Journal of Behavioral Health
www.scopemed.org
DOI: 10.5455/jbh.20160324111100

Original Research

Prevalence of depressive disorders in children with specific learning disabilities

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Received: January 21, 2016
Accepted: March 06, 2016
Published: April 09, 2016

ABSTRACT

Background: Learning disabled children are at risk for behavioral disorders, including depression. In India, diagnosis and interventions for learning disorders are limited. The purpose of this study was to examine the prevalence of depression and its severity in school-aged children with specific learning disability (SLD) compared to non-learning disabled peers. **Methods:** In a tertiary care pediatric neurodevelopmental center in Mumbai, we identified 200 children consecutively over 12 months referred for low academic performance, by screening of clinical records, academic history, vision-hearing tests, who additionally underwent psychoeducational battery and cognitive testing at the center, and were determined to have average intelligence but meeting criteria for SLD. The controls were 100 siblings of the cases who were screened for SLD by curriculum-based tests. We assessed depression using Hamilton rating scale for depression (HDRS for 8-12 years) and beck depression inventory II (BDI for 13-14 years). In addition, parental history of prescription medications for mental health needs was also noted. We performed multivariate logistic regression to study the association between SLD and depression. All activities were approved by the Institutional Review Board. **Results:** The mean (standard deviation [SD]) age of children with SLD was 11.9 (1.6) years and of non-SLD children was 11.2 (1.2) years. In SLD group the M: F ratio was 1.5:1 and in the non-SLD it was 0.8:1. A significantly higher proportion of children with SLD reported that their academic and extracurricular activities were reduced compared to children without SLD (6% vs. 0%, $P < 0.01$). Although, a higher proportion of children with SLD reported depression compared with children without SLD (16% vs. 11%, $P = 0.29$), the difference was not statistically significant. About 15% of the SLD cases had mild and 1% had moderate depression. About 11% of non-SLD children had mild depression as per the HDRS (7-17 indicates mild) and BDI II (10-16 is mild) cut-offs. None of the children had severe depression. In the multivariate model, depression was more likely in older children (aged 13-14 years vs. 10-12 years; odds ratio [OR]: 5.2, 95% confidence intervals [CI]: 2.4-11.1), in children from upper middle socio-economic status (SES) (OR: 6.7, 95% CI: 1.3-34.0), and in those whose parents had mental health concerns (OR: 5.3, 95% CI: 1.8-16.1). **Conclusions:** In an Indian tertiary center cohort, children with SLD do not have significantly higher proportion of depression than their non-disabled siblings. However, older children, and those with higher SES, and co-existent parental psychopathology are significantly associated with risk of depression.

KEY WORDS: Children, depression, learning disorders

INTRODUCTION

Specific learning disorders (SLD) are defined as impairments in reading, writing or mathematics occurring in 3-10% of the school-aged children [1]. In addition to academic challenges, these children exhibit frequent behavioral and emotional difficulties compared to peers without these challenges [1]. Previous Indian studies have found that 79% of children with learning disabilities exhibit comorbid psychological disorders, 32% of which were internalizing disorders such as depression and anxiety [2]. Studies on the exact prevalence of depression in Indian children with learning disabilities yielded varied results due to diverse methodologies and outcome measures. The purpose of this study was to assess the prevalence of depressive disorders, their severity and gender difference in school children with and without learning disabilities.

METHODS

This study was undertaken in the Department of Pediatrics, LTMGH, Mumbai, India (January 2013 to May 2014) after obtaining approval from the Institute Ethics Committee.

Suspected learning disabled cases were identified by screening on academic history, vision-hearing tests, and average intelligence in children referred to the pediatric neurodevelopmental center for academic underachievement. Diagnosis of SLD was done on the synthesis of clinical records and results of psychoeducational tests.

About 200 students with SLD, aged 7.1-14.0 years (mean age 11.9 years) were enrolled as cases. The controls were 100 non-affected siblings of these cases (mean age 11.2 years), screened for learning disorders by curriculum-based tests. Informed consent and assent were taken, and baseline demographics were recorded. Clinical details of symptoms, such as early mid or late insomnia, affection of work and hobbies, weight loss, suicidal ideation, excessive sleepiness, irritability, or low mood within last 6 months, were recorded. Academic concerns in parents, siblings and presence of a parental history of mental health needs were also noted.

The presence of depressive symptoms and their severity was screened by scales depending on the ages, both child self-report and parent questionnaire were administered. The scales used were Hamilton depression rating scale [3] HDRS (ages 8-12 years) and Beck's depression inventory II [4] beck depression inventory II (BDI-II) (ages 13-14 years). A clinical interview to screen for depressive disorders based on DSM 4 criteria was conducted [5].

Differences between two groups were analyzed using Pearson chi-square or Fisher's exact test whenever appropriate. Statistical analysis was conducted using STATA version 13.1(STATA Corporation, College Station, TX). Crude and adjusted odds ratio (OR) and 95% confidence intervals (95% CI) were calculated using conditional logistic regression models. Multivariate analysis was applied to adjust for potential confounding factors with the inclusion of variables such as presence of SLD, adolescent age, gender, socioeconomic class, and parental history of medications for mental health needs. $P < 0.05$ was considered statistically significant.

RESULTS

Of the 200 cases with SLD, the mean (standard deviation [SD]) age was 11.9 (1.6) years and of the 100 controls, mean (SD) age was 11.2 (1.2) years. Clinical records revealed that in both groups, the chief complaints were insomnia, weight loss and affection of work and hobbies. A significantly higher number of cases with SLD reported impaired participation in academic and non-academic tasks compared to non-SLD controls (6% vs. 0%, $P < 0.01$) [Table 1]. Of the total 300 enrolled children, the prevalence of depressive disorders was 14%. On comparison of demographic variables in depressed and non-depressed enrolled children, it was higher in cases with SLD (16%) versus controls (11%) $P < 0.29$. Depressive symptoms were present in 27% of adolescents (13-14 years) and 8% of preadolescents (8-12 years) $P < 0.001$. Most children had depressive symptoms in the borderline to mild range and none had moderate or severe depression or any suicidal ideation. Depressive disorders

Table 1: Demographic variables of 300 enrolled children with and without depression

Demographic variables	Total (*n*)	*n* (%)		*P* value
		Depression present	Depression absent	
All children enrolled	300	42 (14)	258 (86)	
Children without SLD (controls)	100	11 (11)	89 (89)	0.29
Children with SLD (cases)	200	31 (16)	169 (85)	
Age (years)				
8-12	202	16 (8)	186 (92)	<0.001
13-14	98	26 (27)	72 (73)	
Gender				
Female	134	16 (12)	118 (88)	0.36
Male	166	26 (16)	140 (84)	
Socio-economic status				
Lower middle	32	2 (6)	30 (94)	0.11
Middle	153	18 (12)	135 (88)	
Upper/upper middle	115	22 (10)	93 (81)	
Parents with mental health issues				
No concerns	282	35 (12)	247 (88)	0.002
Concerns present	18	7 (39)	11 (61)	

SLD: Specific learning disability

were present in both sexes, 16% males and 12% females and more prevalent in middle (12%) and upper social strata (10%) as compared to lower strata (6%). The prevalence of mental health needs in parents in both groups was 6%, and 39% of their children had depressive symptoms and 61% had no depressive symptoms $P < 0.002$.

Further comparison of depressive disorders in the two groups showed increased prevalence in adolescent cases (25%) versus 9% preadolescent cases ($P < 0.001$) [Table 2]. In controls, depressive disorders were seen in 33% adolescents versus 7% preadolescents ($P < 0.003$). In the cases, males were more affected (18%) than females (11%) $P < 0.18$, while in controls females were more affected (13%) than males (9%) $P < 0.54$. In cases, depressive disorders were prevalent in 18% families of upper socioeconomic strata, 16% of middle and 7% of the lower middle class, $P < 0.38$. In controls, depressive disorders were more often in 21% families of upper socioeconomic strata, 6% of middle and 0% of lower middle class, $P < 0.08$. In cases with depression, 43% of either parent had mental health concerns whereas in 9% cases neither parents had mental health disorders $P < 0.03$. In controls with depression, 36% of either parent had mental health disorders while 14% parents were unaffected $P < 0.07$.

On unadjusted and adjusted estimates for depression, compared to preadolescents, adolescents had a higher risk of 4.20 (2.13, 8.28) $P < 0.01$ and 5.21 (2.44, 11.10) $P < 0.01$ respectively [Table 3]. On adjusted estimates compared to lower middle socioeconomic class, depressive disorders were prevalent in upper and upper middle-class status with a risk of 6.68 (1.31, 34.02) $P < 0.05$. On both estimates, parental mental health increased the risk of depressive disorders in children by 4.49 (1.63, 12.34) $P < 0.01$ and 5.32 (1.76, 16.13) $P < 0.01$, respectively. On estimates for depression with reference to the diagnosis of SLD or gender, the risk was not significant. Children irrespective of their age and gender self-reported symptoms more than their parents.

Table 2: Comparison of variables between learning disabled cases (Group 1) and non-learning disabled controls (Group 2)

Variables	Learning disabled cases - Group 1 n=200			Non learning disabled controls - Group 2 n=100		
	Total	n (%)		Total	n (%)	
		Depression present	Depression absent		Depression present	Depression absent
Age (years)						
8-12	117	10 (9)	107 (91)	85	6 (7)	79 (93)
13-14	83	83 (25)	62 (75)	15	5 (33)	10 (67)
P value		0.001			0.003	
Gender						
Female	80	9 (11)	71 (89)	54	7 (13)	47 (87)
Male	120	22 (18)	98 (82)	46	46 (9)	42 (91)
P value		0.18			0.54	
Socio-economic status						
Lower middle	29	2 (7)	27 (93)	3	0 (0)	3 (100)
Middle	89	14 (16)	75 (84)	64	4 (6)	60 (94)
Upper/upper middle	82	15 (18)	67 (82)	33	7 (21)	26 (79)
P value		0.38			0.08	
Parents with mental health issues						
No concerns	93	8 (9)	85 (91)	189	27 (14)	162 (86)
Concerns present	7	3 (43)	4 (57)	11	4 (36)	7 (64)
P value		0.03			0.07	

SLD: Specific learning disability

Table 3: The unadjusted and adjusted estimates for depression

Case status	Unadjusted estimates	Adjusted estimated
Case status		
Children without SLD	Reference	Reference
Children with SLD	1.48 (0.71, 3.09)	0.98 (0.42, 2.28)
Age (years)		
8-12	Reference	Reference
13-14	4.20 (2.13, 8.28)**	5.21 (2.44, 11.10)**
Gender		
Female	Reference	Reference
Male	1.37 (0.70, 2.67)	1.24 (0.59, 2.64)
Socio-economic status		
Lower middle	Reference	Reference
Middle	2.00 (0.44, 9.09)	3.38 (0.67, 17.14)
Upper/upper middle	3.55 (0.79, 15.98)	6.68 (1.31, 34.02)*
Parents with mental health issues		
No	Reference	Reference
Yes	4.49 (1.63, 12.34)**	5.32 (1.76, 16.13)**

*$P<0.05$, **$P<0.01$, SLD: Specific learning disability

DISCUSSION

The overall prevalence of depressive disorders in a school-aged population of children at our referral clinic was 14%, higher than the prevalence of 1% in community surveys [6]. Previous studies had suggested that the prevalence of depressive disorders in individuals with SLD is 2% more than that in the general population [7]. We found similar results with depression in 16% of referred SLD cases. Symptomatology of depressive disorders may be masked by associated academic concerns in our study. Our review of clinical records revealed that insomnia, poor academic performance, and reduced social participation were present in only learning disabled cases irrespective of their mental health status. In our study, depressive disorders were more frequent in adolescents than preadolescents. Research indicated that adolescence was a risk factor (4-8 times) [8] for depression especially in females, although we found increased depressive disorders in adolescents, female predilection was not seen in learning disabled cases [9]. Synder *et al*. [10] had reported child self-ratings for depressive symptomatology especially at older ages as more accurate than their parents, and this finding was also observed in our study. A >16 BDI-II [11] cutoff score was used for screening of depression and it was found that most children had borderline to mild depressive range of symptoms. Previous studies had also reported mild depression scores in SLD versus their non-affected peers [7].

In our logistic regression models validate past studies which show increased risk (4-5 times) of depression in adolescent children corroborating with literature of increased risk (2-4 times) of depression after puberty [12]. Although statistically insignificant, we found that learning disabled males were more prone to depression than females; crude and adjusted OR were 1.37 (CI 0.70, 2.67) and 1.24 (CI 0.59, 2.64). This is contrary to literature, one of the factors could be sampling bias due to high M:F ratio of 1.5:1 of enrolled learning disabled children [9]. However, the M: F ratio in non-learning disabled peers was 0.9:1. The other factor could be that the study enrollment cutoff was early adolescence (13-14 years) and probably gender predilection in depression evolved with increasing age [13]. Contrary to studies [14] that suggested economically disadvantaged children as more prone for depression we found the reverse to be true. Upper middle/upper socioeconomic learning disabled cases were 6.8 times more susceptible to depressive disorders than lower socioeconomic class children OR 6.68 (CI 1.31, 34.02) $P < 0.05$. In India referral services for children with SLD are accessed by the upper middle socio-economic groups and the lower SE groups have limited access to diagnostic services which was also reflected in our data. There is a perceived taboo to mental health disorders in Indian society so direct enquiry of the same can yield biased responses. Hence, a history of parental intake of medications for mental health needs was sought as substitute for psychiatric disorders in first-degree relatives of probands. It was found that learning disabled children with a

parental history of mental health concerns had 4-5 times the risk of depression, OR 5.32 (CI 1.76, 16.13) $P < 0.01$. Family studies had demonstrated the lifetime risk of depression as 15-45% in children of depressed parents [15,16].

We conclude that male, adolescent, children with SLD in a referred clinic population are at a higher risk for depressive disorders than the general population. Demographics such as high-income families and parental psychopathology pose an increased risk of depressive disorders in children. Internalizing symptomatology is often missed by teachers and parents. However, the child's perception is often accurate and should not be disregarded.

What This Study Adds?

Adolescent, learning disabled children are at a higher risk for depressive disorders than the general population.

Upper socioeconomic class and co-existent parental psychopathology significantly increase risk of depression in these children.

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Source of Support: Nil, Conflict of Interest: None declared.