



# Implications of Psychological Morbidity on Physical Health and Behavior of Adolescents in Aligarh, India

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## Abstract

**Background:** Worldwide, 20% of children and adolescents experience a disabling mental illness, almost half of which begin by the age of 14. Puberty, also marks a transition in risks for depression and other mental disorders, psychosomatic syndromes, and antisocial behavior. The increase in stress during adolescence due to nutritional and pubertal transition may impact physical health and behavior.

**Objectives:** The current study aimed at determining the association between psychological morbidity and nutritional status, as well as the association of psychological morbidity and physical activity, sleep duration, and dietary behavior.

**Methods:** This study was based on a world health organization (WHO) Global School Health Survey (GSHS) conducted on 13- to 15-year-old age group. The study was held at 3 different schools of Aligarh. Strength and difficulties questionnaire (SDQ) was used to measure psychological morbidity and its association with obesity, physical activity, sleep duration, and dietary behavior.

**Results:** A total of 1456 students were included in the study and the prevalence of psychological morbidity was 9.75%. Those with psychological morbidity had higher odds for being obese (35.36), physically inactive (1.78), having sleep duration inadequacy (5.42), and poor dietary behavior (7.46) on multivariate analysis.

**Conclusions:** Psychological problems were present in seemingly normal adolescent student population in India. Most of these students and their parents/teachers were either unaware of this problem or thought that these problems were not worthy of attention. The association of these problems with lifestyle, dietary behavior, and physical activity warrants special attention.

**Keywords:** Adolescence, Psychology, Mental, Obesity, Physical Activity, Sleep, Diet, Dietary Behavior, Nutrition, India

## 1. Background

Worldwide, 20% of children and adolescents experience a disabling mental illness (1), almost half of which begin by the age of 14 (2). Puberty marks a transition in risks for depression and other mental disorders, psychosomatic syndromes, and antisocial behavior (3). The increase in stress during puberty and early adolescence due to nutritional and pubertal transition may influence brain development and vulnerability to psychopathologies and poor physical health and behavior (4). Despite the substantial prevalence (5), teenagers are often unaware of their condition (6), due to their reluctance in seeking help either because of shame or for the fear of being treated differently from their peers. This unawareness is more common in developing countries like India where proper school mental and psychological health issues are still not a prior-

ity and the prevalence or estimate of the total number of adolescents with these worrisome conditions are often not known.

Despite the ever-increasing adolescent population of the country, there is an absence of national reporting of psychological/mental disorders in adolescents. Previous studies in the same study population have reported a substantial problem of psychological disorders, obesity, sleep duration inadequacy, and adverse dietary behavior (7-10). Therefore, this study was conducted with the objective of determining the association between psychological morbidity and nutritional status, and the relationship between psychological morbidity and physical activity, sleep duration, and dietary behavior.

## 2. Methods

This study was designed as a cross sectional school-based study and was conducted over a period of 6 months, from November, 2011 to April, 2012. The study was held at 3 different schools of Aligarh, all of which were English medium schools affiliated to the Aligarh Muslim University (AMU) Board of Examinations. In terms of numbers, these were among the largest schools of Aligarh. A prior permission was taken from the school authorities, parents, and teachers of the respective classes.

The study population comprised of students aged between 13 and 15 years old, enrolled in the aforementioned schools studying at levels 6 to 10. This mid adolescence phase of life coincides with the late middle and early high school years, often associated with rebellion and experimentation with identity (11). Additionally, this phase of life is associated with pubertal spurt, leading to an increase in stress and problematic behavior (12). In India, this is a phase of life when the students finish their high school and are supposed to lay the groundwork for selection of their subjects and interests for their future careers, leading to increased pressure and stress from their family and peers. Therefore, this phase of adolescence (13 to 15 years of age) was chosen for this study, in line with the World Health Organization- Global School-based student Health Survey (WHO-GSHS) and Global Youth Tobacco Survey (GYTS) (13, 14). All the students in the age group of 13- to 15-years, who provided consent, were recruited in the study. Since this was a self-administered questionnaire, the study was conducted on small groups to improve response rates, accuracy and reliability of the responses. The forms were filled under supervision of the interviewer. A detailed plan of the study was made with the teacher in-charge and principals of different schools, in order to reduce the risk of contamination and to minimize the impact on the regular teaching schedule of the students.

The study instrument had 2 parts, Part A and Part B. Part A was the Strength and difficulties questionnaire (SDQ), English version (15). The strengths and difficulties questionnaire (SDQ) is a 5-scale behavioral screening instrument for evaluating social, emotional, and behavioral functioning in children and adolescents. The importance of this questionnaire has already been emphasized in Indian settings by Sharan and Sagar, who recommend that it has the potential to become a basis for data collection for a much needed national database (8). The self-rated version of the SDQ has been shown to be a reliable and valid method for the assessment of behavioral and other problems in children and adolescents (15), and has a sensitivity of 85% and specificity of 80% versus an independent diagnosis of a clinician (16), with a satisfactory reliability and validity, as reported by

Goodman (17).

Part B of the questionnaire consisted of questions on physical activity, anthropometric measure to ascertain overweight/obesity status, dietary behavior, sleep duration at night, and socio-demographic profile of the students. The physical activity status was based on a 60-minute screening measure for moderate to vigorous physical activity PACE+ (patient-centered assessment and counselling for exercise plus nutrition) standards (18). The weight and height measurements and classifications as overweight or obese were based on WHO (1995) standards and were calculated by WHO Anthro Plus (19). The dietary behavior was calculated by a scoring system devised from a food frequency questionnaire based on modified WHO-GSHS questionnaire (13). The dietary behavior score was calculated on the basis of answers in the following 5 domains; 1. Frequency of breakfast intake and skipping (10), 2. Frequency of junk food intake, 3. Frequency of soft drink intake, 4. Frequency of fruit intake, and 5. Frequency of vegetable intake.

The sleep duration at night was taken as adequate, if it was  $\geq 7$  hours and inadequate if  $< 7$  hours, based on previous researches on sleep and obesity associations (9). The age was taken from the school register for greater accuracy. A pilot study was conducted after Part A and B were incorporated in a single questionnaire and the pro-forma was tested and validated.

### 2.1. Ethical Issues

The multidisciplinary institutional ethical and research advisory committee approved the study. A written consent for the study was also taken from the parents and teachers of the students, in addition to the students themselves. Counseling, health education, and relevant advices were offered to all participants. Those who needed specialized care due to medical reasons were referred to the JN medical college, Aligarh. The results of the study were kept confidential and the investigator personally informed the parents, if required. All the students, who were found to have psychological morbidity were reviewed and referred to the Department of Psychiatry, J.N. Medical College and Hospital, Aligarh. The parents of those with borderline scores were advised for confidential review at the hospital apart from the relevant advices and counselling, which was given to each student.

### 2.2. Statistical Analysis

The weight and height of the students were entered in the WHO Anthro Plus software. The WHO Anthro Plus Software was used to calculate the Body Mass Index (BMI) and Z scores and for classification as overweight/obese;

the details of which are available in a previous publication (8). The data from Anthro Plus was imported with all the other data to statistical product and service solutions (IBM SPSS Statistics) version 20, for further statistical calculations. The socio-demographic characteristics were measured through frequency and percentages. Chi-square tests were applied to determine the association between psychological morbidity and socio-demographic (age, gender, and standard of living index) and other physical health parameters, including physical activity status, nutritional status, dietary behavior, and sleep duration at night. Later, multivariate analysis was applied to find the association of psychological morbidity and socio-demographic factors, to adjust all the confounding factors. The 'enter' method of selection was used for regression analysis and all the socio-demographic and physical health characters were selected for multivariate analysis.

### 3. Results

A total of 1456 students were sampled for the study, out of which 733 were males and 723 were females. The prevalence of psychological morbidity was 9.75% (142 out of 1456), whereas 18.48% (269 out of 1456) were found to be on the borderline scores. Remarkably, the prevalence of those with borderline scores was almost twice the number of students, who were found to be morbid. The socio-demographic, baseline, and physical health characteristics of the students are presented in Table 1. In chi square analysis, physical inactivity, overweight/obesity, poor dietary behavior, and sleep duration inadequacy were found to have a significant association with psychological morbidity.

Furthermore, multivariate analysis was applied to find the association between psychological morbidity, physical health characteristics, and sociodemographic factors (Table 2). The adjusted odds ratio of being physically inactive was 1.78 (1.10 to 2.87) in psychologically morbid adolescents, whereas it was 54.57 (32.67 to 91.17) for obesity. Psychological morbidity was also associated with inadequate sleep duration at night and poor dietary behavior, the odds being 1.69 (2.34 to 12.56) and 7.46 (2.90 to 19.16), respectively (Table 2). Among socio-demographic factors, psychological morbidity was higher in those who had a higher standard of living index.

### 4. Discussion

The prevalence of psychological morbidity was found to be 9.75% in the present study. This study was conducted with the objectives of finding an association between psychological morbidity and nutritional status, physical activity, sleep duration, and dietary behavior. The study found

that psychological morbidity was associated with a higher odds' of physical inactivity (1.78), overweightness/obesity (54.57), sleep duration inadequacy (1.69), and poor dietary behavior (7.46).

As far as the prevalence of psychological morbidity in India is concerned, the other studies in India reported psychological morbidity as 12% (20), 13.76% (21), 17.8% (22), 20.12% (23), and 29.5% (24) in similar age groups in different cities of India. This wide variation could be primarily attributed to 2 reasons. The first reason was the difference in the nature of the diagnostic tools used. Among the mentioned studies, a variety of screening tools were used, such child behavior check list (CBCL) (20), youth self-report (YSR) (21, 24), youth report of pediatric symptom checklist (22) and childhood psychopathology measurement scale (CPMS) (23). Additionally, some of the researchers used international classification of diseases- tenth edition (ICD-10) for confirmation of these diagnoses (20, 22, 23). The second reason for the variation was the difference in types of disorders included in the prevalence, which also leads to a lack of comparability across these studies.

The association of physical inactivity and psychological morbidity was present in the current study despite the adjustment of all the confounding factors. This may be due to psychosocial, physiological or biochemical factors, or their combination (25). This is also in-line with another GSHS-based study, conducted among 23,372 adolescents of 6 middle-income countries, which found an association between low physical activity and anxiety or loneliness, although not with depression (26). The association has also been found to be true in studies conducted in the United Kingdom and Iran (27, 28).

As far as the association of psychological morbidity with obesity is concerned, theories on the two-way association, where either obesity or psychological morbidity could lead to the other are known (29). Psychological morbidity could lead to obesity due to behavioral (unhealthy lifestyle), biological (side effects of medication), psychological (low expectations of weight loss measures), and social factors (29). Similar findings of association have been reported by other studies, as well (30, 31).

Inadequate sleep duration at night was also significantly associated with psychological morbidity. Becker et al. and Shanahan et al. have also reported an association between psychological morbidity and insufficient sleep (32, 33). Other studies have also found an association between short sleep duration and internalizing as well as externalizing behavioral problems (34, 35).

Poor dietary behavior was also significantly associated with psychological morbidity. A study on children, based on SDQ, found a significant association between junk food intake and childhood behavioral problems (36). The many

**Table 1.** Socio-Demographic and Baseline Characteristics Associated with Psychological Morbidity<sup>a</sup>

Variable (n)		Psychological Morbidity	Normal	Statistical Test
Age, y	13 (473)	46 (9.7)	427 (90.3)	$\chi^2 = 0.50, df = 2, P = 0.78$
	14 (509)	53 (10.4)	456 (89.6)	
	15 (474)	43 (9.1)	431 (90.9)	
Gender	Female (723)	65 (9.0)	658 (91.0)	$\chi^2 = 0.95, df = 1, P = 0.33$
	Male (733)	77 (10.5)	656 (89.5)	
Standard of Living Index	Medium and Low (876)	76 (8.7)	800 (91.3)	$\chi^2 = 2.90, df = 1, P = 0.09$
	High (580)	66 (11.4)	514 (88.6)	
Physical Activity Status	Active (514)	35 (6.8)	479 (93.2)	$\chi^2 = 7.82, df = 1, P < 0.001$
	Inactive (942)	107 (11.4)	835 (88.6)	
Nutritional Status	Normal (1249)	36 (2.9)	1213 (97.1)	$\chi^2 = 471.15, df = 1, P < 0.001$
	Overweight/Obese (207)	106 (51.2%)	101 (48.8)	
Dietary Behavior	Good (384)	8 (2.1)	376 (97.9)	$\chi^2 = 57.65, df = 2, P < 0.001$
	Poor (291)	57 (19.6)	234 (80.4)	
	Fair (781)	77 (9.9)	704 (90.1)	
Sleep Duration at night	Adequate (1109)	78 (7.0)	1031 (93.0)	$\chi^2 = 39.09, df = 1, P < 0.001$
	Inadequate (347)	64 (18.4)	283 (81.6)	

<sup>a</sup>Values are expressed as No. (%).

**Table 2.** Physical Health and Socio-Demographic Characteristics Associated with Psychological Morbidity<sup>a</sup>

Variable		$\beta$ Coefficient	Odd's Ratio	P Value	95 % CI
			Reference Category		
Physical Activity Status	Active <sup>b</sup>				
	Inactive	0.58	1.78	0.02	1.10 - 2.87
Nutritional Status	Normal <sup>b</sup>		Reference Category		
	Overweight/Obese	4.00	54.57	0.000	32.67 - 91.17
Dietary Behavior	Good <sup>b</sup>		Reference Category		
	Poor	2.01	7.46	0.000	2.90 - 19.16
	Fair	2.14	8.52	0.000	3.36 - 21.61
Sleep Duration at night	Adequate (ASDN)		Reference Category		
	Inadequate (IASDN)	1.69	5.42	0.000	2.34 - 12.56
Age, y	13 <sup>b</sup>		Reference Category		
	14	-0.14	0.87	0.636	0.48 - 1.56
	15	-0.10	0.90	0.731	0.50 - 1.62
Gender	Female <sup>b</sup>		Reference Category		
	Male	0.50	1.65	0.177	0.80 - 3.43
Standard of Living Index	Medium and Low <sup>b</sup>		Reference Category		
	High	1.64	5.18	0.000	2.92 - 9.19

<sup>a</sup>R<sup>2</sup> = 0.536, Multivariate adjustment for all the variables in the table.

<sup>b</sup>Reference.

psychosocial correlates of poor eating behavior in children and adolescents was also highlighted in a review of 77 selected articles (37).

Psychological morbidity's association with physical health factors like obesity and physical inactivity is alarming if we considering the increase in non-communicable diseases in India. In addition, psychological morbidity is also related to inadequate sleep duration at night and poor

dietary behavior.

This study had certain limitations as well. It was based on a self-administered pro-forma and has not used a multi-informant method of assessment. The study only included the school attending adolescents and therefore must not be taken as the true prevalence of the entire population of adolescents, as it didn't include the children with special abilities. Whether a prior detection of these disorders has

a long-term benefit in the overall outcome is something, which has not been researched in depth. Also, the so-called implications on physical health factors cannot be temporally associated, and the classic chicken and egg situation, which is a deficiency of cross sectional studies, remains.

#### 4.1. Conclusions

Psychological problems are present in seemingly normal school-going adolescent population in India. Despite the need, there is a dearth of studies conducted in this crucial age group in India. Most of these students and their parents/teachers are either unaware of this problem or think that these problems are not worthy enough of attention. The association of these problems with lifestyle, dietary behavior and physical activity deserves special attention, although little could be said about the cause or temporal relation with psychological morbidity.

School mental health and social services have the potential to detect psychological disorders by assisting in the assessment, referrals, and management of affected students as well as propagating healthy dietary behavior, physically active lifestyle, and importance of adequate sleep habits. Thus, psychological morbidity should be evaluated and screened in apparently normal adolescents because it increases the likelihood of adverse physical health and behavior.

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