>Considered Statistically Significant.

p VALUE	E vs M	M vs O	O vs E
Q1	0.001	0.0001	0.6299
Q2	0.0029	0.143	0.1487
Q3	0.0095	0.3736	0.0754
Q4	0.0229	0.0054	0.508
Q5	0.1188	0.775	0.0765
Q6	0.9481	0.0462	0.0452
ITS	0.0001	0.0007	0.0342
HTS	0.2399	0.1828	0.0126
TOTAL	0.008	0.0016	0.7176

values 0.0029 and 0.0095 significant (p significant respectively). No statistically differences were observed in Q5 among the students. In Q6 however, which deals with hyperactivity, a p value of 0.0342 was noted between O v E students. No significant differences were seen in the individual HTS scores, however, the ITS scores of Medical students were significantly lower than their counterparts with a p value of 0.0001 in E v M and 0.0007 in M v O.

Discussion: A total of 300 Indian Undergraduates were included in this study. The data clearly shows that the average ITS scores of Medical Students is significantly lower than students in other programmes. The 4 questions that give the ITS scores are concerned with finalizing details of a project, organizing and planning, attention to smaller details as well as readiness to tackle difficult problems. This may be an adaptation as Indian students before entering into medical school study long hours in their preparation, and those that cannot, never make it through.

As for the HTS scores, no statistically significant differences amongst students of different programmes were found. Due to the constrictions in the size of the sample, the authors have purposefully omitted analyzing the scores of each question individually.

The prevalence of ADHD amongst children in India is well documented, with a study²⁴ conducted in 2013 stating the incidence at 11.32%, most evident in the 9-10 year age group. However, to our knowledge, this is the first study to report on the incidence of ADHD in Adult Undergraduate students in India. Only one another study focusing on adult ADHD has been published in India. However the study was conducted on an outdoor psychiatric setting, with a focus on psychiatric comorbidities with Adult ADHD. To our knowledge, no other study has been conducted on adults with ADHD in India.

A similar study conducted in American University undergraduates found, that an overall, 10.3% of individuals without an existing clinical diagnosis of ADHD had high levels of ADHD symptoms^{25.} As compared to this study in Indian undergraduates, only 3.33% of students without an existing clinical diagnosis of ADHD had high levels of ADHD symptoms.

A study conducted in the UK²⁶ elucidated the differences between subjects with persistent childhood ADHD (21.1%) and late onset ADHD (67.9%), with the former having fewer cognitive impairments and behavior problems. It, along with 2 more studies from Brazil²⁷ and New Zealand²⁸ concluded that the majority of the subjects having ADHD symptoms in Adults were of late onset or underdiagnosed, and were not persistent childhood ADHD cases. Yet another similar study conducted in Switzerland²⁹ reported 37.7% of men and 28.2% of women of the study population screened positive using the ASRS v1.1. Owing to the paucity of epidemiological studies in India, there is a need for undertaking such studies from Indian scientists, for whom our study shall serve as a pilot project.

In an online article posted on WebMD, the authors discussed the various facets of an ADHD individual such as ADHD adults commonly being creative, repulsive to authority and routines etc. The various suggested professions (Nursing, Sales, teaching etc.), as well as the multitude of corporations willing to hire ADHD individuals proves that although it is a limitation, ADHD does not necessitate dependence.³⁰

Strengths: The outcome of this study is aimed at establishing the scale of ADHD or partial ADHD symptoms amongst Indian undergraduates. Also, as this study is being carried out in a niche area that has not been well explored, it seeks to build a foundation for future research regarding ADHD not only in university students, but Indian adults in general. The study aims to eliminate the widespread stereotype that ADHD is endemic to children and adults living with ADHD are not alone. More importantly, this study has been a tool in educating the study subjects about possible symptoms of ADHD as well as strategies on how to combat them. This study, conducted in the wake of a paucity of data in India hopes to contribute in planting the seed for epidemiological studies on Adult ADHD in India.

Limitations: The study sample of 300 was small. This study was a prospective questionnaire-based study. The ASRS v1.1 although quite accurate cannot substitute clinical diagnosis by trained professionals.

Conclusion: The ITS scores of adult Indian medical undergraduates were lowest amongst the screened cohorts and hence, were least likely to have persistent ADHD symptoms in adulthood. Based on the screening done with the ASRS v1.1, only 3.33% of Indian University Undergraduates showed high level ADHD symptoms. All study subjects were sensitized to the symptomatology of adult ADHD, as well as strategies to cope with it.

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