

## ORIGINAL ARTICLE

# INCLUSION OF MENTAL HEALTH SURVEYS IN SCHOOLS: NEED OF THE HOUR

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### ABSTRACT

**Background:** Attention-Deficit/Hyperactivity Disorder (ADHD) and its associated comorbidities are often undiagnosed due to lack of awareness in schools, communities.

### Objectives:

- To determine prevalence of ADHD and its associated comorbidities in school children aged 9-12 years.
- To compare the prevalence of externalizing/internalizing behaviours in children with/without ADHD.

**Methods:** A prospective cohort study was conducted in two schools using the Vanderbilt ADHD Diagnostic Parent Rating Scale (VADPRS) tool online. Data collected was analysed statistically using the  $\chi^2$  test and z test.

**Results:** Of 1286 children aged 9-12 years approached from 2 schools, 762 consented for study (response rate 59.3%). The prevalence of ADHD in our cohort was 7.1%. Children with ADHD had significantly more externalizing/internalizing behaviours than children without ADHD, 75.9% and 9.8% respectively ( $p < 0.00001$ ).

**Conclusion:** There is a high prevalence of undiagnosed ADHD and externalizing and internalizing behaviours among children in community. We recommend that mental health surveys should be conducted in addition to physical ailment surveys during annual school health camps.

### Introduction

Attention-Deficit/Hyperactivity Disorder (ADHD) is the most prevalent and chronic neurobehavioral disorder of childhood in school-age children.<sup>1</sup> Childhood ADHD is often overlooked by parents and teachers and dismissed as 'misbehaviour' or 'disobedience' in the child, and this usually worsens the condition due to a delay in seeking help for diagnosis and treatment.<sup>2</sup> In school health camps, screening for mental health disorders is usually not included due to the lack of awareness and acceptance among teachers, parents, and even primary care physicians. This study was conducted with the aim to assess willingness and acceptability of screening mental health conditions in Indian schools. We wished to determine the prevalence of previously undiagnosed ADHD and its associated comorbidities in school children aged 9-12 years and compare the prevalence of comorbidities in children with ADHD versus non affected children.

### Methods & Materials

A prospective cohort study was conducted in 2 co-educational State board schools in the Mumbai city and its suburban outskirts, over 3 months (Jan-March 2021) after obtaining IRB clearance and permissions

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from the school authorities. As per the modified Kuppaswamy Scale the first school was situated in Mumbai with children from upper-lower and lower-middle socioeconomic strata. The second school was situated in Mumbai Metropolitan Region, with children from upper and upper-middle classes strata. Although all the required clearances were received in early February 2020 the initiation of study was postponed due to unprecedented Covid 19 pandemic. The questionnaire was administered online due to virtual academic schedules. The investigator conducted a pre Case Record Form and questionnaire filling guidance session with school authorities, consenting parents using zoom platform and Google forms.

Consenting children aged 9-12 years of average academic performance without a diagnosis of ADHD were enrolled. Children with an intellectual disability, genetic disorders, syndromic, or any other medical illness were excluded from the study.

The participants were shared an online link of study materials [information sheet, consent form, CRF and questionnaire Vanderbilt ADHD Diagnostic Parent Rating Scale (VADPRS)]. VADPRS is a parent based questionnaire for assessment of ADHD symptoms and their effects on behaviour and academic performance.<sup>3</sup> Symptoms are assessed in 3 settings- home, school and community and it also assesses symptoms for associated comorbidities such as Oppositional Defiant Disorder, Conduct Disorder, Anxiety, and Depression.<sup>4,5</sup>

The data obtained was analyzed using MS Excel and descriptive statistics were calculated. Association between variables was assessed by chi square test, two sample Z test was used to compare between ADHD and non ADHD children.

Post questionnaire results of the cases and controls were conveyed to school authorities, parents, and guidance was given regarding Developmental Behavioural Pediatrician clinical interview and appropriate interventions at our Institute via offline or telemedicine services.

**Results**

Of the 5 coeducational schools approached for the study, 2 consented for the same. About n=1286 children from both schools were approached for the study, of these n=762 consented for enrolment (response rate 59.3%). Of these 413 (54%) were males and 349 (45.8%) were females, M:F ratio 1:18. Of these maximum children were aged 11.1-12 years 274/762 (35.9%), 141/762 (18.5%) were aged 8.1- 9 years, 168/762 (22.1%) were aged 9.1-10 years, and 179/762 (23.5%) were aged 10.1-11 years, with a mean age of 10.32 years. n=762 enrolled children were administered the VADPRS questionnaire and, 54/762 (7.1%) children met the ADHD criteria. Of these 32 were males and 22 were females, M:F ratio of 1.45:1. Whereas 708 (92.9%) children did not have ADHD with a M:F ratio of 1.16:1. Thus, the prevalence of ADHD in this school cohort was 7.1%. The chi-square test demonstrated no significant association between gender and prevalence of ADHD (p=0.43).

9/141 (6.4%) of children aged 8.1-9 years, 13/168 (7.7%) of children aged 9.1-10 years, 10/179 (5.6%)

of children aged 10.1-11 years, and 22/274 (8.0%) of children aged 11.1-12 years were found to have ADHD. The chi square test demonstrated that there was no significant association between prevalence of ADHD and age of children. (p=0.75) On analysis of ADHD by its subtypes, we found that 14/762 (1.8%) had Inattentive type (ADHD-IN), 23/762 (3.0%) had Hyperactive/Impulsive subtype (ADHD-HI) and 17/762 (2.2%) had Combined subtype (ADHD-C). They were further categorized as per age and gender. (Table 1)

On analysis of 54 children with ADHD in our study using the VADPRS, 41/54 (75.9%) had associated comorbidities either externalising (ODD, CD) or internalising (anxiety,depression) behaviours. The overall prevalence of associated behaviours in our school cohort was 41/762 (5.4%).

Of the behaviours, 33/54 (61.1%) had ODD with M:F ratio of 1.75:1, maximum in children aged 9.1-10 years, 25/54 (46.3%) had CD with M:F ratio of 1.5:1, maximum in children aged 11.1-12 years, and 20/54 (37.0%) had either anxiety/depression with M:F ratio of 1.22:1, maximum in children aged 11.1-12 years.

On analysis of behaviours of all enrolled children but excluding the ADHD cohort(n=54) according to the VADPRS, n=708, we found externalising (ODD, CD) and internalising behaviors (anxiety, depression) in 69/708 (9.7%) participants.

Of these, 26/708(3.7%) had ODD with M:F ratio of 1.2:1, maximum in children aged 10.1-11 years, 18/708 (2.5%) had CD with M:F ratio of 1.6:1, maximum in children aged 10.1-11 years, and 18/708(2.5%) had Anxiety/Depression with M:F ratio of 1.3:1, maximum in children aged 10.1-11 years. (Table 2)

**Table 1.** Age and gender distribution of ADHD and its subtypes

Demographic variables	Total (N)	ADHD-All subtypes n, %	ADHD-Inattentive n, %	ADHD-Hyperactive n, %	ADHD-Combined n, %
Age (years)					
8.1-9	141	9, 6.4	3, 2.1	3, 2.1	3, 2.1
9.1-10	168	13, 7.7	3, 1.8	7, 4.2	3, 1.8
10.1-11	179	10, 5.6	2, 1.1	4, 2.2	4, 2.2
11.1-12	274	22, 8	6, 2.2	9, 3.3	7, 2.6
Gender					
Male	413	32, 7.8	7, 1.7	17, 4.1	8, 1.9
Female	349	22, 6.3	7, 2	6, 1.7	9, 2.6
<b>Total</b>	<b>762</b>	<b>54, 7.1</b>	<b>14, 1.8</b>	<b>23, 3</b>	<b>17, 2.2</b>

**Table 2.** Age and Gender distribution of externalising/ internalising behaviors among children with ADHD and children without ADHD (Neurotypicals).

Demographic variables	Total		Oppositional Defiant Disorder		Conduct Disorder		Anxiety/ Depression	
	Neurotypicals	ADHD Cases	Neurotypicals	ADHD Cases	Neurotypicals	ADHD Cases	Neurotypicals	ADHD Cases
			n, %	n, %	n, %	n, %	n, %	n, %
Age (years)								
8.1-9	132	9	3, 2.3	4, 44.4	3, 2.3	4, 44.4	1, 0.8	2, 22.2
9.1-10	155	13	5, 3.2	9, 69.2	2, 1.3	4, 30.8	1, 0.6	4, 30.8
10.1-11	169	10	9, 5.3	6, 60.0	6, 3.6	5, 50.0	7, 4.1	3, 30.0
11.1-12	252	22	9, 3.6	14, 63.6	7, 2.8	12, 54.5	9, 3.6	11, 50.0
Gender								
Male	381	32	14, 3.7	21, 65.6	11, 2.9	15, 46.9	10, 2.6	11, 34.4
Female	327	22	12, 3.7	12, 54.5	7, 2.1	10, 45.5	8, 2.5	9, 40.9
Total	708	54	26, 3.7	33, 61.1	18, 2.5	25, 46.3	18, 2.5	20, 37.0
Z score			15.223	13.431	11.225			
P value			<0.0001	<0.0001	p<0.0001			

The two sample z test for proportions demonstrated that children with ADHD had significantly higher externalising and internalising behaviours when compared with children without ADHD ; ODD,  $z=15.223$ ,  $p<0.0001$ , CD,  $z=13.431$ ,  $p<0.0001$ , anxiety/depression,  $z=11.225$ ,  $p<0.0001$ .

### Discussion

ADHD, a common neurobehavioral disorder, affects 5-8% of school aged children globally.<sup>6</sup> School health camps/surveys conduct mass screening to detect early physical ailments with little or no focus on neurobehavioral conditions such as ADHD, academic delays, anxiety, behavioural disorders. We primarily focussed on screening for neurobehavioral disorders as part of school survey using a standardized questionnaire tool to understand its acceptability by parents and school teachers for screening purposes. Our low response rate of 59.3% could possibly be due to environmental factors- ongoing COVID-19 pandemic, online survey or stigma associated with mental health disorders. A prospective cohort study was conducted in 2 co-educational State board schools in the Mumbai city and its suburban outskirts, over 3 months to assess prevalence of undiagnosed ADHD in community schools using a standardised questionnaire tool. About 5 coeducational schools were approached, 2 consented for the study. About 1286 children from both schools were approached for the study and 762 consented for study enrolment.

Of the screened 762 children, 54 were ADHD, so the prevalence of undiagnosed ADHD was 7.1%. A meta analysis by Thomas R, et al. established a benchmark prevalence of 7.2% among school children.<sup>7</sup>

Arupallan J, et al. found the prevalence of ADHD to be 8.8% whereas Venkata JA et al. found the prevalence in primary school children to be 11.32%.<sup>8,9</sup> A systematic review conducted by Tong L, et al gave a pooled estimate of ADHD prevalence among Chinese children and adolescents as 6.3%.<sup>10</sup>

We found no statistical significance between gender and prevalence of ADHD in our study. Rucklidge JJ concluded that increased ADHD prevalence existed in boys compared to girls (2:1 to 9:1) depending on the subtype and the setting, and females may be underdiagnosed due to referral bias.<sup>11</sup> An Indian study by Gajre, et al. demonstrated a M:F ratio of 3:1 using the Vanderbilt ADHD Diagnostic Parent Rating Scale.<sup>12</sup>

We found that children with ADHD were highest in adolescent age group of 11.1-12 years (8%), however it was not significant ( $p=0.75$ ). Although Huang Y, et al. found the prevalence of ADHD to be highest among 9.1-10 year olds (7.3%), it was not statistically significant.<sup>13</sup>

We found that of the 3 ADHD subtypes, ADHD-HI was most common, 23/54 (42.6%), especially in children aged 9.1-10 years. This is consistent with the findings of Pham, et al, who estimated that ADHD-HI subtype had the highest prevalence.<sup>14</sup>

We found a high association of comorbidities (externalising or internalising behaviors) among children with ADHD, 61.1% had ODD and 46.3% had CD. In a four year follow up study conducted by Biederman J, et al., 65% of children with ADHD had ODD and 22% had CD.<sup>15</sup> In children, depression and anxiety disorders

mimic ADHD symptoms of restlessness, inability to concentrate, and forgetfulness.<sup>16</sup> We found that 37% of children with ADHD had either anxiety/ depression symptomatology. Xia W, et al. found comorbid anxiety in 27% and depression in 18% children with ADHD.<sup>17</sup>

We found that 26/708 (3.7%) children without ADHD had ODD with a M:F ratio of 1.2:1. López-Villalobos, et al. estimated an overall prevalence rate of ODD was 4.2%, and was higher in males.<sup>18</sup>

We found that 18/708 (2.5%) children without ADHD had CD with a M:F ratio of 1.6:1. Sarkhel, et al. found the prevalence of CD in community to be 4.58%.<sup>19</sup> 18/708(2.5%) children without ADHD had internalising behaviors. This is in contrast to a high prevalence of 11.4% estimated by Liu, et al.<sup>20</sup>

The z test demonstrated that prevalence of externalising and internalising behaviors was significantly higher in children with ADHD versus children without ADHD ( $p<0.0001$ ).

The study had limitations due to ongoing COVID 19 pandemic, format of online survey, lack of physical interviews and pre form filling workshops.

### Conclusion

Previously undiagnosed children with ADHD and other neurobehavioral disorders exist in community, which could be brought to clinician attention via inclusion of mental health screening in annual school health screening camps.

The ADHD comorbidities of ODD, CD, anxiety/ depression were significantly higher in children with ADHD as compared to neurotypicals, implying urgency for early diagnosis, timely clinician referrals, appropriate treatment and interdisciplinary holistic care.

Hence, we strongly recommend that screening of neurobehavioral disorders should be part of annual school camps. This will provide holistic evaluations for both physical and mental health of school children. Additionally, it may be the first point of contact between the child, school teachers, parents and trained developmental paediatricians.

### Compliance with Ethical Standards

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Conflict of Interest: None

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