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Relationship between mindfulness and perceived stress in first year medical students of a medical college in Nepal: a cross-sectional observational study

Lok Raj Joshi[1], Niraj Pandey[2], Shaligram Chaudhary[1]

Author(s) info :

[1]Department of Physiology, Lumbini Medical College and Teaching Hospital, Palpa, Nepal

[2]Department of Anatomy, Lumbini Medical College and Teaching Hospital, Palpa, Nepal

Correspondence :

Dr. Lok Raj Joshi, *MBBS, MD*
Department of Physiology, Lumbini Medical College and Teaching Hospital, Palpa, Nepal

Email:
lokraaj.joshi@gmail.com

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ABSTRACT

Introduction: Though mindfulness-based strategy is receiving attention to manage stress among medical students globally, role of mindfulness in the Nepalese context has not been studied. We aimed to study the relationship between perceived stress and trait mindfulness among first year medical students in a medical college in Nepal.

Materials and methods: An observational cross-sectional study was conducted in which all of the participants completed the structured self-administered questionnaire online. Mindfulness Attention Awareness Scale was used to assess trait mindfulness and Perceived Stress Scale to assess perceived stress. Information about some potential stressors was also collected. Simple correlation as well as multiple linear regression analysis supplemented with relative weight analysis were performed to study the relationships.

Results: Seventy-nine out of 99 first year medical students of the college participated in the study. Mean mindful attention awareness score was 3.88 (SD=0.78) and mean perceived stress score was 21.98 (SD=6.03). Perceived stress score correlated negatively and significantly with mindfulness score (Pearson's r= -0.38, 95% CI= -0.56 to -0.18, p-value = 0.0005). Relative weight analysis also revealed significant and comparable (but in opposite direction) predictor roles of mindfulness and perceived academic course difficulty in prediction of perceived stress. However, sex, home country, perceived economic pressure, perceived peer pressure and perceived study environment adversity did not reach predictor significance in the relative weight analysis.

Conclusions: Trait mindfulness is a significant predictor of perceived stress among first year medical students in the Nepalese context. Higher mindfulness is associated with lower perceived stress.

Keywords: Medical students, mindfulness, perceived stress, prevention, stress management

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INTRODUCTION

The concept of biological stress has evolved to include both physical and psychosocial situations that may disrupt homeostasis and well-being of the organism.[1,2] Physiological responses to stress are essential to combat stress in the short term but chronic stress has various detrimental effects on emotional wellbeing, learning, cognition, endocrine system, cardiovascular health, gastrointestinal health, immunity etc.[3] Chronic psychological stress among medical students has been recognized as an issue of concern globally including Nepal due to its potential to negatively affect health, academic performance, patient care, interpersonal relations etc.[4–8] Academic workload, economic pressure, peer pressure, being away from home, increasing responsibilities are among the known stressors. [5,9] Recognition of high prevalence of stress among medical professionals and the importance of physician well-being is also reflected in the current revised World Medical Association Declaration of Geneva.[10]

Various preventive measures have been proposed and being tried to address the problem of stress and mindfulness-based programs are increasingly being used to this end.[11] Mindfulness, which is described as present-moment attention or awareness with the quality of being open and compassionate has been shown to reduce perceived stress and overall psychological health in general. [12–14] Mindfulness is originally a concept in Buddhist philosophy and modern scientific studies have suggested that mindfulness correlates negatively with stress in various populations including primary care health workers, nursing students and medical students.[15–17] However, in the context of Nepal, role of mindfulness has not been studied in medical students. We aimed to study the relationship between mindfulness and global perceived stress in first year medical students in a medical college in Nepal as they are not yet adapted to the medical education environment. We hypothesized that Mindful Attention Awareness Score would negatively correlate with Perceived Stress Score. We also aimed to assess the relative weight of mindfulness factor compared to other factors (sex, home country, perceived academic course difficulty, economic pressure, pressure due to competition and perceived study environment adversity) as predictors of stress.

MATERIALS AND METHODS

A quantitative observational cross-sectional study was conducted among first-year medical students of Lumbini Medical College and Teaching Hospital (LMCTH) after ethics approval from the Institutional Review Committee (IRC-LMC 28-D/021) during the month of October 2021 (October 7-31). It was an observational quantitative, cross-sectional study. Expecting at least moderate level of correlation (Pearson's correlation coefficient of 0.3) and setting level of significance at 5%, power at 80% and nonresponse rate at 15%, we got sample size of 99. We used the package 'pwr' (version 1.3-0) in statistical software R to determine the sample size. The MBBS I year batch consisted of 99 students and we attempted to recruit all of the students aged 18-25 years. Those who were not willing to participate in the study or who did not respond to the questionnaire were excluded from the study.

Considering the COVID-19 context, data was collected online through self-administered structured questionnaires. Each of the participants received information about the study and provided written consent online. The link to a Google Form was sent to all of the target participants via Viber and reminders were sent twice at an interval of about one week.

The questionnaire included questions about the general demographics (age, sex, home country), Mindful Attention Awareness Scale (MAAS) questions and Perceived Stress Scale-10 item (PSS-10) questions. MAAS is a 15 item scale that asks the respondents to answer how frequently they have particular experiences in daily life like 'I could be experiencing some emotion and not be conscious of it until some time later' on a Likert scale ranging from 1 (Almost always) to 6 (Almost never). Mean of the scores to all 15 items is the MAAS score of the participant and higher score means higher mindfulness. PSS-10 contains 10 items e.g. 'In the last month, how often have you been upset because of something that happened unexpectedly?' and the respondents rate their experience on a Likert scale ranging from 0 (Never) to 4 (Very often). Scoring is done by summing up all of the responses while reversing the responses (i.e. 0 = 4, 1 = 3, 2 = 2, 3 = 1 and 4 = 0) to positively stated items (fourth, fifth, seventh and eighth statements). Higher score refers to higher perceived stress. The participants who responded late were instructed to consider their experience in the earlier month

Table 1: Perception of the participants about the potential predictors of stress (N=79)

Statements	Frequency of responses (%)				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I find the MBBS I year academic course difficult.	5 (6.3)	9 (11.4)	38 (48.1)	22 (27.8)	5 (6.3)
I feel economic pressure.	11 (13.9)	17 (21.5)	26 (32.9)	18 (22.8)	7 (8.9)
I feel pressure due to competition.	8 (10.1)	20 (25.3)	26 (32.9)	23 (29.1)	2 (2.5)
I feel that the study environment is not favorable.	10 (12.7)	34 (43.0)	18 (22.8)	12 (15.2)	5 (6.3)

that corresponded to their university examination period to make sure that all of the participants recalled the same potentially stressful period. Besides this, the questionnaire also included a section of questions about potential stressors namely perceived difficulty of the academic course, perceived economic pressure, perceived pressure due to competition, perceived adversity of the study environment each of which required responses on a 5-point Likert scale (1=Strongly disagree and 5=Strongly agree). The latter section was prepared by the authors themselves after necessary literature review. The MAAS and the PSS are already validated tools and are probably the most commonly used tools to measure mindfulness and perceived stress respectively.[14,18–20] The Google Form and included questionnaires were pretested before use which did not lead to any changes to the questionnaires.

The data obtained in the Google Sheet was further processed and analysed with the statistical software environment R (version R-4.1.1) using R packages 'tidyverse'(version 1.3.1 for most basic functions and multiple linear regression), 'psych' (version 2.1.9 for Cronbach alpha), and 'broom' (version 0.7.10 for multiple regression model diagnostics). Multiple linear regression analysis was supplemented with relative weight analysis which was performed using R package 'rwa' (version 0.0.3) assisted by the RWA-WEB Shiny App.[21] P values of 0.05 or less (both sided test) were considered statistically significant.

RESULTS

Out of 99 students of MBBS first year in the college, 79 (35 males and 44 females) participated in the study. Their age ranged from 18-25 years with mean age 20.8 years (SD=1.2 years). Sixty of them (75.9%) mentioned Nepal as their home country and 19 were from India. Internal consistency of both MAAS questionnaire (Cronbach alpha = 0.84, 95% CI=0.79-0.89) and PSS questionnaire (Cronbach alpha = 0.78, 95% CI=0.70-0.85) were good. Visual inspection of the histograms as well as Shapiro-Wilk normality test suggested that both MAAS (W=0.99, p=0.70) and PSS (W=0.99, p=0.72) followed normal distribution. The participants had mean MAAS of 3.88 (SD=0.78) and mean PSS of 21.98 (SD=6.03). As shown in Table 1, about one third of the students perceived the academic course as difficult (marked 'agree' or 'strongly agree'). Almost similar numbers (one third each) of the students marked that they perceived economic pressure or pressure due to competition. About one fifth of the students perceived the study environment as unfavorable.

Welch T test showed difference in perceived stress score (PSS) of males (mean = 19.8, SD = 5.9) and females (mean = 23.7 SD = 5.7) which was statistically significant (t = -31.46, df = 79.071, p-value < 0.002) without adjustment for other variables. Also, there was a statistically significant difference (t = -31.95, df = 78.793, p-value < 0.002) between PSS (unadjusted) of students from Nepal (mean = 21.6, SD = 6.2) and those from India (mean = 23.2, SD = 5.5)

Simple Pearson's correlation analysis revealed statistically significant moderate negative correlation with mindfulness score (r= -0.38, CI= -0.56 to -0.18, t = -3.6395, df = 77, p-value = 0.0005). Scatterplot between mindfulness score and perceived stress score is shown in Figure 1.

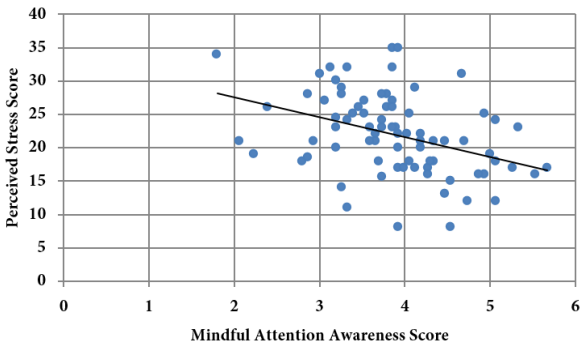

Fig 1. Scatterplot showing the relationship between Mindful attention awareness score and Perceived stress score

Multiple regression analysis revealed statistically significant multiple regression model [F(6.42(7,71) = 6.42, p-value = 0.02)] to predict PSS from MAAS, sex, home country, perceived course difficulty, perceived economic pressure, perceived peer pressure and perceived study environment adversity which explained 39% of the variance (R^2=0.39) in perceived stress. This model was found to follow the assumptions of multiple linear regression model namely linearity of data, normality of residuals and homogeneity of residuals variance. Presence of influential values was also ruled out. In this model, only MAAS and perceived academic difficulty reached statistical significance (both p-values < 0.001). Relative weight analysis (RWA, Table 2) showed that raw relative weights to predict perceived stress, in the decreasing order, were for perceived course difficulty (0.14), MAAS (0.13), sex (0.06), home country (0.015) and raw relative weights were less than 0.015 for each of the rest. MAAS that explained 34.35% of the explained variance with raw relative weight of 0.13 (CI = 0.043-0.27) was found to be a significant predictor of PSS. Besides MAAS, perceived course difficulty was also found to be a significant predictor and this inference is in line with that from multiple linear regression model. Predictor comparison between these two did not reach statistical significance. Predictor role of sex did not reach statistical significance and neither did its role compared to MAAS. Predictor role of MAAS was statistically significantly better than those of home country, perceived economic pressure, perceived peer pressure and perceived study environment adversity.

DISCUSSION

This study aimed to determine the relationship between mindfulness and perceived stress among medical students. It also aimed to find out the relative weight of mindfulness compared to some other factors in prediction of perceived stress.

Table 2: Results of the relative weight analysis of the predictors of perceived stress (N=79)

Parameters	Raw relative weight (CI)	Rescaled relative weight (in %)	Sign of rescaled relative weight	Statistical significance
Mindful attention awareness score	0.133 (0.043-0.269)	34.35	Negative	Yes
Perceived course difficulty	0.143 (0.024- 0.308)	37.00	Positive	Yes
Perceived economic pressure	0.014 (0.002-0.080)	3.70	Negative	No
Perceived pressure due to competition	0.006 (0.000-0.014)	1.61	Positive	No
Perceived study environment adversity	0.014 (0.001-0.092)	3.61	Positive	No
Sex	0.061 (0.001-0.158	15.82	Positive*	No
Home country	0.015 (0.001-0.082)	3.92	Positive**	No

*Males were labeled as '0' and females as '1'. **Nepal was labeled as '0' and India as '1'. CI = 95% confidence interval

In the current study, mean MAAS score was 3.88 (SD=0.78). It is comparable to previous normative data that reported mean score of 3.83 (SD=0.70). Mean PSS in the current study was 21.98 (SD=6.03). It is higher compared to normative data for United States people with some college level education which had mean PSS of 16.00 (SD= 7.54).[22] It indicates higher level of perceived stress among first year medical students in our study. Stress inherent to medical education, COVID-19 context and the fact that the reported perceived stress corresponded to the duration of university exams in our study might be responsible for the higher level of stress. Other authors also have reported high level of stress among medical students, for example, Gazzaz et al. in Saudi Arabia (mean = 28.5, SD = 3.8), Anuradha et al. in India (mean = 25.64, SD = 5.44).[23,24] Both of these studies used PSS-14 with maximum possible score of 56 whereas we used PSS-10 with maximum possible score of 40.

The present study shows that trait mindfulness is an important predictor of perceived stress among first year medical students with mindfulness having negative correlation with stress. Simple correlation between MAAS and PSS as well as relative weight analysis support this inference. Simple correlation revealed statistically significant moderate negative correlation (r = -0.38) between MAAS and PSS. Gupta et al. also observed significant negative correlation (r = -0.23) between mindfulness and stress among non-medical (management and information technology faculties) college students in Kathmandu, Nepal though they used somewhat different tools than ours.[25] A previous study by Atanes et al. also showed negative correlation (r = -o.54) between MAAS and PSS in Brazilian primary health professionals.[15] In the same line, Lu et al. showed significant negative correlation (r about -0.5) between PSS-10 and most of the various facets of mindfulness (acting with awareness, describing, non-judging, non-reactivity) using Five Factor Mindfulness Questionnaire among undergraduate nursing students.[16] A review by Daya Z et al. revealed that four out of seven studies studying effect of mindfulness interventions on stress among medical students had reported beneficial effect.[26]

In the present study, relative weight analysis revealed that predictor role of MAAS (with negative correlation with stress) is comparable to that of perceived academic difficulty (but with positive correlation with stress). However, our study suggests that MAAS played better predictor role compared to home country, perceived economic pressure, perceived peer pressure and perceived study environment adversity. Academic stressors have been identified as the cause of stress among medical students by previous studies as well, for instance, study by Manandhar et al. conducted in Nepal Medical College, study by Bali et al. in Bhairahawa, Nepal, study by Anuradha et al. in India and study by Seedhom et al. in Egypt. [5,24,27,28]. A study by Garg et al. in India found financial factor as the major cause of stress among students.[29] It did not reach statistical significance to predict stress in relative weight analysis in our study though about one third of the students agreed ('Agree' plus 'Strongly agree') that 'they felt economic pressure'. Perceived stress was higher among females in the present study. However, after adjustment for other factors during relative weight analysis, it was not a statistically significant predictor. Some authors, for example Seedhom et al, have shown higher level of stress among females while others, Manandhar et al, for example, have shown higher stress among Males.[5,27] A study by Heinen in Germany showed no gender difference in stress level.[30] Personality or cultural differences and methodological variations in the studies might lie behind these differences in results across studies. We cannot rule out that predictor role of some predictors might not have reached statistical significance due to inadequate sample size for the weak predictors.

Though our cross-sectional study design cannot establish the causal relationship, our results combined with results of previous experimental studies in other countries suggest that mindfulness-based approach is a good candidate to tackle the problem of stress among medical students in the Nepalese context as well. Experimental studies with participants from multiple colleges might explore the broader generalizability of our findings in the Nepalese context. Mindfulness-based approach has other known advantages as well. Of note, mindfulness is a modifiable factor and it also brings with it other benefits like protection against anxiety, depression and other mental health issues and overall wellbeing.[14]

To discuss the limitations of the study, our questionnaire used single item (statement) measures to gather information about the predictors (other than MAAS) though multiple item-based measures would have been more reliable. Besides this, there is possibility of recall bias as the participants who

responded late quite farther from the time of examinations might have reported lower level of stress compared to those who responded earlier. This in turn might have led to underestimation of correlation between MAAS and PSS. On the other hand, the strength of this study lies on the fact that it uses relative importance analysis approach that partitions the explained variance among the predictors and allows better predictor comparison than the multiple linear regression model alone.

CONCLUSION

The current study shows that trait mindfulness is an important predictor of perceived stress among first year medical students. It revealed moderate negative association of stress with mindfulness and a similar level of positive association of stress with perceived academic course difficulty. Mindfulness-based strategy may be considered for stress management among medical students in the Nepalese context as well. Future multi-college experimental research might explore its full potential.

CONFLICT OF INTEREST

None.

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