Prevalence and determinants of anxiety disorders among adolescents in a rural community from northern India

Swapna Madasu[a], Sumit Malhotra[a,*], Shashi Kant[a], Rajesh Sagar[b], Ashwani K Mishra[c], Puneet Misra[a], Farhad Ahamed[a]

[a] Centre for Community Medicine, All India Institute of Medical Sciences, New Delhi, India
[b] Department of Psychiatry, All India Institute of Medical Sciences, New Delhi, India
[c] National Drug Dependence and Treatment Centre, Ghaziabad and Department of Psychiatry, All India Institute of Medical Sciences, New Delhi, India

A B S T R A C T

Introduction: There is scarce data available on community based prevalence of Anxiety Disorders (ADs) amongst adolescents in north Indian settings.
Objective: To determine the prevalence of anxiety disorders, and associated factors amongst adolescents in a rural community of Ballabgarh block, district Faridabad, Haryana.
Methods: Participants (10–19 years) were enrolled through simple random sequence from a sampling frame of adolescents residing in 28 villages of Ballabgarh block using household survey technique. They were screened using Screen for Childhood Anxiety Related Emotional Disorders (SCARED) tool and then subjected to confirmatory diagnosis using Mini-International Neuropsychiatric Interview for Children/Adolescent (MINI KID). All adolescents with ADs were assessed for co-psychiatric morbidities using MINI-KID and functional impairment using Children Global Assessment Scale (CGAS). Prevalence and 95% Confidence intervals are reported. Additionally, socio-demographic factors were elicited using a semi-structured interview schedule and associations were determined using multivariable logistic regression analysis.
Results: A total of 678 adolescents participated in this study with mean age (SD) as 14.2 (2.5) years. The age adjusted prevalence of anxiety disorders was found to be 16.6% (95% CI: 16.0–17.2). The most prevalent anxiety disorder among participants was social anxiety disorders followed by specific phobias. Female sex and low socio-economic status were associated with anxiety disorders. Two third of adolescents with ADs had no functional impairment and almost one third were found to have one or more co-existing psychiatric co-morbidity.
Conclusion: We found a high prevalence of ADs in rural north Indian community settings warranting adequate health system response at primary care level.

1. Introduction

Adolescence, a transitional phase between childhood and adulthood, is characterized by a number of physical, psychological, personality, cognitive, and attitudinal changes. World Health Organization (WHO) defines adolescents as those aged 10–19 years (WHO, 2014). As a result of improved child survival along with high fertility rate, adolescent population is increasing across the globe. Adolescent age group constitutes almost 18% of world's population and 88% of them are living in developing countries (Anthony, 2011). In India, the estimated size of adolescent population is 253 million constituting 21% of country's total population (Census India, 2011).

Many of the common mental health problems like anxiety disorders appear during adolescence, but often go unidentified and left untreated, resulting in wide ranging sequel (Patton et al., 2014). Anxiety disorders are among the most common and functionally impairing mental health disorders to occur in adolescence (Ollendick et al., 2010). Anxiety disorders share common features, including excessive fear, avoidance of whatever is feared, and anticipation and worry when expected to encounter whatever is feared.

Globally, it is estimated that almost 3.6% of the population suffer from anxiety disorders. The prevalence among adolescents is similar to the global prevalence (WHO, 2017). Nair et al. (2013a,b,c) have estimated the prevalence of anxiety disorders among south Indian

adolescents to be 14.5%. Anxiety disorders were ranked as the sixth largest contributor to non-fatal health loss globally and led to a global total of 24.6 million Years Lived with Disability (YLDs) in 2015 (WHO, 2017). Early identification and management of anxiety disorders among adolescents prevent future complications and improves quality of life. However, there is paucity of comprehensive community level data on adolescent Anxiety Disorders in India (Trivedi and Gupta, 2010).

The National Mental Health Survey of India, (2015-16) included only a pilot survey on adolescent age group 13–17 years in four states with no coverage in northern parts of the country. Anxiety disorders were the commonest mental morbidity found in this pilot study. It recommended expanding the adolescent survey to larger Indian populations (Gururaj et al., 2016). The recently launched *Rashtriya Kishore Swasthya Karyakarm* (National adolescent health programme) includes addressing mental health needs of adolescents (Samal and Dehury, 2017). The integration of mental health into adolescent health programmes currently in India is far from optimal (Roy et al., 2019). Sufficient evidence base is required for different common mental health disorders among adolescents so as to influence practice at primary care level within routine health systems Thus, there was a need for generating community level data on anxiety disorders in northern parts of India.

The current study was done to assess the prevalence of anxiety disorders, associated socio-demographic and other factors and co-existing psychiatric morbidities amongst adolescents in a rural community of Ballabgarh block, district Faridabad, Haryana.

2. Methods

2.1. Study settings

This community based cross-sectional study was done at the Comprehensive Rural Health Services Project (CRHSP), Ballabgarh, District Faridabad, Haryana, India. The CRHSP Ballabgarh comprises of field practice area run by Centre for Community Medicine, All India Institute of Medical Sciences (AIIMS), New Delhi in collaboration with the state government of Haryana. The field practice area covers 28 villages serving a population of approximately 96,000. The inhabitants of this area predominantly were engaged in agriculture and related trades. (Kant et al., 2013) The project ran a community psychiatry programme with daily presence of psychiatrist at a secondary care level and once in a week psychiatry outpatient facility at primary health care programme. The postgraduates in community medicine were trained and engaged in running this community psychiatry programme in co-ordination with psychiatry department of AIIMS, New Delhi.

2.2. Study participants and sample selection

Boys and girls aged between 10–19 years were defined as adolescents. All adolescents residing in the study area for at least past six months were included in the study. Married adolescents, those unable to communicate and who were not contactable even after three home visits were excluded from the study. Assuming the prevalence of anxiety disorders among adolescents as 14% (Nair et al., 2013a,b,c) relative precision of 20% and an alpha value of 0.05, the required sample size was 614. Considering a nonresponse rate of 10%, the minimum calculated sample size was 676. The Health Management Information System (HMIS) maintained at CRHSP, Ballabgarh had information on all persons residing in the field practice area. From HMIS, a list of all adolescents residing in the field practice area was prepared. There were a total of 17,272 adolescents in the study area. This served as the sampling frame. Study participants were selected through simple random sampling using a computer generated sequence from the sampling frame. Initially, a random list of 700 adolescents was drawn to cover the desired study sample size. Due to prevailing communal riots in one

of the villages (Atali) at the time of data collection, adolescents from that village were dropped out from random list generated (n = 71). Additional 100 adolescents were drawn randomly at a later stage to meet the minimum sample size for the study. A total of 729 subjects were considered for inclusion in this study.

2.3. Assessment and procedures

A structured interview schedule was developed on the basis of a review of the literature and opinion of experts in this field. It was pretested and finalized. The interview schedule was used to collect information on socio-demographic details and other determinants related to anxiety disorders. Uday-Parikh scale was used to collect socio-economic information. "Screen for Childhood Anxiety Related Emotional Disorders (SCARED)" tool was administered as screening tool. (Birmaher et al., 1999). The tool was validated in India among adolescents by Nair et al. (2013a,b,c). "Mini International Neuropsychiatric Interview for children/adolescent (MINI KID)" was used as a confirmatory tool for diagnosing anxiety disorders among adolescents. MINI KID amongst screen positive adolescents. This tool developed by Sheehan et al. (2010), is a structured clinical diagnostic interview designed to assess the presence of various psychiatric disorders including anxiety disorders in children and adolescents. Sensitivity and specificity of this tool were 90% and 77% respectively for any anxiety disorder. When compared to other confirmatory tools which were commonly used, MINIKID was easy to administer and took relatively less time than other instruments. The tools have been validated for use in Indian settings (Pradeep et al., 2018). The pilot adolescent age group survey as part of National Mental Health Survey in India also utilized MINI KID for assessment of mental morbidity. Children's Global Assessment Scale (CGAS), developed by Shaffer et al. (1983), was used to know the functional level of adolescents diagnosed with anxiety disorders. The study tools were administered by a single investigator (MS), primary care physician who was trained in psychiatry department in administration of all study tools by a senior experienced psychiatrist (RS) for a period of one month. The training resulted in good agreement against psychiatrist in using the study tools. The primary care physician was engaged in a community psychiatry programme and was supported by psychiatrist in provision of primary mental health care in a community setting.

House to house visits were made to all selected adolescents. In case an adolescent was not found at home despite three visits, she or he was categorized as a non-respondent. The visits were made 2–3 weeks apart. All the adolescents available during the visits were informed about the purpose of the visit. They were provided with an information sheet in Hindi. A written informed consent was taken from parents and assent from minor adolescents. Thereafter, the concerned participant was assessed by SCARED tool. Adolescents found positive on screening tool were subjected to MINIKID. Further, participants who were diagnosed with anxiety disorders were also assessed for functional level using CGAS. Interviewer was accompanied by ASHA (Accredited Social Health Activist) worker to help in building the rapport with the parents / guardian of the adolescent. Quality assurance visits were made by team of investigators (SM, RS) in sample of adolescents and diagnosis was cross-checked as part of supervision. Good agreement (> 90%) was achieved in the diagnosis.

2.4. Statistical analyses

Data were entered in Microsoft Excel version 2013. Data cleaning was performed using range, consistency, and logical checks. Statistical analysis was done using STATA software version 12.0 (StataCorp. 2012. Stata Statistical Software: Release 12. College Station, TX: StataCorp LP.). Prevalence of anxiety disorders was reported as proportion with 95% CI. Psychiatric co-morbidities amongst adolescents diagnosed with anxiety disorders were identified. Associated socio-demographic factors

were determined computing odds ratios along with 95% CI. Bivariate logistic regression was performed and variables with p < 0.25 on bivariate analysis were entered into multivariable model for identifying associated factors. A value of p < 0.05 was considered statistically significant.

2.5. Ethics clearance

Approval was taken from the Institute Ethics Committee of AIIMS, New Delhi. Written consent from parents/guardians and assent from adolescents was taken. The study was done as per principles laid out by Declaration of Helsinki.

3. Results

3.1. Descriptive details of study participants

House-to-house visits were made to the 729 randomly selected adolescents from the sampling frame. Of these, 9 participants refused to participate in the study. Five participants had permanently shifted to other area. Houses of 27 participants were locked even after three visits. Seven adolescents were excluded as they were married and for three participants, interview could not be completed (two were unable to understand the questions; one was deaf and dumb since birth so unable to interact). Thus for a total 51 (7.0%) participants, data could not be obtained. The remaining 678 participants were included in the study with a response rate of 93% - almost equal for males (93.7%) and females (92.3%).

A total of 356 (52.5%) boys and 322 (47.5%) girls were included in the study. The mean age (SD) of the participants was 14.2 (2.5) years. The mean years of completed education of the study participants was 7.8 (2.8) years. Details of socio-demographic status of participants are shown in Table 1.

A total of 38 (5.6%) participants self-reported at least one stressful event in last one year. No participant had more than single stressful event at the time of study. Equal proportion of boys and girls reported stressful events in past. Death of family member was the most common cited response (2.4%) among all the reported stressful events. Loss of dearest friend (1.3%), debts in the family (1.2%), fights in the family (0.4%) and self-perceived stress about family loss of property (0.3%) were the other stressors. Fifteen (2.2%) adolescents had history of chronic disease i.e., diseases with duration of more than six months.

Table 1
Demographic characteristics of the adolescents.

Variables	Males = 356 Number (%)	Females = 322 Number (%)	Total = 678 Number (%)	p value
Age (in completed years)				0.56
10-14	183 (51.4)	179 (55.6)	362 (53.4)	
15-19	173 (48.6)	143 (44.4)	316 (46.6)	
Completed years of education				0.31
Up to primary	74 (20.8)	81 (25.2)	155 (22.9)	
Middle	105 (29.5)	97 (30.1)	202 (29.8)	
Above middle	177 (49.7)	144 (44.7)	321 (47.4)	
Working status				0.49
No	348 (97.7)	312 (96.9)	660 (97.3)	
Yes	8 (2.24)	10 (3.1)	18 (2.7)	
Socio-Economic Status (Udai Pareek Scale)				0.82
Upper class (upper and upper middle)	147 (41.3)	142 (44.1)	289 (42.6)	
Middle	127 (35.7)	114 (35.4)	241 (35.6)	
Lower middle	82 (23.0)	66 (20.5)	148 (21.8)	
Living status with family				0.73
Yes	354 (99.4)	322 (100)	672 (99.7)	
No	02 (0.6)	0	02 (0.29)	

There was no statistically significant difference between boys and girls for distribution of stressful events (p = 0.73) and chronic diseases (p = 0.56).

3.2. Prevalence of anxiety disorders

A total of 152 [22.5%; 95% CI: 21.9–23.1] participants were found to be screen positive. Out of all screen positive adolescents, higher number of girls (27.6%) were found to be screen positive than boys (18.3%) (p < 0.01). All the screened positive adolescents (n = 152) were subjected to confirmatory diagnostic schedule MINI-KID. Anxiety disorders were diagnosed in 112 participants (16.6%) using MINI-KID tool. Thus, the age adjusted prevalence of anxiety disorders in adolescents in our rural setting was found to be 16.6% (95%CI: 16.0–17.2). The prevalence of anxiety disorders were found to be higher among girls (20.8%) than boys (12.9%) (p = 0.01). The most prevalent anxiety disorder among participants was social anxiety disorder with a prevalence of 14.1% (95% CI: 13.6–14.6) followed by specific phobias with prevalence 7.9% [95% CI:7.5–8.3]. Details of anxiety disorders have been given in Table 2.

3.3. Socio-demographic and other determinants

On multivariable analysis female sex and low socioeconomic status were found to be positively associated with anxiety disorders. Girls had two times higher odds for anxiety disorders as compared to boys (Adjusted Odds Ratio AOR 1.8; 95% CI 1.2–2.8; p = 0.005). Adolescents with lower middle socioeconomic status had two times higher odds for anxiety disorders compared to those belonging to upper class (AOR 2.2; 95% CI 1.3–3.7; p = 0.003). All other factors assessed within multivariable model viz age, education status, schooling status, working status, number of family members, living status, history of any stressful event in last one-year duration and history of chronic diseases were statistically insignificant associated with anxiety disorders. Table 3

3.4. Functional impairment and Co-existing psychiatric disorders

Majority of the adolescents (63.7%) with anxiety disorders had no functional impairment. Approximately one fourth of adolescents (36.3%) had more than slight impairment. Twelve participants (10.6%) had some difficulty in any of the single functional area. Among the adolescents diagnosed with anxiety disorders, 29.2% (95% CI: 20.8–37.6) were found to be affected by one or more coexisting psychiatric comorbidities other than anxiety disorder (extra AD comorbidities). Most common comorbidity found with anxiety disorder was major depressive disorder (4.4%). Table 4

4. Discussion

The present study found the age adjusted prevalence of anxiety disorders amongst adolescents as 16.6% (95% CI: 16.0–17.2). Social anxiety disorder [14.1%; 95%CI: 13.6–14.6] was found to be the commonest anxiety disorder among adolescents. In Indian settings, the reported prevalence of anxiety disorders amongst adolescents ranged from 14.4%–56.8%. (Nair et al., 2013a,b,c; Yadav and Kumar, 2013; Rapheal and Varghese Paul, 2012; Rakhee and Aparna, 2011; Sahoo and Khess, 2010; Deb et al., 2010). Nair et al. (2013a,b,c) reported a lower prevalence of anxiety disorders among adolescents than the current study. Non-random sampling technique and use of different confirmatory tool (KSADS PL- Kiddie Schedule for Affective Disorders and Schizophrenia Lifetime Version) in the earlier study were the possible reasons behind this observed difference in prevalence. All other Indian studies had reported higher prevalence of anxiety disorders among adolescents. (Yadav and Kumar, 2013; Rapheal and Varghese Paul, 2012; Rakhee and Aparna, 2011; Sahoo and Khess,

Table 2

Prevalence of anxiety disorders among adolescents assessed by MINIKID.

Anxiety disorder category by MINIKID	Total = 678 Number (%) 95% CI	Males (N = 356) Number (%)	Females (N = 322) Number (%)	Age Adjusted prevalence (95% CI)	p value
Social anxiety (SC)	97 (14.3) 11.7-16.9	38 (10.7)	59 (18.3)	14.1 (13.6-14.6)	< 0.01
Specific phobia	54 (7.9) 5.9-10.0	22 (6.2)	32 (9.9)	7.9 (7.5-8.3)	0.01
Generalized anxiety disorder (GAD)	49 (7.2) 5.3-9.2	17 (4.8)	32 (9.9)	7.6 (7.1-7.9)	< 0.01
Panic disorder(PD) – lifetime	49 (7.2) 5.3-9.1	22 (6.2)	27 (8.4)	7.1 (6.7-7.5)	0.01
Panic disorder(PD) – current	45 (6.6) 4.8-8.5	21 (5.9)	24 (7.5)	6.6 (6.2-7.0)	0.01
Agoraphobia	34 (5.0) 3.4-6.7	12 (3.4)	22 (6.8)	4.9 (4.6-5.2)	0.01
Separation anxiety (SP)	14 (2.1) 1.0-3.1	6 (1.7)	8 (2.5)	2.0 (1.8-2.2)	0.01
Obsessive compulsive disorder (OCD)	9 (1.3) 0.5-2.2	4 (1.1)	5 (1.6)	1.4 (1.2-1.6)	0.01

2010; Deb et al., 2010). These studies were done in school and college settings. Education related pressure might have some role in higher prevalence of anxiety disorders in these studies. Use of different tools was another possible reason behind higher prevalence of anxiety disorders reported in other Indian studies. As per pilot survey undertaken in four states of India within National Mental Health Survey (2015-16), the overall prevalence of common mental morbidity was 7%. The prevalence of phobic anxiety disorder and social phobia was found to be 3.6% (2.6–4.7%) and 0.8% (0.3–1.4%) respectively. This pilot survey included only age group 13–17 years and used MINI-KID as a diagnostic tool for assessment of mental morbidity. In studies done outside India, prevalence of anxiety disorders amongst adolescents ranged from 2.9%–84.5% (Olofsdotter et al., 2016; Radeef et al., 2014; Xiaoli et al., 2014; Abbo et al., 2013; Tramonte and Willms, 2010; Roberts et al., 2007; Canino et al., 2004; Costello et al., 2003; Angold et al., 2002). Types of study tool for assessing anxiety disorders, different study setting and cross cultural variations could be the reason for differences in prevalence observed in western countries. The current study reported Social Anxiety Disorder as most prevalent anxiety disorder (14.1%). A study done in USA reported similar findings (Kessler et al., 2012).

Girls were found to have positive association for presence of anxiety disorders in our study. This is consistent with other studies that have reported adolescent girls twice as likely as boys to develop all kinds of anxiety disorders (Nair et al., 2013a,b,c; Costello et al., 2003; Wittchen et al., 1998; Pine et al., 1998). Different types of biological and environmental reasons have been speculated for the higher prevalence

Table 4

Coexisting psychiatric morbidities in adolescents with ADs by MINIKID.

Morbidity	Sub-type	Number (%) (n = 113)
Major Depressive Disorder	MDD total	5 (4.4)
	Current	4 (3.5)
	Past	1 (0.9)
Suicidality	Total	3 (2.7)
	Low	1 (0.9)
	Moderate	1 (0.9)
	High	1 (0.9)
Dysthymia	Current	2 (1.8)
Alcohol consumption	Total	4 (3.5)
	Alcohol dependence	1 (0.9)
	Alcohol abuse	3 (2.7)
Substance abuse	Current	2 (1.8)
ADHD	Total	2 (1.8)
	ADHD combined	1 (0.9)
	ADHD inattentive	1 (0.9)
Conduct disorder	–	4 (3.5)
Oppositional defiant disorder	–	3 (2.7)
Adjustment disorder	–	3 (2.7)
Motor tic disorder	–	3 (2.7)
Psychotic disorder	–	2 (1.8)

seen in girls (Lewinsohm et al., 2009; Beesdo et al., 2009). Unlike current study, a school based study in Kolkata reported higher prevalence of anxiety disorders among males compared to females (20.1% vs 17.9%) (Deb et al., 2010). The justification for higher prevalence in

Table 3

Socio-demographic and other factors for determining associations with anxiety disorders in adolescents.

Variable	Category (n)	Anxiety disorders Present n (%)	Unadjusted Odds ratio (95% CI)	Unadjusted p value	Adjusted* Odds ratio (95% CI)	Adjusted p value
Age	10-14 (362)	63 (17.4)	1.0	–	1.00	
	15-19 (316)	50 (15.8)	0.9 (0.6-1.3)	0.58	0.9 (0.6-1.4)	0.62
Sex	Male (356)	46 (12.9)	1.0	–	1.00	
	Female (322)	67 (20.8)	1.8 (1.2-2.7)	< 0.01	1.8 (1.2-2.8)	< 0.01
Completed years of education	Up to Primary (155)	28 (18.1)	1.00	–	–	–
	Middle (202)	31 (15.4)	0.8 (0.5-1.4)	0.49	–	–
	Above high school (321)	54 (16.8)	0.9 (0.6- 1.5)	0.74	–	–
Socio-Economic Status	Upper class (289)	37 (12.8)	1.0	–	1.00	–
	Middle (241)	41 (17.0)	1.4 (0.9-2.3)	0.17	1.4 (0.9-2.3)	0.14
	Lower middle (148)	35 (23.7)	2.9 (1.3-3.5)	< 0.01	2.3 (1.4-3.8)	< 0.01
Working status	Not working (660)	110 (16.7)	1.0	–	–	–
	Working (18)	3 (16.7)	1.0 (0.3-3.5)	0.78	–	–
Schooling status	In school (600)	98 (16.3)	1.0	–	–	–
	Out of school (78)	15 (19.2)	1.2 (0.7-2.2)	0.81	–	–
Living status	Living with parents (672)	112(16.7)	1.0	–	–	–
	Others (2)	1 (50.0)	5.0 (3.1-8.1)	0.25	–	–
Stressful event (within last one year)	Absent (640)	103 (16.1)	1.0	–	–	–
	Present (38)	10 (26.3)	1.9 (0.8-4.0)	0.11	–	–
Chronic disease *	Absent (663)	110 (16.6)	1.0	–	–	–
	Present (15)	3 (20.0)	1.3 (0.3-4.5)	0.73	–	–

* Adjusted for age, sex, socio-economic status.

males could be due to, as mentioned by the authors of the study, higher academic pressure among males as compared to females. Age group, adopted in Kolkata based study, was narrow (13–17 years) which might have influenced the results. Another study done in Kerala found that in addition to female sex, lower socio-economic status was one of the major predictors of anxiety status of adolescent (Rapheal and Varghese Paul, 2012). A school based study carried out in Kolkata reported low socio economic status to be found associated with increased stress and anxiety. (Deb et al., 2010). Goodman et al. (2005) also reported that the social disadvantage acts as high risk factor for developing anxiety disorders.

A systemic review has found that persons suffering from anxiety disorders also tend to suffer from functional impairment of various grades (McKnight et al., 2016). A study from southern part of India reported that almost 59% of adolescents with anxiety disorders had concomitant psychiatric morbidities and 23.7% of adolescents with anxiety disorders were also suffering from depressive disorder. (Russell et al., 2013). These findings were consistent with our survey. Studies done outside India reported lower prevalence of comorbidity associated with anxiety disorders than our study. A large school based study done in United States found that 18.7% study participants with anxiety disorders were also suffering from psychiatric disorders other than anxiety disorders (Lewinsohn et al., 1997). Another school based study done in Germany reported comorbidity rate associated with anxiety disorders as 14.1%. (Essau et al., 2000) Study settings, and differences in culture and ethnicity could be the reasons for such a low prevalence of co-morbidities associated with anxiety disorders amongst adolescents as compared to our study.

4.1. Strengths and Limitations of this study

This was one of few community based studies done in rural setting in India with robust methodology and high response rate (93%). Thus, the study results can be considered as reliable and generalizable to the rural community. Tools, validated in Indian settings, with high validity were used in this study. Though, every effort was undertaken to build adequate rapport, with the adolescents, the possibility of information bias could not be ruled out. Also, since the data collection was done by a female investigator, this could yield mixed effects. Female participants could have confided more readily while male participants could have guarded their responses especially for socially undesirable responses. Quality assurance visits were undertaken by team of investigators and in sample of positive adolescents with anxiety disorders, diagnosis was cross-checked and agreement was found in all sample adolescents. We did not assess separately who were screen negative after SCARED tool administration and thus would have missed few false negatives. However we feel these would have been within confidence interval of our prevalence estimate.

4.2. Implications of the study

We found a high prevalence of anxiety disorders in rural community settings. Extrapolating this to the entire study population residing within 28 villages, there will be 2936 adolescents with anxiety disorders. These adolescents require a health system response and appropriate interventions need to be provided so that sequel and progression of anxiety disorders can be halted. Further research will be needed in this area especially a longitudinal study to assess the progression of anxiety disorders amongst those having their onset at early age of adolescence. We hope our study will serve as baseline study for gauzing effect of future interventions in this setting.

Conflicts of interests

All authors declare no conflicts of interests

References

Abbo, C., Kinyanda, E., Kizza, R., Levin, J., Ndyanabangi, S., Stein, D., 2013. Prevalence, comorbidity and predictors of anxiety disorders in children and adolescents in rural north-eastern Uganda. Child Adolesc. Psychiatry Ment. Health 7, 21. https://doi.org/10.1186/1753-2000-7-21.

Angold, A., Erkanli, A., Farmer, E.M., Fairbank, J.A., Burns, B.J., Keeler, G., Costello, E.J., 2002. Psychiatric disorder, impairment, and service use in rural African American and white youth. Arch. Gen. Psychiatry 59, 893–901.

Anthony, D., 2011. The state of the world's children 2011. Adolescence an Age of Opportunity. United Nations Children's Fund (UNICEF). Available at. http://www.unicef.org/adolescence/files/SOWC_2011_Main_Report_EN_02242011.pd.

Beesdo, K., Lau, J.Y., Guyer, A.E., McClure-Tone, E.B., Monk, C.S., Nelson, E.E., et al., 2009. Common and distinct amygdala-function pertubations in depressed vs anxious adolescents. Arch. Gen. Psychiatry 66, 275–285.

Birmaher, B., Brent, D., Chiappetta, L., Bridge, J., Monga, S., Baugher, M., 1999. Psychometric properties of the screen for child anxiety related emotional disorders (SCARED): a replication study. J. Am. Acad. Child Adolesc. Psychiatry 38, 1230–1236. https://doi.org/10.1097/00004583-199910000-00011.

Canino, G., Shrout, P.E., Rubio-Stipec, M., Bird, H.R., Bravo, M., Ramirez, R., Chavez, L., Alegria, M., Bauermeister, J.J., Hohmann, A., Ribera, J., Garcia, P., Martinez-Taboas, A., 2004. The DSM-IV rates of child and adolescent disorders in Puerto Rico: prevalence, correlates, service use, and the effects of impairment. Arch. Gen. Psychiatry 61, 85–93. https://doi.org/10.1001/archpsyc.61.1.85.

Census India, 2011. Population Composition. Available at. . http://www.censusindia.gov.in/vital_statistics/srs_report/9chap%202%20-%202011.pdf.

Costello, E.J., Mustillo, S., Erkanli, A., Keeler, G., Angold, A., 2003. Prevalence and development of psychiatric disorders in childhood and adolescence. Arch. Gen. Psychiatry 60, 837–844. https://doi.org/10.1001/archpsyc.60.8.837.

Deb, S., Chatterjee, P., Walsh, K., 2010. Anxiety among high school students in India: comparisons across gender, school type, social strata and perceptions of quality time with parents. Aust J Educ Dev Psychol 10, 18–31.

Essau, C., Conradt, J., Petermann, F., 2000. Frequency, comorbidity, and psychosocial impairment of anxiety disorders in german adolescents. J. Anxiety Disord. 14, 263–279.

Goodman, E., Ewen, B.S., Dolan, L.M., Schafer-Kalkhoff, T., Adler, N.A., 2005. Social disadvantage and adolescent stress. JAdolesc Health 37, 484–492. https://doi.org/10.1016/j.jadohealth.2004.11.126.

Gururaj, G., Varghese, M., Benegal, V., Rao, G.N., Pathak, K., Singh, L.K., Mehta, R.Y., Ram, D., Shibukumar, T.M., Kokane, A., Lenin Singh, R.K., Chavan, B.S., Sharma, P., Ramasubramanian, C., Dalal, P.K., Saha, P.K., Deuri, S.P., Giri, A.K., Kavishvar, A.B., Sinha, V.K., Thavody, J., Chatterji, R., Akoijam, B.S., Das, S., Kashyap, A., Ragavan, V.S., Singh, S.K., Misra, R., NMHS collaborators group, 2016. National Mental Health Survey of India, 2015-16: Prevalence, Patterns and Outcomes. National Institute of Mental Health and Neuro Sciences, Bengaluru NIMHANS Publication No. 129.

Kant, S., Misra, P., Gupta, S., Goswami, K., Krishnan, A., Nongkynrih, B., Rai, S.K., Srivastava, R., Pandav, C.S., 2013. The Ballabgarh health and demographic surveillance system (CRHSP-AIIMS). Int. J. Epidemiol. 42, 758–768.

Kessler, R.C., Petukhova, M., Sampson, N.A., Zaslavsky, A.M., Wittchen, H.-U., 2012. Twelve-month and lifetime prevalence and lifetime morbid risk of anxiety and mood disorders in the United States. Int. J. Methods Psychiatr. Res. 21, 169–184. https://doi.org/10.1002/mpr.1359.

Lewinsohm, P.M., Gotlib, I.H., Lewinsohm, M., Seeley, J.R., Allen, N.B., 2009. Gender differences in anxiety disorders and anxiety symptoms in adolescents. J. Abnorm. Psychol. 107, 109–117.

Lewinsohn, P., Zinbarg, R., Seeley, J., Lewinsohn, M., Sack, W., 1997. Lifetime comorbidity among anxiety disorders and between anxiety disorders and other mental disorders in adolescents. J. Anxiety Disord. 11, 377–394.

McKnight, P.E., Monfort, S.S., Kashdan, T.B., Blalock, D.V., Calton, J.M., 2016. Anxiety symptoms and functional impairment: a systematic review of the correlation between the two measures. Clin. Psychol. Rev. 45, 115–130. https://doi.org/10.1016/j.cpr.2015.10.005.

Nair, M.K., Russell, P.S., Krishnan, R., Russell, S., Subramaniam, V.S., Nazeema, S., Chembagam, N., George, B., 2013a. ADad 4: the symptomatology and clinical presentation of anxiety disorders among adolescents in a rural community population in India. Ind J Pediatr 80, 149–154. https://doi.org/10.1007/s12098-013-1234-1.

Nair, M.K., Russell, P.S., Mammen, P., Chandran, R.A., Krishnan, R., Nazeema, S., Chembagam, N., Peter, D., 2013b. ADad 3: The epidemiology of anxiety disorders

among adolescents in a rural community population in India. The Ind J Pediatr 80, 144–148. https://doi.org/10.1007/s12098-013-1097-5.

Nair, M.K., Russell, P.S., Subramaniam, V.S., Nazeema, S., Sequeira, A.Z., Chembagam, N., George, B., 2013c. ADad 6: the predictive factors for anxiety disorders among adolescents in a rural community population in India. Ind J Pediatr 80, 160–164. https://doi.org/10.1007/s12098-013-1231-4.

Ollendick, T.H., Raishevich, N., Davis 3rd, T.E., Sirbu, C., Ost, L.G., 2010. Specific phobia in youth: phenomenology and psychological characteristics. Behav. Ther. 41, 133–141. https://doi.org/10.1016/j.beth.2009.02.002.

Olofsdotter, S., Vadlin, S., Sonnby, K., Furmark, T., Nilsson, K., 2016. Anxiety disorders among adolescents referred to general psychiatry for multiple causes: clinical presentation, prevalence, and comorbidity. Scand J Child and Adolescent Psychiat Psychol 4, 55–57.

Patton, G.C., Coffey, C., Romaniuk, H., Mackinnon, A., Carlin, J.B., Degenhardt, L., Olsson, C.A., Moran, P., 2014. The prognosis of common mental disorders in adolescents: a 14-year prospective cohort study. Lancet 383https://doi.org/10.1016/S0140-6736(13)62116-9. 1404-141.

Pine, D.S., Cohen, P., Gurley, D., Brook, J., Ma, Y., 1998. The risk for early-adulthood anxiety and depressive disorders in adolescents with anxiety and depressive disorders. Arch. Gen. Psychiatry 55, 56–64.

Pradeep, B.S., Gururaj, G., Varghese, M., Benegal, V., Rao, G.N., Sukumar, G.M., Amudhan, S., Arvind, B., Girimaji, S., Thennarasu, K., Marimuthu, P., Viayasagar, J., Bhaskarapillai, B., Thirthalli, J., Loganathan, S., Kumar, N., Sudhir, P., Sathyanaryana, V.A., Pathak, K., Singh, L.K., Mehta, R.Y., Ram, D., Shibhukumar, T.M., Kokane, A., Singh, R.K.L., Chavan, B.S., Sharma, P., Ramasubramanian, C., Dalal, P.K., Saha, P.S., Deuri, S.P., Giri, A.K., Kavishvar, A.B., Sinha, V.K., Thavody, J., Chatterji, R., Akoiam, B.S., Das, S., Kashyap, A., Sathish, R.V., Selvi, M., Singh, S.K., Agarwal, V., Misra, R., 2018. National Mental Health Survey of India, 2016-rationale, design and methods. PLoS One 13 e0205096.

Radeef, A.S., Faisal, G.G., Ali, S.M., Ismail, M.M., 2014. Source of stressors and emotional disturbances among undergraduate science students in Malaysia. Int J Med Res Health S 3, 401–410.

Rakhee, A.S., Aparna, N., 2011. A study on the prevalence of anxiety disorders among higher secondary students. Educ Sc Psychol 1, 33–35.

Rapheal, J., Varghese Paul, K.V., 2012. Environmental correlates of adolescent anxiety. Int. J. Sci. Res. 2, 479–482.

Roberts, R.E., Roberts, C.R., Xing, Y., 2007. Rates of DSM-IV psychiatric disorders among adolescents in a large metropolitan area. J. Psychiatr. Res. 41, 959–967. https://doi.

org/10.1016/j.jpsychires.2006.09.006.

Roy, K., Shinde, S., Sarkar, B.K., Malik, K., Parikh, R., Patel, V., 2019. India's response to adolescent mental health: a policy review and stakeholder analysis. Soc. Psychiatry Psychiatr. Epidemiol. https://doi.org/10.1007/s00127-018-1647-2.

Russell, P.S., Nair, M.K., Mammen, P., Chembagam, N., Vineetha, K.S., Shankar, S.R., Nazeema, S., George, B., 2013. The co-morbidity in anxiety disorders among adolescents in a rural community population in India. Ind J Pediatr 80, 155–159. https://doi.org/10.1007/s12098-013-1207-4.

Sahoo, S., Khess, C., 2010. Prevalence of depression, anxiety, and stress among young male adults in India. J. Nerv. Ment. Dis. 198, 901–904. https://doi.org/10.1097/NMD.0b013e3181fe75dc.

Samal, J., Dehury, R.K., 2017. Salient features of a proposed adolescent health policy draft for India. J. Clin. Diagn. Res. 11, LI01–LI05.

Shaffer, D., Gould, M.S., Brasic, J., Ambrosini, P., Fisher, P., Bird, H., Aluwahlia, 1983. A children's global assessment scale (CGAS). Arch Gen Psychiat 40, 1228–1231.

Sheehan, D., Sheehan, K., Shytle, R., Janavs, J., Bannon, Y., Rogers, J.E., Milo, K.M., Stock, S.L., Wilkinson, B., 2010. Reliability and Validity of the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID). J. Clin. Psychiatry 71, 313–326. https://doi.org/10.4088/JCP.09m05305whi.

Tramonte, L., Willms, D., 2010. The prevalence of anxiety among middle and secondary school students in Canada. Can. J. Public Health 1, 19–22.

Trivedi, J.K., Gupta, P.K., 2010. An overview of Indian research in anxiety disorders. Indian J. Psychiatr. Soc. Work. 52, 210–218. https://doi.org/10.4103/0019-5545.69234.

WHO, 2017. Depression and Other Common Mental Disorders: Global Health Estimates. World Health Organization, Geneva Licence: CC BY-NC-SA 3.0 IGO.

Wittchen, H.U., Nelson, C.B., Lachner, G., 1998. Prevalence of mental disorders and psychosocial impairments in adolescents and young adults. Psychol. Med. 28, 109–126.

World Health Organization, 2014. Health for the World's Adolescents: a Second Chance in the Second Decade. Available at. http://apps.who.int/adolescent/second-decade/.

Xiaoli, Y., Chao, J., Wen, P., Wenming, X., Fang, L., Ning, L., Huijuan, M., Jun, N., Ming, L., Xiaoxia, A., Chuanyou, Y., Zenguo, F., Lili, L., Lianzheng, Y., Lijuan, T., Guowei, P., 2014. Prevalence of psychiatric disorders among children and adolescents in Northeast China. PLoS One 9, e111223. https://doi.org/10.1371/journal.pone.0111223.

Yadav, D.D., Kumar, A., 2013. Wake up call: rising incidences of anxiety Disorder in paediatric population. Int. J. Pharm. Biol. Sci. Arch. 4, 1056–1062.