Austin Journal of Psychiatry and Behavioral Sciences

Open Access

Austin Publishing Group

Research Article

Determinants of Psychological Impairment in Rural Adolescent Girls from the KONKAN Region in the State of Maharashtra, India

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Received: November 19, 2020; **Accepted:** December 31, 2020; **Published:** January 07, 2021

Abstract

Aim: Adolescence is the stage of life in which a child transitions into an adult. It is characterized not only by accelerated growth, sexual maturation but there are complex psycho-social interactions during this period which play a major role in subsequent mental health.

Methods: In a cross-sectional study we examined the mental health of 1521 school/college going adolescent girls from Dervan area of the KONKAN region using Youth Pediatric Symptoms Checklist (YPSC). We also performed anthropometry (height, weight and BMI), clinical examination and collected socioeconomic data.

Results: The girls had a mean age of 14.7 years (±1.7 years). About 80% had reached menarche with mean age at menarche of 13.1 years (±1.0 years). About 9% girls had at least 3 clinical disorders. Overall, 24% adolesecent girls were classified as psychologically impaired. Significant risks of psychological impairment were observed in those with higher education (risk 2.15, $p<0.001$), lower family income (1.54, $p<0.05$), increased age (1.72, $p<0.001$), multiple clinical disorders (2.17, $p<0.001$), being post menarchal (2.1, $p<0.01$). On multivariate analysis, all of the above except BMI and age independently predicted psychological impairment. Odds ratios with 95% confidence intervals were 2.40 (1.29, 4.47) for higher education, 1.53 (1.06, 2.20) for lowest family income, 1.77 (1.17, 2.67) for being post menarchal and 2.10 (1.36, 3.25) for those with at least 3 clinical disorders.

Conclusions: Our results from rural KONKAN suggest the need by health care workers to look at socioeconomic factors as well as simple clinical indicators to assess the metal health of an adolescent girl.

Keywords: Adolescents; KONKAN; Impairment; YPSC; India

Introduction

Psychological wellbeing in adolescence is vital for maintaining social and emotional practices. Factors affecting mental health are healthy sleep patterns, regular exercise, family and school surroundings, development of coping. Worldwide 10-20 % of adolescents suffer psychological health problems [1]. A recent meta-analysis report from India found about 6.5% community prevalence of child and adolescent psychiatric disorders. The figure was 23% for school prevalence [2]. Epidemiological studies have shown that almost half of mental health problems start by 14 years of age [3]. According to WHO [4], 20% of children and adolescents experience a disabling psychological illness, half of which begin by the age of 14. Sexual development coupled with nutrition and puberty may impact physical health and behavior [5]. (Cameron, 2004) Early menarche has been linked with more rates of depression in early middle adulthood as mental health problems in adolescence did not diminish but continued to persist in adulthood thus posing the adolescent girls to develop irreversible psychological problems [4]. Thus, health care providers should be aware of mental health risks in adolescence. According to 34-country report on socioeconomic inequalities, adolescents with a low Socioeconomic Status (SES) were most affected by psychological and physical symptoms [6]. There are many studies reporting association between low (SES) and mental health problems in childhood and adolescence [7-9]. In many such studies the SES has been measured by the household per capita income, parental education and parental occupation status. Indian girls suffer multiple barriers of gender bias, superstitions and communal norms. This ultimately affects their learning, cognition and academic performance [10].

KONKAN area is a narrow strip of land along the coast of the western Indian state of Maharashtra. It has a difficult geographical terrain.

BKL Walawalkar Hospital is situated in the village of Dervan in KONKAN. Since its inception in 1996 it has been providing the health service to the surrounding community with holistic approach. All the services offered under these programs are offered free of cost. It launched adolescent community program 10 years ago. Under this program adolescent girls are brought to the hospital for 4 day residential camp. Counseling sessions are held on sexuality,

Citation: Patil SN, Chavan R, Jadhav D, Modak A, Sonawane S, Dervankar O, et al. Determinants of Psychological Impairment in Rural Adolescent Girls from the KONKAN Region in the State of Maharashtra, India. Austin J Psychiatry Behav Sci. 2021; 7(1): 1075.

menstruation, menstrual hygiene. Medicines are given for those diagnosed with anemia. In addition, the adolescent girls also undergo dermatological, ophthalmic, gynecological and dental investigation. Further treatment if needed is given. We conducted a cross sectional study among adolescent girls and examined the associations between SES, physical health and psychological health.

Methods

Adolescent community program is conducted throughout the year, where adolescent girls between ages 10-18 are recruited from schools and colleges in the region. They are visited every 6 months.

Sample selection and data collection

We recruited 1923 adolescent girls from 26 schools and 5 colleges covering 55 villages in Ratnagiri district of KONKAN region. These schools/colleges were never visited in last 6 months. Socioeconomic information was collected using questionnaire. All the participants underwent clinical, physical examination. Following data was collected. Socioeconomic data: Education of adolescent girl, birth order and family details (number of siblings, family type and family size), housing (type of house, number of living rooms) and annual income was collected.

Clinical information: Age at menarche, clinical signs (hair falling, dark circle around eyes, koilonychias, dandruff, pallor and clubbing, history of getting tired easily). Physical examination: Subjects underwent anthropometric assessment. We measured height, weight using standardized protocols. BMI was calculated. Stunting and underweight in adolescent girls was defined using World Health Organization (WHO) standards [11].

Psychological assessment: We used Youth self-report Pediatric Symptoms Checklist (YPSC). It is a 35-part questionnaire related to cognitive, emotional and behavioural characteristics [12-13]. Each item is scored as 0,1 or 2. Individuals with net score >=30 is labeled as psychologically impaired. In addition, it also generates scores for 3 domains namely internalizing problems (e.g. anxiety, depression etc.), attention, externalizing problems (e.g. conducive behavior, aggressive behavior etc.). The questionnaire indicates only the likelihood that a youth is at risk for a psychological impairment. The study period was June 2019-December 2019.

Ethics and consents

Written informed consent was obtained from at least one of the parents of the adolescent girls who were under 18 years of age. Written informed assent was obtained from the adolescent girls under 18 years of age and written informed consent was obtained from those above 18 years of age. In case of absence of both the parents written informed consent from their close relative or a school teacher was taken. Our recruitment took place on school/college premises hence we also took the permission of the school authorities. Permission was also obtained from Institute Ethics Committee of BKL Walawalkar Rural Medical College and Hospital. Committee is registered with government of India and the registration code is EC/755/INST/MH/2015/RR-18.

Statistical analysis

Data is represented by mean, standard deviation, range (minimum-maximum) for continuous variables and frequencies and % for categorical variables. We created quartiles of BMI. Data on various clinical signs divided in to 3 groups based on number of various signs detected (1-No signs, 2: 1-2, 3: 3 or more). Risks with 95% Confidence Intervals (CI) for psychological impairment were calculated. First univariate risks were calculated using each individual variable in the demographic data, anthropometry data (stunting and BMI) and clinical findings as exposures. Exposures which were significantly associated with risk of psychological impairment were put on a multiple logistic regression model and Odds Ratios (OR) with 95% CI were obtained. Data was analyzed using SPSS 25.0.

Results

We excluded 421 girls who were more than 18 years old. Thus, our final sample for the analysis consists of 1521 adolescent girls. YPSC data. About 24% adolescents could be classified as psychologically impaired. Impairment proportion on 2 domains (attention and externalizing) was small but that on the remaining domain (internalizing) was very high (40.5%) (Table 1). Demographic data. About 16% adolescent girls had no siblings and 50.4% were staying in nuclear family (Table 2). More than 75% families had at least 5 members and 19% came from lower economic strata based on their monthly income. Data on anthropometry and clinical signs. Mean age of the girls was 14.7 years with a standard deviation of 1.7 years (Table 3). About 80% girls in our sample had attained menarche and mean age at menarche was 13.1 years. Large proportion (33.8%) adolescents were stunted and underweight (33.3). Among clinical signs hair falling was reported by 27.7% and presence of dandruff was reported by 19% of adolescent girls. About 59% had normal clinical examination with no obvious signs of any disorder. About 9% had 3 or more signs of clinical disorders. On univariate analysis (Tables 4 and 5) adolescents who were at least above 8th standard, coming from lowest socio-economic status, lying in the 3rd quartile of BMI, post menarchal, being at least 15year of age and having multiple clinical signs were at high risk of psychological impairment. On multiple logistic regressions, all the exposures (except BMI) which significantly predicted psychological impairment on univariate analysis independently predicted psychological impairment.

Discussion

In our study, about 24% adolescent girls could be classified as psychologically impaired. Psychological impairment was associated with higher age, attainment of menarche, BMI, poor income (low SES), higher education on univariate analysis. All these exposures except BMI predicted impairment even on multivariate analysis. There

Table 1: YPSC (n=1521).

Parameters	
YPSC total score	23.7 (8.3), 1-54
Psychologically Impaired (≥30)	368 (24.2%)
Attention domain score	3.89 (1.93) 0-10
Attention (≥7)	139 (9.1%)
Internalizing domain score	4.16 (1.91) 0-10
Internalizing (≥5)	616 (40.5%)
Externalizing domain score	3.51 (2.3) 0-12
Externalizing (≥7)	180 (11.8%)

Mean (std dv), range for continuous parameters otherwise n (%).

Table 2: Demographic characteristics (n=1521).

Parameters		n (%)
Education standard	5-8	526 (34.6%)
	8-10	629 (41.4%)
	>10	364 (24%)
Birth Order	1	579 (38.1%)
	2-3	805 (52.9%)
	>3	137 (9.0%)
Number of siblings	0	245 (16.1%)
	1-3	1164 (76.5%)
	>3	112 (7.4%)
Type of family	Nuclear	766 (50.4%)
	Joint	385 (25.3%)
	Extended	370 (24.4%)
Family Members	1-4	360 (23.7%)
	5-6	662 (43.5%)
	>6	449 (32.8%)
Living Rooms	1-3	517 (34.0%)
	4	315 (20.7%)
	5	280 (18.4%)
	>5	409 (26.8%)
Type of House	kacha	230 (15.1%)
	Semi-pucca	976 (64.2%)
	Pucca	315 (20.7%)
Income (Indian Rupees / month)	<900	283 (18.6%)
	900-3000	237 (15.6%)
	3000-6000	342 (22.5%)
	>6000	659 (43.3%)

Table 3: Physical characteristics and clinical examination (n=1521).

Parameter	Mean (S.D.) /%	Range (minimum-maximum)
Anthropometry		
Age (years)	14.7 (1.7)	10.1-18.0
Attained menarche	1210 (79.6%)	
Age at menarche	13.1 (1.0)	10.0-17.0
Height (cm)	149.3 (7.5)	114.0-174.0
Stunted	514 (33.8%)	
Weight	38.0 (7.3)	18.7-79.0
Underweight	507 (33.3%)	
BMI (kg/m^2)	17.0 (2.9)	10.5-42.2
Clinical signs		
Hair falling	421 (27.7%)	
Dark circle around eyes	126 (8.3%)	
Nails: Koilonychias	5 (0.3%)	
Get Tired Easily	140 (9.2%)	
Dandruff	289 (19%)	
Pallar and clubbing	132 (8.7%)	
Summary of multiple clinical signs		
0-No signs	901 (59.2)	
1-2	489 (32.1)	
>2	131 (8.6)	

are studies exploring different aspects psychological health in Indian adolescents. A cross sectional community survey among children and adolescents (6-16 y age) in a southern Indian state of Kerala, hazardous alcohol abuse by parents, child abuse and physical neglect worsened child behavioral disorders [14]. Adolescents with history of child work were at an extremely high risk of poor mental health in a study done in north India [15]. A study done in the northern Indian city of Lucknow among adolescents staying in slums found mental health disorder prevalence of 33% and age, gender, education, SES were the main determinants [16]. A study from the western Indian state of Maharashtra among rural adolescents reported the depression prevalence of 60%. Disturbed family and harsh parenting were the main determinants [17]. All of these reports are from urban areas of the country. A study in the rural areas of southern Indian state of Pondicherry among adolescents with majority of boys in the study sample found association of better maternal education, middle level SES with positive mental health [18]. In a study done on more than 3000 tribal adolescent girls in the north Indian state of Jharkhand, 12% girls had problems associated with depression and anxiety [19]. There are very few reports of mental health of rural adolescent Indian girls. In a study from Indian state of Karnataka, 35% girls were psychologically distressed [20]. A study from rural district in north India found depression prevalence of 39% among adolescent girls [21]. Our institute has conducted a cross sectional study of psychological assessment of adolescent girls in surrounding area and found 78.5% prevalence of abnormal expression, poor hygiene, low decision making [22]. The present study was our first attempt to investigate the direct/ indirect associations between SES, physical health with psychological health in adolescent girls from KONKAN using YPSC. Most of these adolescents and their parents are either unacquainted of this problem or believe that these problems are not worthy of attention. But as our data shows they must deserve the attention of healthcare providers. Various scales, WHO questionnaires are used for assessing the mental health. We don't proclaim YPSC to be an ideal tool, but it was simple to administer. We had used it earlier and reported the association between poor nutritional status and psychological impairment using YPSC, but the sample size of this cross-sectional study was very small [23]. There are some shortcomings to our study. We could not collect blood samples to measure some mental health markers (For eg-cortisol). Also, our study is restricted to girls; hence we cannot comment on psychological impairment among adolescent boys. Psychological foundations are laid down throughout adolescent period. Adolescent period witnesses several psychosocial and physiological changes. A review by Romeo RD attributes these changes to heightened Hypothalamic-Pituitary-Adrenal (HPA) axis reactivity [24]. In a study of 44 healthy children and adolescents ages 10-15 years, different pace of maturation of affective and cognitive brain region laid to imbalance in neurocognitive processes making them susceptible to psychiatric disorders [25]. High prevalence of psychological impairment observed in girls attending menarche in our study could be due

Table 4: Univariate risks for psychological impairment (n=1521).

Exposures	Risk categories	Risks with 95% confidence intervals
Education standard	5-8	1 (ref)
	8-10	1.63 (1.22,2.18)**
	>10	2.15 (1.57,2.94)**
Birth Order	1	1 (ref)
	2-3	0.9 (0.7,1.16)
	>3	1.3 (0.86,1.96)
Number of siblings	0	1 (ref)
	1-3	1.11 (0.80,1.55)
	>3	1.18 (0.70,1.99)
Type of family	Nuclear	1 (ref)
	Joint	1.04 (0.76,1.41)
	Extended	1.24 (0.91,1.67)
Family Members	>6	1 (ref)
	5-6	1.04 (0.78,1.39)
	1-4	1.16 (0.83,1.62)
Living Rooms	>5	1 (ref)
	5	1.02 (0.69,1.50)
	4	1.08 (0.74,1.57)
	1-3	0.98 (0.70, 1.37)
Type of House	Pucca	1 (ref)
	Semi-pucca	1.1 (0.81,1.54)
	Kacha	1.0 (0.65,1.55)
Income Per Month (INR)	>6000/-	1 (ref)
	3000-6000/-	1.3 (0.93,1.81)
	900-3000/-	1.20 (0.82,1.76)
	<900/-	1.54 (1.09,2.18)*
Stunting	Not-stunted	1 (ref)
	Stunted	0.87 (0.68,1.12)
BMI (kg/m^2)	Q_1 (10.5-15.1)	1 (ref)
	Q_2 (15.1-16.6)	1.16 (0.82,1.64)
	Q_3 (16.6-18.3)	1.57 (1.13,2.19)**
	Q_4 (18.3-42.2)	1.27 (0.90,1.78)
Menarche	No menarche	1 (ref)
	Attained menarche	2.06 (1.47,2.89)**
Age	10-14 y	1 (ref)
	14-15 y	1.37 (0.99,1.90)
	15-17 y	1.66 (1.24,2.24)**
	>17y	1.72 (1.15,2.57)**
Clinical signs	0-No signs	1 (ref)
	1-2	1.66 (1.28,2.14)**
	>2	2.17 (1.46,3.22)**

ref: Reference Category
Q_1, Q_2, Q_3, Q_4: Quartiles of BMI
*p<0.05, ** p<0.01, ***p<0.001.

to imbalance between neurocognitive processes and heightened hypothalamic pituitary adrenal axis reactivity. Adolescent care givers need to understand this physiology of psychological health and attempt to create awareness in the family about it should be made. Children and adolescents with low Socioeconomic Status (SES) suffer from mental health problems more often than their peers with high SES [26]. Low Socioeconomic Status (SES) families are and exposed to several stressors related to income, employment, social status and health issues [27-28]. Associations of presence of clinical signs with psychological impairment was the novel thing in our data. We have shown the univariate risks of psychological impairment in those with presence of multiple clinical signs in (Table 4) but we also found out risks for presence of individual clinical signs. They were 1.75, 95% CI (1.36, 2.25) for hair falling, 1.49 (1.0, 2.21) for dark circle around eyes, 2.28 (1.59, 3.27) for getting tired easily, 1.55 (1.17, 2.05) for dandruff and 1.64 (1.12, 2.40) for pallor and clubbing. The risk associated with koilonychias was not significant. This could be due to very small number (only 0.3%). A study from Korea found association of presence of dark circle under eyes with anger, anxiety, depression and sleep disturbance [29]. (Ilkoo Ahn, et al., 2019) though we do not have any measures of these. Poor nutrition, not eating enough healthy food can contribute to hair loss. We have already demonstrated association between poor nutrition and psychological impairment [23], thus risk of psychological impairment in those with reported hair falling could be mediated by poor nutrition as body isn't getting enough protein, vitamins and minerals to support hair growth. In our study, impairment on 2 domains attention and externalizing was small but that on the remaining domain (internalizing) was very high. Internalizing was more evident in girls with low socioeconomic status (Data not shown). Low SES has been reported as a major

Table 5: Multiple logistic regression of psychological impairment (n=1521).

Exposures	Risk categories	Odds ratios with 95% confidence intervals
Standard	5-8	1 (ref)
	5-10	1.39 (0.89, 2.17)
	>10	2.40 (1.29, 4.47)**
Income	>6000/-	1 (ref)
	3000-6000/-	1.24 (0.88, 1.75)
	900-3000/-	1.13 (0.76, 1.69)
	<900/-	1.53 (1.06, 2.20)*
BMI (kg/m^2)	Q_1 (10.5-15.1)	1 (ref)
	Q_2 (15.1-16.6)	0.94 (0.64, 1.39)
	Q_3 (16.6-18.3)	1.19 (0.81, 1.74)
	Q_4 (18.3-42.2)	0.90 (0.60, 1.3.5)
Menarche	No menarche	1 (ref)
	Attained menarche	1.77 (1.17,2.67)**
Age	10-14 y	1 (ref)
	14-15 y	0.89 (0.57,1.41)
	15-17 y	0.65 (0.37,1.13)
	>17y	0.49 (0.24,0.39)
Clinical signs	0-No signs	1 (ref)
	2 (1, 2)	1.70 (1.27, 2.26)***
	3(>2)	2.10 (1.36, 3.25)***

ref: Reference Category
Q_1, Q_2, Q_3, Q_4: Quartiles of BMI
*p<0.05, ** p<0.01, ***p<0.001.

determinant of internalizing problems in 11 y old adolescents [30]. Few studies on obesity and psychiatric health of obese adolescents have indicated that obese adolescents also often have psychological issues, such as impaired self-awareness, low self-esteem, inferiority, anxiety and depression and autonomic function, along with a lack of social adaptability [31]. In our study also though there were fewer adolescents with obesity but on univariate analysis they still had positive association with psychological impairment.

To conclude propitious attention to risk factors for psychological health in adolescents need to be identified and treated sensibly as adolescent period is reflected as a healthy period of life and is usually neglected by parents and teachers. Future long term studies are needed to distinguish mechanism of development of socio economic and physical, nutritional factors and psychological weakness in adolescents.

Funding

Study was undertaken as a part of hospital's community program for adolescents. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Acknowledgement

We thank parents of the adolescent girls for giving the consent to study their adolescent girl. We would like to extend our special thanks to school/college authorities for extending the full cooperation to carry out the study on their premises.

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