Coping styles to vitiate the risk of psychological morbidities among pre/para-clinical and clinical undergraduate medical students: a comparative cross-sectional study in India

Sunny Garg[1]* , Alka Chauhan[1], Devesh Sharma[2], Anchal Sharma[3] and Sanjeet Singh[4]

Abstract

Background: Psychological morbidities are high among undergraduate medical students. They experience the transition between pre/para-clinical and clinical training as a stressful period and cope differently. Research from India in this regard are lacking. The aim of this study is to assess and compare the prevalence of psychological morbidities, associated factors and coping styles between pre/para-clinical and clinical undergraduate medical students. This institution-based cross-sectional observational design study was conducted among pre/para-clinical and clinical group of undergraduate medical students (a total of 382) by using a questionnaire in the period between April and June 2021. Stratified random sampling technique was used to select the study participants. The survey included standard self-administered questionnaires like GHQ-28 and Lin-Chen's coping inventory to assess psychological morbidities and coping styles, respectively. Associated factors for psychological morbidities, and coping styles between two groups, were compared using chi-square test, independent t-test and binary logistic regression analysis.

Results: Out of the 382 responders, psychological morbidities (GHQ-28 score > 23) were found in 61% participants. Both groups reported high level, a slightly higher preponderance in clinical (61.5%) than pre/para-clinical students (60.6%) and with nonsignificant difference of psychological morbidities. Compared to pre/para-clinical group, clinical group was found to have more substance consumption behavior ($p < 0.001$), dissatisfaction with academic performance ($p < 0.001$), sought psychiatric consultation ($p < 0.004$) and currently on psychiatric treatment ($p < 0.04$). Overall, coping was found to be average and good among the participants. Active problem coping behavior was more significantly used by pre/para-clinical group, while passive problem coping and passive emotional coping behaviors were positively significantly correlated with psychological morbidities in clinical group.

Conclusions: This study established a significant correlation between psychological morbidities and passive coping styles in clinical group. These students need interventions to encourage the use of more active coping styles during the training to provide advances in future career. A strong correlation with dissatisfied academic performance may be a call for an efficient and more student-friendly curriculum.

*Correspondence: docter.sunny@gmail.com
[1] Department of Psychiatry, Bhagat Phool Singh Government Medical College for Women, Khanpur Kalan, Sonipat, Haryana 131305, India
Full list of author information is available at the end of the article

Background

The study of medicine including vigorous training schedule is distinctive and more mentally challenging than any other professional courses worldwide [1]. Undoubtedly, this unique and highly systematic competency-based curriculum in itself is highly stressful and jeopardizes the emotional and mental well-being of the students which develop the burnouts throughout the study courses [2–4]. Previous literature has confirmed that poor mental health was a predictor of a cascade of psychological morbidities such as depression, anxiety, suicidal behavior and substance abuse [5–8]. A recent survey in India [9] revealed that 60.3% of medical students had psychological morbidities which was much higher than other studies conducted in the past where the prevalence rate reported ranged between 20 and 50% [10–12]. This growing evidence of untreated psychological morbidities in medical students is attributed to barriers in seeking psychiatric consultation, which has been a prime concern for mental health authorities [13]. A nationwide survey in Brazil [14] showed a higher prevalence (30.8%) of psychological problems among first-year medical students as compared to the final-year students (9.8%), while other authors have reported notable rise in prevalence with progressing years of study [1, 15, 16]. Considerable literature has also suggested a constant prevalence of psychological morbidities in medical students throughout the medical course [17].

The transition from theoretical framework to clinical phase has been identified as a crucial stage in medical training, regarding student's stress [18]. Students in clinical training were distinct from pre/para-clinical undergraduate students (UGs) in many ways and thus are likely to encounter different stressors. The most obvious difference is that all clinical UGs in addition to examination stress also have intense emotional experiences while interacting with dying patients, interpersonal problems with patients and work overload [19, 20], while pre/para-clinical UGs who tend to be school passouts or at most have taken a "gap year" face a transitional environment of professional college life which compels them to acquire new skills for peer competition, difficulties envisaged for integration into system, separation from family, unlimited parental expectations and academic stress [21, 22]. Existing findings in literature concerning the relationship between psychological morbidities and phase of study are still controversial. A study from India identified a much higher prevalence of psychological distress in pre/para-clinical students (91%)

as compared to their counterparts (81%) [20]. A study from Canada and Iran revealed that clinical UGs experienced greater level of psychological distress than pre/para-clinical UGs [23, 24].

At the same time, stress drives medical students to develop certain cognitive skills and behavioral strategies to reduce or tolerate the stressful situations [25]. Few studies consistently demonstrated that active coping styles of constructive actions could generate problem-solving behavior and emotion regulations [26], while passive coping skills focused on emotion expression, negative appraisal and social isolation could enhance the risk of psychological morbidities during confronted stressful situations [27, 28]. It was noted that self-blame and denial were used mainly by first-year medical students, while later-year students shifted towards cognitive, confronting and planned problem-solving strategies [22]. In addition to having different and perhaps more severe stressors, given their maturity and greater life experiences, clinical UGs are likely to use different coping styles compared to their counterparts, but how their respective coping behavior might also differ remains relatively unclear.

There has been extensive research on psychological morbidities, associated factors and coping styles and relationship with year of study in medical students [9, 10, 14–16], but the literature is inconsistent in Indian medical students [5] which evaluated and compared the psychological morbidities and coping styles in pre/para-clinical and clinical group of UGs. These assessments become imperative prior to designing and implementing the interventions to preserve their mental health and reduce psychological morbidities. Therefore, the present study sought to assess and compare the magnitude of psychological morbidities, factors associated with it and the coping styles between pre/para-clinical and clinical UGs in an institution located in northern India. This study also evaluated and compared the association between psychological morbidities and associated factors among both the study groups.

Methods

Study design and settings

This is a cross-sectional and comparative questionnaire-based descriptive study conducted from April 2021 to June 2021, among undergraduate medical students at a tertiary care teaching institution located in northern India. Currently, a total number of 540 undergraduate

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medical students are enrolled in this institution including interns (100). Around 440 students, studying in academic year 1 (preclinical) and academic year 2 (para-clinical), which mainly focus on basic science subjects, were enrolled in pre/para-clinical group, and students from academic year 3 and academic year 4, which focuses on clinical subjects, were enrolled in clinical group. This study was carried out after getting ethical approval from the Institutional Ethical Committee Board and in accordance with ethical committee standards and the Helsinki Declaration. During the study, the anonymity and confidentiality of the responses given by the participants were assured and maintained as their personal information like name or contact was not asked.

Sample size

The study's required sample size ($N = 382$) was calculated by using single population proportion formula. It was calculated on the basis of following assumptions: nearly 50% of the students would have psychiatric morbidities (P), and the absolute precision is 5% (d), at 95% confidence interval (Z).

$$SAMPLE\ SIZE\ (N) = \frac{Z^2 P(1-P)}{d^2}$$

Study sample

Students from all the batches of undergraduate course, aged 18 years or older (both male and female), able to read and understand English and willing to give informed consent, were included in the study, while internship batch and students not willing to provide informed consent were not included in the study.

Sampling and data collection procedure

A stratified random sampling method was applied to make the strata of the students of each group, and then the total sample size was allocated proportionately to each group of undergraduates. Finally, computerized generated random number table was used to select and enlist each study participant to get a calculated sample size of 382 (pre/para-clinical group: 208 out of 240 students and clinical group: 174 out of 200 students). This sampling method was applied, as study population is homogenous and readily available. In order to avoid the effect of examination stress, the questionnaires were distributed among the students 2 weeks before any major class test or examination. The purpose of the study and importance of the honest answers were briefed to the participants, and privacy and confidentiality of their information were also assured. Then, the hard copy of the questionnaire with detachable information sheets about the study was distributed to the selected participants by hand in their classrooms before lectures and during posting hours, and written informed consent was obtained from them before eliciting the required information. All the respondents were instructed that they could ask any question about the study before their participation. At the end of the description, helpline numbers/email address was provided for those in need of professional help.

Data collection measures

The students were administered with the self-administered, pretested, validated and semi-structured questionnaires which had six sections (i to vi), consisting of (i) brief information regarding the study purposes which explained the importance of the study, (ii) written informed consent and (iii) about the sociodemographic information of the students. Section 4 consisted of questions regarding academic and personal characteristics of the students. Section 5 consisted of 28 questions related to General Health Questionnaire which measures psychological morbidities. The last part of the questionnaire (section 6) had the coping inventory to analyze the coping styles adopted by students. The questionnaires regarding sociodemographic profile, and academic and personal profile of the students, were created by two authors after an extensive literature research which were pretested and validated [8–20].

Sociodemographic profile proforma

It consisted of eight questions — current age, gender (male/female), place of residence where the student was born/raised before entering the course (urban/rural), type of family (nuclear/joint), living status during the course of study (hosteller/day scholar), average hours of sleep per day (< 6 h or > 6 h), about their current substance (tobacco/alcohol/cannabis/opioid) consumption status (yes/no), and doing exercises (< 3 days per week or ≥ 3 days per week).

Academic and personal profile proforma

This section of the survey had six questions — academic phase (pre/para-clinical batch or clinical batch), level of academic performance (satisfied/not satisfied), motive for studying medicine (personal/family pressure), family history of psychiatric illness (yes/no), sought psychiatric consultation during the semester (yes/no) and currently taking antidepressant/benzodiazepine/any other psychotropics (yes/no).

General Health Questionnaire-28 (GHQ-28)

It is a validated and standardized self-administered 28-item tool, used to identify potential nonpsychotic psychiatric morbidities. The questionnaire refers to the symptoms experienced in last few weeks and is therefore

an indication of state rather than trait characteristics at a point in time. It has four subscales for the assessment of somatic function (Q1 to 7), anxiety and insomnia (Q8 to 14), social dysfunction (Q15 to 21) and severe depression (Q22 to 28). This is a 4-point Likert scale ranging from 0 to 3, signifying "0 = not at all," "1 = no more than usual," "2 = rather more than usual," and "3 = much more than usual." The total score has ranged from 0 to 84. A cut-off score > 23 was used in the present study to define an abnormal GHQ score/probable case [29]. The Cronbach's alpha of the reliability for the GHQ-28 has been reported to vary from 0.78 to 0.95 [30]. The Cronbach's alpha of scale in the present study is 0.860, presenting good internal consistency reliability.

Coping inventory

The coping techniques employed by the participants were assessed by the coping style inventory developed by Lin and Chen [31] which consists of 28 items. The instruction in the scale given to students was "How do you deal with it when you face problems during this semester?" It was designed as Likert's 5-point scale where scores were ranging from 1 to 5 with 1 being "completely disagree" and 5 being "completely agree." The Cronbach's alpha value of internal consistency for this inventory was reported by them to be 0.830 [31]. In the present study, minor changes were made in the scale as item numbers 2, 3, and 18 of original scale were not much different from other items. So, it was shortened to 25 questions during content validation phase by two authors and validated by pilot testing before the use in current study. This questionnaire was tested on thirty students (15 each from pre/para-clinical and clinical group students) as a pilot study. None of these students faced any difficulty in either understanding or answering the questions. Minor changes were suggested in articulation and vocabulary of the items, and changes were made by experts. These responses were not included in the final study. This scale measures four coping behaviors, i.e., active emotional coping (item 1 to 6), passive emotional coping (7 to 13), active problem coping (14 to 18), and passive problem coping (19 to 25) behavior. Scores are summed, and when it ranged from 25 to 58, then overall coping was rated as poorly adoptive, from 59 to 92 as average, and 93 to 125 as good. The validity of this questionnaire was found to be 0.896, showing good internal reliability.

Statistical analysis

The data was entered and analyzed using SPSS 25.0 (IBM, Chicago, IL, USA). Cronbach's alpha coefficient was used to assess the internal consistency of the scales. Categorical variables were calculated as frequencies and percentages, and continuous variables were calculated as mean and standard deviations. Initially, univariate association between psychological morbidities and multiple variables was performed by using chi-square test for categorical variables and independent student "t"-test (parametric) and Mann-Whitney U-test (nonparametric) for continuous variables. Pearson's correlation test was performed to find out the correlation between the variables and psychological morbidities. Binary logistic regression analysis was applied to explore the contributory factors associated with psychological morbidities. The effect of each of the independent variable was adjusted for few sociodemographic factors which were considered to be potential confounders, viz. current age, gender, residence, type of family, and current living status, in separate binary regression model. Then, results as adjusted odds ratios (aORs) and confidence interval (95% CI) were used to evaluate the strength of association between independent variables and psychological morbidities. Statistically, significant level was set at $p < 0.05$ (two-tailed).

Results

Three-hundred and eighty-two medical students were enrolled in the present study. The majority of participants were female (62%; $n = 239$), and the mean age of the sample was 20.40 ($SD = 1.85$) years with a range of 18–26 years. As expected, the mean age of clinical group (21.90 years; SD: 1.58) was significantly ($p < 0.001$) higher as compared to pre/para-clinical group (19.15 years; SD: 0.87). Most of the respondents in both the study groups were members of nuclear families and coming from rural areas. Around 90% of students were staying in hostel premises. Furthermore, majority of the students (60%) used to sleep for more than 6 h per day on an average and did not participate in exercise for ≥ 3 days/week. Around 29% respondents are currently consuming one or more substance, with statistically significant higher proportion in clinical group than another group of students (38.5 vs. 20.2; $p < 0.001$) (Table 1).

The distribution of responses to the items of academic and personal characteristics of students, shown in Table 2, demonstrated that most of the respondents were dissatisfied with their academic performances, while only 12–19% of the students cited that they were currently on psychiatric treatment, sought psychiatric consultation, studying medicine under family pressure or had family history of psychiatric illness. When the differences between two groups were evaluated, the clinical group had statistically significant higher proportion of participants with dissatisfied academic performance (72.4 vs. 52.8; $p < 0.001$), had sought psychiatric consultation during this semester (20.1 vs. 9.6; $p = 0.004$), and were currently on psychiatric treatment (16.1 vs. 9.1; $p = 0.04$).

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Table 1 Comparison of sociodemographic variables between pre/para-clinical and clinical group of participants

Sr. no.	Variables	Frequency (%)				(Chi-square value) *p*-value
		Subgroups	Total medical students (*N* = 382)	Pre/para-clinical group (*N* = 208)	Clinical Group (*N*=174)	
1	Gender	Female	239 (62.4)	129 (62)	110 (63.2)	(0.058) 0.832
		Male	143 (37.6)	79 (38)	64 (36.8)	
2	Residence (born/raised before entering the course)	Rural	267 (69.9)	149 (71.6)	118 (67.8)	(0.657) 0.435
		Urban	115 (30.1)	59 (28.4)	56 (32.2)	
3	Type of family	Nuclear	261 (68.3)	141 (67.8)	120 (69)	(0.061) 0.826
		Joint	121 (31.7)	67 (32.2)	54 (31)	
4	Living status during the course	Hostel	345 (90.3)	191 (90.8)	154 (88.5)	(1.195) 0.300
		Day scholar	37 (9.7)	17 (9.2)	20 (11.5)	
5	Average sleeping hours per day	< 6 h	152 (39.8)	82 (39.4)	70 (40.2)	(0.026) 0.917
		> 6 h	230 (60.2)	126 (60.6)	104 (59.8)	
6	Do you consume one or more substance (tobacco/alcohol/cannabis/opioid) currently?	Yes	109 (28.5)	42 (20.2)	67 (38.5)	(15.582) **< 0.001*****
		No	273 (71.5)	166 (79.8)	107 (61.5)	
7	Exercise status	< 3 days/week	229 (59.9)	124 (59.6)	105 (60.3)	(0.021) 0.917
		≥ 3 Days / week	153 (40.1)	84 (40.4)	69 (39.7)	

SD Standard deviation

***p < 0.001

Table 2 Comparison of academic and personal characteristics between pre/para-clinical and clinical group of participants

Sr. no.	Variables	Frequency (%)				*P*-value (Chi-square)
		Subgroups	Total medical students (*N* = 382)	Pre/para-clinical group (*N* = 208)	Clinical group (*N* = 174)	
1	Level of academic performance	Satisfied	142 (37.2)	94 (45.2)	48 (27.6)	(12.575) **< 0.001*****
		Dissatisfied	240 (63.8)	114 (54.8)	126 (72.4)	
2	Motive for studying medicine	Personal	317 (83)	172 (82.7)	145 (83.3)	(0.028) 0.892
		Family pressure	65 (17)	36 (17.3)	29 (16.7)	
3	Family history of psychiatric illness	Yes	72 (18.8)	33 (15.9)	39 (22.4)	(2.656) 0.116
		No	310 (81.2)	175 (84.1)	135 (77.6)	
4	Sought psychiatric consultation during this semester	Yes	55 (14.4)	20 (9.6)	35 (20.1)	(8.474) **0.005****
		No	327 (85.6)	188 (90.4)	139 (79.9)	
5	Currently on antidepressant/benzodiazepines/any other psychotropics	Yes	47 (12.3)	19 (9.1)	28 (16.1)	(4.250) **0.04***
		No	335 (87.7)	189 (90.9)	146 (83.9)	

*p < 0.05, **p < 0.01; ***p < 0.001

Psychological morbidities and coping styles

The descriptive statistics on different scales have been shown in Table 3. When the cutoff of 23 was used for GHQ-28, the overall prevalence of psychological morbidities among the study participants was 61%. The mean score on GHQ-28 scale was 30.95 (*SD* = 15.39) ranging from 7 to 79, with about 60.6% (126) of the pre/para-clinical group experiencing psychological morbidities, whereas that among the clinical group was found to be 61.5% (107), with nonsignificant difference. There was no significant difference between either the total GHQ-28 scores or every subscale means score of both groups.

Overall, the level of coping styles was found to be average among 317 (83%) and good among 65 (17%) participants. The mean score on coping style scale was 85.59 (*SD* = 6.87), with slightly higher in clinical group (86.02; *SD* = 6.54) than pre/para-clinical group (85.17; *SD* = 7.23). MBBS students in clinical group have slightly

Table 3 Comparison of GHQ-28 and coping style scores between pre/para-clinical and clinical group of participants

Sr. no.	Scale	Subscale	Mean (SD); frequency (%)			(*t*-test/Mann-Whitney *U*-test value) *p*-value
			Total medical students (*N* = 382)	Pre/para-clinical group (*N* = 208)	Clinical group (*N* = 174)	
1	GHQ-28	Somatic function[a]	7.89 (4.24)	7.95 (4.06)	7.83 (4.46)	(0.274) 0.784
		Anxiety and insomnia[a]	7.89 (5.10)	7.47 (4.89)	8.39 (5.31)	(−1.748) 0.081
		Social dysfunction	10.17 (3.93)	10.19 (3.88)	10.14 (3.98)	(0.135) 0.893
		Severe depression[a]	5.01 (4.98)	4.89 (4.69)	5.13 (5.32)	(−0.463) 0.644
		Total GHQ-28 mean score	30.95 (15.39)	30.50 (14.75)	31.48 (16.16)	(−0.617) 0.537
2	Coping styles	Active emotional coping (AEC)	23.22 (1.80)	23.20 (1.68)	23.25 (1.93)	(−0.323) 0.747
		Passive emotional coping (PEC)	22.46 (3.94)	22.44 (3.90)	22.47 (3.99)	(0.076) 0.939
		Active problem coping (APC)	18.01 (1.82)	17.78 (1.69)	18.28 (1.92)	(−2.702) **0.007****
		Passive problem coping (PPC)	21.87 (3.72)	21.75 (3.55)	22.02 (3.90)	(−0.704) 0.482

GHQ-28 General Health Questionnaire-28, *SD* Standard deviation

***p* < 0.01

[a] Mann-Whitney *U*-test (mean < 2 SD)

higher score than the other group for all the adopted coping styles. Among the coping styles, only active problem coping (APC) was found to be statistically significantly different ($p = 0.007$) and least commonly used (17.78; *SD* = 1.69) coping style among both the study groups, while other coping styles had no statistically significant difference in the mean scores.

Association of independent variables with psychological morbidities among study groups

In intragroup analysis among the pre/para-clinical group, it was observed that when respondents with and without psychological morbidities were compared for various independent variables, a higher number of students reported psychological morbidities; these students were those who were dissatisfied with their academic performance (74.6 vs. 24.4; $p < 0.001$), sleeping less than 6 h/day (56.3 vs. 13.4: $p < 0.001$), participating in exercise less than 3 days/week (82.5 vs. 24.4; $p < 0.001$), having family history of psychiatric illness (23 vs. 4.9; $p < 0.001$), studying medicine under family pressure (24.6 vs. 6.1; $p < 0.001$), and taking psychiatric treatment currently (13.5 vs. 2.4; $p < 0.01$) (not depicted in Tables). The moderate ($r < 0.2$–0.4) and strong ($r > 0.4$) statistically significant positive correlations emerged between these variables and psychological morbidities in pre/para-clinical group as depicted in Table 4.

Table 4 Comparison of correlation between independent variables and psychological morbidities among pre/para-clinical and clinical students (variables only with significant correlation are shown)

Sr. no.	Variables	Psychological morbidity (r)p	
		Pre/para-clinical students	Clinical students
1	Dissatisfied academic performance	**0.493****	**0.384****
2	Substance consumption behaviour	0.112	**0.335****
3	Average sleeping time (< 6 h)	**0.429****	**0.457****
4	Exercise (< 3 days/week)	**0.579****	**0.517****
5	Family history of psychiatric illness	**0.243****	**0.284****
6	Sought psychiatric consultation	0.063	**0.309****
7	Motive for studying medicine (family pressure)	**0.239***	0.005
8	Currently on psychiatric treatment	**0.287***	**0.250***
9	Passive emotional coping (PEC)	0.088	**0.607****
10	Passive problem coping (PPC)	0.050	**0.221***

r Pearson's correlation coefficient

***p* < 0.01; ****p* < 0.001

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Similarly, when respondents in clinical group with and without psychological morbidities were compared for various independent variables, it was found that a higher number of participants reported psychological morbidities, among those who were dissatisfied with their academic performance (86 vs. 50.7; $p < 0.001$), consuming one or more substances currently (51.4 vs. 17.9; $p < 0.001$), sleeping less than 6 h/day (57.9 vs. 11.9: $p < 0.001$), participating in exercise < 3 days/week (80.4 vs. 28.4; $p < 0.001$), having family history of psychiatric illness (31.8 vs. 7.5; $p < 0.001$), sought psychiatric consultation during this semester (29.9 vs. 4.5; $p < 0.001$), taking psychiatric treatment currently (23.4 vs. 4.5; $p < 0.01$), and used PEC and PPC coping styles as their stress-coping behaviors ($p < 0.001$) (not depicted in Tables). The moderate ($r < 0.2–0.4$) and strong ($r > 0.4$) statistically significant positive correlations were also shown between these variables and psychological morbidities in clinical group as depicted in Table 4.

When independent variables of participants with psychological morbidities among both the study groups were compared, it was seen that statistically significantly, a higher number of students in the clinical group were consuming one or more substances currently ($p < 0.001$) (Table 5), being dissatisfied with their academic performance ($p = 0.031$), sought psychiatric consultation during this semester ($p < 0.001$), and currently on psychotropics ($p = 0.049$) (Table 6). Students in clinical

group obtained statistically significantly ($p = 0.026$) higher APC score, whereas students in pre/para-clinical group obtained statistically nonsignificant higher AEC and PEC score and lower PPC score (Table 7).

Adjusted binary logistic regression analysis of psychological morbidities in pre/para-clinical and clinical groups

The results of cross-sectional association between independent variables and psychological morbidities in both study groups have been shown in Figs. 1 and 2, which depicted sole significant predictors of psychological morbidities. The participants in both the study groups who reported dissatisfaction with academic performance, average sleeping < 6 h per day, and doing exercises < 3 days/week were found to be more likely to have psychological morbidities. In clinical group, students who consumed substances like tobacco, alcohol or opioid were found to be more likely to have psychological morbidities ($p = 0.016$) when compared to those who did not.

Discussion

The medical students are expected to excel in academics and to dispense the best quality care to the patients in the future. In the present day, competition in every phase of medical training is at an all-time high and causes distress in medical students when they are unable to cope with it [9]. Medical training-related psychological morbidities

Table 5 Comparison of association of sociodemographic variables between pre/para-clinical and clinical students with psychological morbidities

Sr. no.	Variables	Subgroups	Mean (SD); frequency (%)		P-value (chi-square/t-test
			Pre/para-clinical group (N = 126)	**Clinical group (N = 107)**	
1	Age (years)		19.13 (0.90)	21.80 (1.51)	(16.646) **< 0.001*****
2	Gender	Female	80 (63.5)	68 (63.6)	(0.01) 1.000
		Male	46 (36.5)	39 (36.4)	
3	Residence (born/raised before entering the course)	Rural	91 (72.2)	71 (66.4)	(0.940) 0.392
		Urban	35 (27.8)	36 (33.6)	
4	Type of family	Nuclear	84 (66.7)	73 (68.2)	(0.064) 0.889
		Joint	42 (33.3)	34 (31.8)	
5	Living status during the course	Hostel	117 (92.9)	94 (87.9)	(1.696) 0.261
		Day scholar	9 (7.1)	13 (12.1)	
6	Average sleeping hours per day	< 6 h	71 (56.3)	62 (57.9)	(0.060) 0.894
		> 6 h	55 (43.7)	45 (42.1)	
7	Do you consume one or more substance (tobacco/alcohol/cannabis/opioid) currently?	Yes	30 (23.8)	55 (51.4)	(19.011) **< 0.001*****
		No	96 (76.2)	52 (48.6)	
8	Exercise status	< 3 days/week	104 (82.5)	86 (80.4)	(0.180) 0.736
		≥ 3 days/week	22 (17.5)	21 (19.6)	

SD Standard deviation

***$p < 0.001$

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Table 6 Comparison of association of academic and personal characteristics between pre/para-clinical and clinical students with psychological morbidities

| Sr. no.	Variables	Subgroups	Frequency (%)		P-value (chi-square test)
			Pre/para-clinical group (*N* = 126)	Clinical group (*N* = 107)	
1	Level of academic performance	Satisfied	32 (25.4)	15 (14)	(4.652) **0.034***
		Dissatisfied	94 (74.6)	92 (86)	
2	Motive for studying medicine	Personal	95 (75.4)	89 (83.2)	(2.109) 0.196
		Family pressure	31 (24.6)	18 (16.8)	
3	Family history of psychiatric illness	Yes	29 (23)	34 (31.8)	(2.251) 0.141
		No	97 (77)	73 (68.2)	
4	Sought psychiatric consultation during this semester	Yes	14 (11.1)	32 (29.9)	(12.901) **< 0.001****
		No	112 (89.9)	75 (70.1)	
5	Currently on antidepressant/benzodiazepines/any other psychotropics	Yes	17 (13.5)	25 (23.4)	(3.817) **0.049***
		No	109 (86.5)	82 (76.6)	

*$p < 0.05$; ***$p < 0.001$

Table 7 Comparison of mean scores of coping styles between pre/para-clinical and clinical students with psychological morbidities

Scale	Subscale	Mean (SD)		Mean difference	SE difference	(*t*-test value) *p*-value
		Pre/para-clinical group (*N* = 126)	Clinical group (*N* = 107)			
Coping style	Active emotional coping (AEC)	23.16 (1.78)	23.06 (2.04)	0.106	0.250	(0.426) 0.670
	Passive emotional coping (PEC)	24.68 (3.14)	24.31 (3.29)	0.369	0.422	(0.876) 0.382
	Active problem coping (APC)	17.90 (1.82)	18.45 (1.99)	−0.559	0.249	(−2.242) **0.026***
	Passive problem coping (PPC)	21.90 (3.70)	22.70 (4.08)	−0.807	0.510	(−1.583) 0.115
	Total coping styles mean score	87.65 (6.19)	88.54 (7.25)	−0.890	−0.881	(−1.011) 0.313

SD Standard deviation, *SE* Standard error

*$p < 0.05$
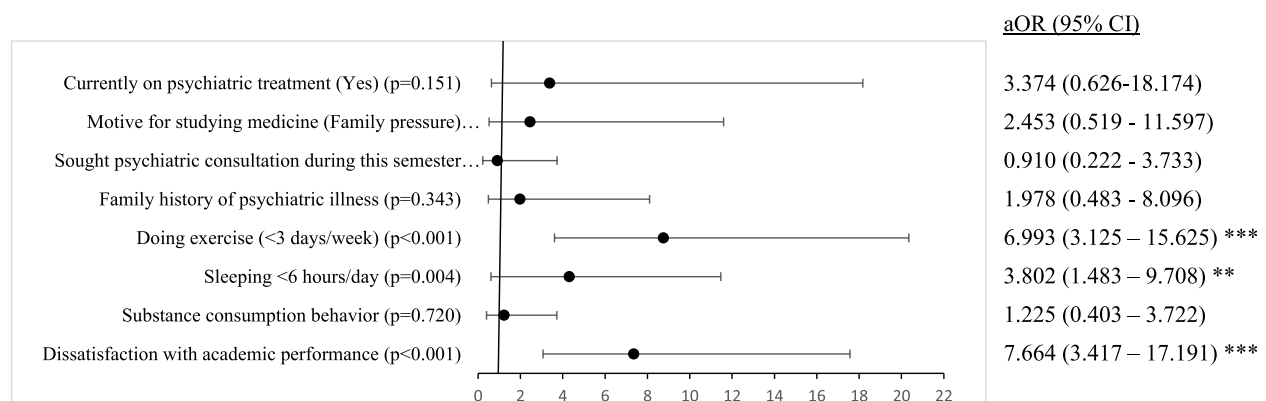
Fig. 1 Forest plot showing binary logistic regression analysis of psychological morbidities in pre/para-clinical medical students. 95% CI, 95% confidence interval; aOR, adjusted odd ratio; odd ratio adjusted for current age, gender, residence (born/raised before entering the course), type of family, and living status during the course. **$p < 0.01$; ***$p < 0.001$

Fig. 2 Forest plot showing binary logistic regression analysis of psychological morbidities in clinical medical students. 95% CI, 95% confidence interval; aOR, adjusted odd ratio; odd ratio adjusted for current age, gender, residence (born/raised before entering the course), type of family, and living status during the course. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$
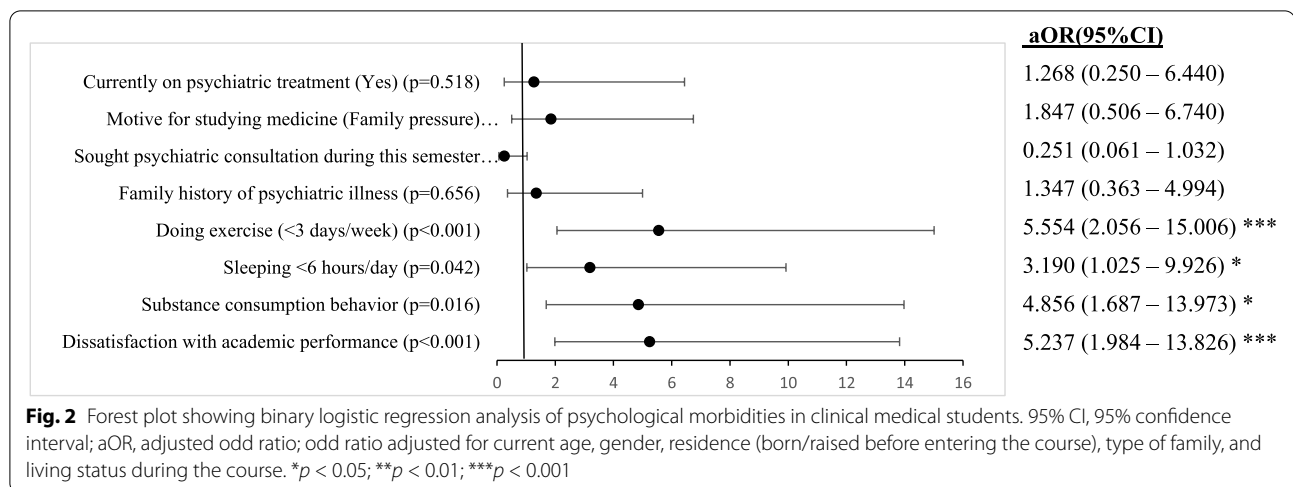
are a widely known phenomenon and goes conjointly with complexity, obscurity, and challenges of the profession. Keeping this in mind, the present research was conducted using the semi-structured instruments to assess and compare psychological morbidities and its possible association with predictor variables and coping styles.

The present study revealed that a staggering 61% of medical students had an abnormal score (> 23) on GHQ-28, which is suggestive of higher prevalence of psychological morbidities. This finding is in accordance with previous study conducted in India stating that a higher proportion of medical students (60.3%) are prone to psychological morbidities [9]. Several previous studies from India and other parts of the world lend support to the findings of present survey and demonstrated a similar high prevalence (59–62%) of psychological morbidities by using GHQ-28 scale among medical students [32, 33]. This might suggest a decrease in the psychological health of medical students when one compares the findings of the present study with the studies conducted previously in different areas of the world which evaluated a lower prevalence of psychological morbidities [5, 10, 21, 34–37]. On the contrary, numerous studies revealed lower prevalence ranging from 21 to 52% in India [5, 34, 35], 21.6% in Iran [10], 23.3% in Pakistan [36], 25% in Nigeria [37], and 46–52% in the UK [21] by using different methodology and instrument such as GHQ-60. Also, the prevalence of psychological morbidities in present survey was much higher than global prevalence (34%) estimated by a meta-analysis of 10,147 medical students in Asia [6] and aggregate prevalence (25.2%) in Nigeria [38]. These discrepancies might be related to differences in sociocultural background, sample size, and study design used. The high prevalence of psychological morbidities might be due to

significantly higher workload related to academics which leads to burnouts among study participants.

In the present survey, the prevalence of psychological morbidities among pre/para-clinical and clinical UGs was found to be 60.6% and 61.5%, respectively, but could not find any statistically significant difference in GHQ-28 scores, suggesting that the rate of psychological morbidities is almost equal in both study groups. This result is in contrast to the findings of a study done by Beniwal et al. [5] and Konjengbam et al. [39], in which authors as per GHQ-60 and GHQ-12 scales, respectively, observed that the proportion of psychological morbidities among pre/para-clinical UGs was higher (37%) than that of clinical UGs (27–30%) which was found to be statistically significant. Currently, not much data is available within the existing literature for the comparison of psychological morbidities among both the study groups because in most of the previous surveys [14–16], the psychological problems faced by the medical students were compared on the basis of their year/semester of study, and also, the other available literature [20, 23, 24, 40] compared the psychological distress (using PSS-10 and GHQ-12) rather than psychological morbidities among pre/para-clinical and clinical UGs groups. This finding in present study might suggest that students have certain common factors related to psychological morbidities, but the training-phase factor plays a small role. The slightly higher preponderance of psychological morbidities towards clinical group of UGs is understandable, considering the fact that they are under constant pressure of academics and insecurities about not attaining their goal of being a physician [19, 26].

The observation of present survey demonstrated that sociodemographic variables such as age and substance consumption behavior were statistically significant

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between pre/para-clinical UGs and clinical UGs with psychological morbidities, while other sociodemographic variables included in the survey were insignificant between the comparable groups. These results were nearly similar to the observations of few studies done by Mangalesh et al. [9] and Biswas et al. [35] in which psychological morbidities among different years of UGs training were statistically significantly associated with age, gender, living status, and substance consumption behavior. Zvauya et al. [21] and Kiran et al. [32] also found that psychological morbidities among pre/para-clinical and clinical UGs were statistically significantly associated with age of the participants. In assonance with present survey, studies from India [32] and another developed country [15] had also suggested that with advancement of age and phase of training, the increased academic load and responsibility bestowed upon them engendered stress and made them highly susceptible to psychological morbidities. On the contrary, the cross-sectional survey by Beniwal et al. [5] pointed out that sociodemographic factors were nonsignificant between pre/para-clinical UGs and clinical UGs with psychological morbidities. Recently, a few authors from India [9, 35] established a significant association where substance consumption behavior increases five to ten times odd risk of psychological morbidities among medical educators. The present study also investigated that the substance consumption behavior among clinical UGs significantly increased the propensity of psychological morbidities having approximately five times higher odds, though it cannot be said for the pre/para-clinical UGs as the association between psychological morbidities and substance consumption behavior was not statistically significant despite having higher odds (1.25 times). This finding might support the results of other surveys [9, 41] where it was hypothesized that students in clinical group adopted these detrimental habits in response to their struggles and personal grievances and needs a special mention because of the deteriorating effects on the cognitive functions. Taneja et al. [42] observed that univariate analysis did not confirm the evidence regarding the significant association between psychological morbidities and substance consumption behavior in medical students, inconsistent to the findings of present survey.

In the present study, the results yield a significant effect of dissatisfaction of academic performance on the prevalence of psychological morbidities among medical UGs (both groups). These findings align with previous research in literature which reported that dissatisfaction with academic performance was one of the key factors in inducing the mental health issues among medical students [9, 35, 43, 44]. In the present survey, it was also highlighted that students in clinical group were more in

proportion with dissatisfied academic performance than pre/para-clinical group, validating the already existing findings where dissatisfaction with academic performance proportionally increased with advancement in phase training [15]. This could possibly be due to self-perceived lack of knowledge in clinics, insecurities about clinical competencies, and future careers, leading to fear of failure in exam, due to which students might have feelings of worthlessness, hopelessness, and uselessness, that ultimately leads to multiple mental health issues. The holistic learning approaches like acquisition of new clinical skills and early clinical exposure through new medical curriculum might prove promising in alleviating these stresses and associated psychological morbidities in medical UGs.

Previously, it was well established that multiple factors such as stigmatization, denial of mental health problems, informal consultations, concerns about confidentiality, fear of unwanted interventions and self-diagnosis among medical students were the key influencers on the decision-making process of the student's psychiatric help-seeking behavior [45]. The present study suggested that more than three-fourths of students with psychological morbidities are still suffering in silence and notoriously reluctant to seek psychiatric consultation. This finding on the rate of seeking of psychiatric consultation among medical students with psychological morbidities is in the range of previous meta-analysis [17] and a study conducted on American surgeons [46]. Previously, it was formulated that students in later phases of training got correct knowledge regarding the etiology of psychological problems and psychiatric medicine which was significantly related to student's disposition to use psychiatric services [47], similar to the results of the present survey where a significant proportion of students in clinical group as compared to pre/para-clinical group sought psychiatric help and are currently on psychopharmacotherapies. Accordingly, it can be said that there is a need to initiate psychoeducation program for the medical students at the initial stages of training where "naturalization" of symptoms contributes to nonrecognition of the psychological problems.

The present study is among the first to assess how a subset of medical students cope in response to psychological morbidities and how their phase of training affects those coping behaviors. As mentioned in the present study, coping styles adopted by medical students were found to be average among a large number of participants which was in line with this notion among medical undergraduate students in a midwestern university [4]. Indeed, there is a growing body of evidence supporting that the further medical students get in their education, the more emotionally taxing it might be [48, 49]. This

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pattern in medical education literature aligns with the observations of the present study where emotional coping styles were used relatively more commonly by the clinical students as compared to another group, while findings revealed by Bamuhair et al. [22] were inconsistent to this notion. The possible justification for it could be that clinical students encounter situations they will have never experienced before or may be relatively disconnected from social networks they had in place during pre/para-clinical years. However, significant positive correlation between psychological morbidities and passive emotional and passive problem scores in clinical group indicates that coping styles adopted by students at a very challenging stage of medical education were not satisfactory and predict stress in long term. These findings correlate with reports in the other parts of the world, showing that medical students in later vs. earlier years of training tend to use more passive coping strategies, which tend to emanate when stressors are perceived as uncontrollable [50, 51]. Hence, how students cope likely depends on the unique environments and stressors they face in each phase of their training.

Although both the study groups showed lowest use of the active problem coping style to deal with imminent stressors, but a significant difference was observed. Of note, students with psychological morbidities in clinical group had significantly better active problem scores under coping styles than the other study group. It could be suggested that participants with psychological morbidities in clinical group might have used active problem-solving coping style as a stress-protective mechanism to reinterpret their negative emotions in a positive way. An explanation might be that students in clinical group were hence more mature and composed than the participants of pre/para-clinical group in analyzing the center of the problem in a calm and optimistic manner and in finding the solutions for the same. This was a good sign that these students tried to put main emphasis on active-problem coping styles by accepting their responsibility. This result is discordant with few cross-sectional studies done in India [51] and the USA [52] which showed that active-problem coping style was significantly higher in early years of training than in the later years.

The main strength of the present study is that this study is, to our awareness, the first to evaluate and compare the psychological morbidities and coping styles in pre/para-clinical and clinical group of UGs. Secondly, the study also helped in finding the vulnerable groups of medical students and phase of medical training by using standardized validated tools with very good internal reliability. Thus, the results observed were intriguing and had effective therapeutic implications in the prevention of psychological morbidities among medical students.

Findings of the present study must be interpreted in light of the limitations of this study. It is important to note that the rates of psychological morbidities reported in the present study were based on self-reported questionnaires and not on detailed psychiatric evaluations. Therefore, the inherent limitations of self-reported measures should be noted. Second, the present study did not evaluate the specific factors associated with the work-related stress. Third, the present survey carried out a cross-sectional assessment which precluded definitive conclusions regarding the direction of causality. Future studies must follow longitudinal study designs to overcome this limitation of the study. Fourth, the study population consisted only of medical students in one institute and therefore may not be extended directly to other settings. Lastly, all the medical undergraduate students were eligible to participate in the study, and there were no exclusion criteria. This may lead to a self-selection bias, as medical students with psychological problems may be less motivated to complete the questionnaires, or on the other hand, they may be more likely to participate since the topic is relevant to them.

Conclusions
The result of present study reflected that a higher proportion of medical students experienced psychological morbidities. It was also suggested that psychological morbidities are significantly associated with substance consumption behavior and dissatisfaction with academic performance in clinical group. These findings implied that there is an urgent need to develop mechanisms to evaluate other factors associated with psychological morbidities and related targeted measures to decrease substantially the burden of psychological problems on the students. At the same time, there is a need to mitigate stigma associated with mental disorders so that at the time of the need, the students can seek psychiatric help. By broadening the use of psychiatric consultation and adopting more active and less passive coping skills, psychological problems may be prevented or at least diminished among medical students. Stress-reducing techniques need to be encouraged in curriculum, and counselors should be provided for effective addressing and solving of the problems.

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Declarations

Ethics approval and consent to participate
The informed consent was obtained from all the participants, and the study protocol was approved by the institute ethical board/committee prior to the start of data collection. This institute-based original study was approved by the ethical committee (HF(MC)B (12)1/2018).

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

Author details
[1]Department of Psychiatry, Bhagat Phool Singh Government Medical College for Women, Khanpur Kalan, Sonipat, Haryana 131305, India. [2]Department of Psychiatry, Indira Gandhi Medical College and Hospital, Shimla, Himachal Pradesh, India. [3]Department of Radiodiagnosis, Maharishi Markendeshwar Medical College and Hospital, Kumarhatti, Solan, Himachal Pradesh, India. [4]Department of Community Medicine, Bhagat Phool Singh Government Medical College for Women, Khanpur Kalan, Sonipat, Haryana, India.

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