Inverse Correlation between Stress and Adaptive Coping in Medical Students

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Abstract

BACKGROUND: Medical students in their academic years are generally under stress but very few studies revealed the relationship between the stress and how the students manage to adapt these stressful conditions.

AIM: The aim of the study was to investigate the levels of stress and their adaptive coping in the 1st 3 years medical students and also to determine the factors associated with adaptive coping strategies.

METHODS: This is a descriptive cross-sectional study conducted on 441 medical students of Qassim University from September-October 2019. First 3 years medical students were randomly selected and their stress levels or adaptive coping strategies were determined by general health questionnaire (GHQ-12) and strategies coping mechanisms (SCM), respectively. The 5-points Likert scale was used for scoring and the data obtained were further validated by DASS and Brief COPE scales.

RESULTS: Out of 441 medical students, 39.2% agreed to participate. The data showed that the level of stress among students was highest during their 1st year academic blocks, followed by 2nd and 3rd year students. Interesting, the adaptive coping among them was found highest during the academic blocks of 3rd year students, followed by the 2nd and 1st year students. Importantly, female students showed better adaptation against stress. Students living with their parents avoided stress in better ways as compared to those who were living alone.

CONCLUSION: This is the first study that shows an inverse correlation between the stress and adaptive coping in medical students of Qassim University. The data concluded that adaptation of stress in the 3rd-year students was the highest followed by 2nd and 1st year medical students. Moreover, female students adapted well against stress and students living alone showed worse adaptation of stress.

Introduction

Attending a medical school is considered as a very challenging experience as it changes the complete lifestyle of the medical students. There is a general perception that the academic years in medical schools are stressful but very few studies were reported to reveal the relationship between stress and how medical students manage to adapt to these new stressful conditions [1], [2], [3]. Adaptation in terms of medical education is basically a constantly altering process that trails exposure to innovative life circumstances, with the individuals' social environment manipulating [4]. In the Kingdom of Saudi Arabia, 5 academic years are mandatory to be graduated in any of the medical schools. In the first 3 academic years, students are taught basic medical science subjects and in the last 2 years students are exposed to clinical teaching along with attending real patients under the supervision of well experienced medical professionals [5]. Attending the 1st year of medical college is a very challenging for a student as it is utmost precarious for college adaptation because of the massive imaginable adjustment troubles [1], [2], [6]. A good quality 1st year transition encompasses a medical student to efficiently function in remaining years by acquiring the skill to deal with a new and multifarious world of medical science [2], [6]. Studies have shown that a large number of students in their 1st academic years were quit from their medical school [1], [2], [7]. The major reason(s) for students quitting were innovative complex goals, weak commitment, and lack of time management and absence of external motivation [6], [7]. A study conducted in a local public university of Malaysia revealed four important factors that resulted in a weak adaptation of medical students to the medical education environment were health problems, academic difficulties, financial crunch, social, and personal glitches [8]. Recently, another study conducted in Ukraine stated that the failure in the adaptation of 1st-year students in their medical schools seriously affected, not only on their educational activities but also on their social and

personal independence [9]. Recently, it was reported that every year more than 100,000 students were registered in medical schools globally but by the end of their 1st year more than 50% were dropped out [1], [2], [3]. This clearly explained the difficulties of medical students in their transition from senior secondary school to medical school. In support of these observations, a number of studies were conducted to estimate the stress levels among medical students as compared to non-medical students and a majority of them pointed out that medical students were in more stress as compared to other college students [7], [8]. Specifically, stress was also reported among the 1st year medical students of Qassim University, similar to the medical students of other universities [10], [11], [12]. Despite these difficulties facing by the medical students just after transition from senior secondary school to medical college, only few studies were conducted on the stress and its associated adaptive behavior [11], [12] but none of them showed a correlation between the stress levels and their adaptive coping strategies and also none was conducted on medical students of Qassim University. In view of these, this study was designed for the first time to find out the correlation between the level of stress and its adaptive coping among first 3 years medical students of Qassim University and the factors associated with adaptive coping against the stress were also attempted.

Methods

Study type, design, and participants

This is a descriptive cross-sectional study performed on medical students of Qassim University from September to October 2019. The first 3 years medical students from Qassim University were randomly selected and were involved in the study. The study was designed to compare the stress levels and the adaptive coping on first 3 years undergraduate medical students.

Data collection and instruments

The data were collected using self-administered questionnaires, which comprised three main sections: The first section was on the social demographic details, the second section was a general health questionnaire (GHQ-12) comprised the questions on general health to measure stress levels as described previously [8], [13] and the third section of the questionnaire was comprised of questions on the strategies coping mechanisms (SCM) such as problem solving, positive reinterpretation and expression of emotion, facilitate student adaptation against stress, mental well-being, and physical health [14]. The validity and reliability of the questionnaire used in this study were previously approved by a number of studies [8], [13], [14]. The Likert 5-points scale was

used for data scoring, point 1 on the scale represents strongly disagree, points 2, 3, 4, and 5 represent mildly disagree, neutral, mildly agree, and strongly agree, respectively, as described previously [15]. The data related to stress obtained by the Likert 5-points scale were further validated by the Depression Anxiety Stress Scales (DASS) [16], [17]. The DASS scale was a well-established and a well-validated method for measuring of depression, anxiety, and stress but here we used only "the stress section" of DASS, which comprised 14 questions about difficulty, relaxing, nervous arousal, and being easily upset/agitated, irritable/over-reactive and impatient as described previously [16], [17]. Whereas the data on the adaptive coping strategies were further validated by another well-validated scale Brief COPE, which comprised 13 questions on the adaptive coping strategies of focusing on problems and emotions as described previously [18], [19].

Ethical consideration

Ethical approval of this study was taken from the Qassim University and written informed consents from the participated medical students were administered from the questionnaires used for their health assessment.

Statistical analysis

The data were statistically analyzed by the Student t-test or ANOVA followed by Tukey's *post hoc* and/or Bonferroni *post hoc* tests using one-way and/or two-way analysis for statistical comparison between the groups. $p < 0.05$ was considered significant.

Results

Out of 441 medical students, 173 were responded completely; therefore, we have included them in this study. Among them 26.6% students were 1st year medical students, whereas 31.8% and 41.6% were 2nd and 3rd years students, respectively. All demographic details are summarized in Table 1. In this study, we first compared the levels of stress among 1st 3 years medical students with their adaptive coping potential by the 5-points Likert scale. The 5-points Likert scale data for measuring the stress levels in first, second, and third medical students were found to be 3.8, 2.6, and 1.7, respectively (Figure 1a). The data clearly pointed out the highest degree of stress in 1st year medical students followed by 2nd year students, whereas the 3rd year medical students showed lower stress levels ($p < 0.05$). At the same time, the same the 5-points Likert scale was also used for measuring the levels of adaptive coping among the same groups of

medical students. As shown in Figure 1b, the 5-points Likert scale shows that the reading for adaptive coping in 1st year, 2nd year, and 3rd year was 1.7, 2.5, and 3.9, respectively. The data clearly pointed out the 3rd year students were more stress adaptive as compared to the 1st year and 2nd year students ($p < 0.05$).

Table 1: Socio-demographic profile of the medical students

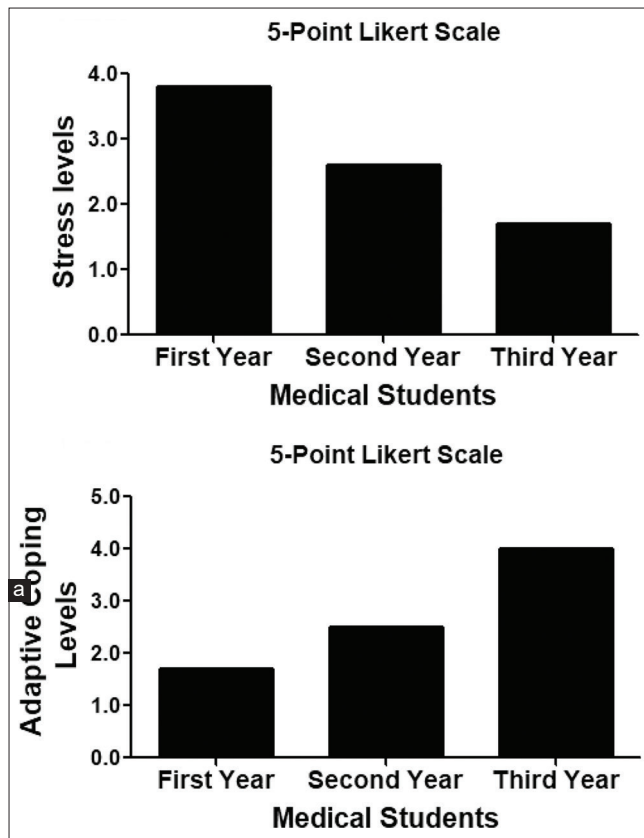| Socio-demographic factor	No. (%)
Nationality	Saudi national
Gender	
Male	94 (54.3)
Female	79 (45.7)
Residence	
Living without parents	68 (39.3)
Home with parents	105 (66.7)
Academic year	
First medical students	46 (26.6)
Second medical students	55 (31.8)
Third medical students	72 (41.6)

Figure 1: Levels of stress (a) and adaptation coping (b) among 1st year, 2nd year, and 3rd year medical students. Levels of stress and adaptive coping were measured by 5-point Likert scale

To analyze the data in depth, we analyzed the levels of stress and adaptive coping of medical students their academic blocks. As shown in Figure 2a, level of stress among 1st year medical students during their all academic blocks were found to be highest followed by the academic blocks of during the 2nd and 3rd years ($p < 0.05$). Specifically, the 5-points Likert scale data for 1st year academic blocks, medical education (ME), man and his environment and metabolism (MEM), growth and development (GD), principle of diseases (PD), and musculoskeletal and skin (MSS) blocks were found to be 3.7, 3.9, 3.8, 4.0, and 3.8, respectively. Whereas the 5-points Likert scale data for the 2nd year students' blocks, endocrine block (EB), hematopoietic and
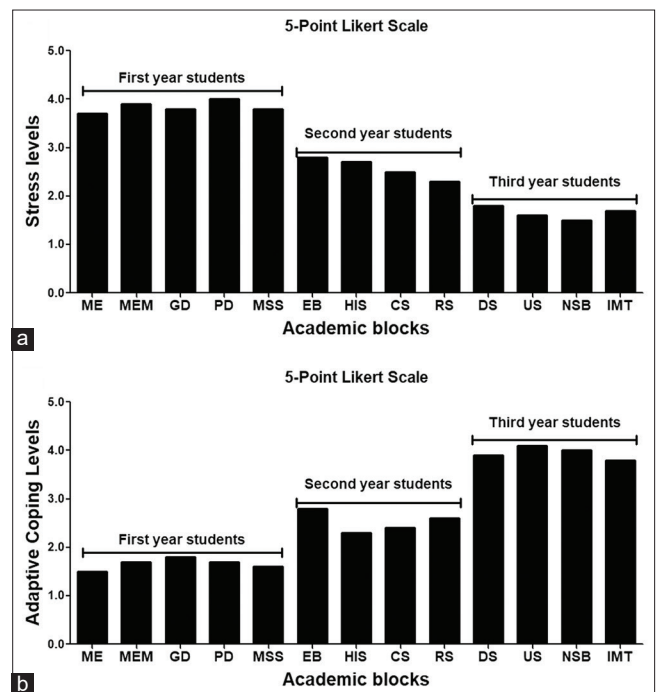

Figure 2: Levels of stress (a) and adaptation coping (b) among 1st year, 2nd year, and 3rd year medical students during their academic blocks. Levels of stress and adaptive coping were measured by 5-point Likert scale. ME: Medical education block, MEM: Man and his environment and metabolism block, GD block: Growth and development block; PD: Principle of diseases block, MSS: Musculoskeletal and skin block, EB: Endocrine block, HIS: Hematopoietic and immune system block, CS: Cardiovascular system block, RS: Respiratory system block, DS: Digestive system block, US: Urinary system block, NSB: Nervous system-special senses-behavioral sciences block, IMT: Integrated multisystems and therapeutics block

immune system (HIS), cardiovascular system (CS), and respiratory system (RS) blocks were 2.8, 2.7, 2.5, and 2.3, respectively. The stress levels in the 3rd year student blocks, the digestive system (DS), urinary system (US), nervous system – special senses – behavioral sciences (NSB), and integrated multisystems and therapeutics (IMT) blocks were found to be 1.8, 1.6, 1.5, and 1.7, respectively. The data clearly pointed out that stress level was significantly lower among the students of 3rd year as compared with the 1st year and 2nd year medical students ($p < 0.05$). On the other hand, we have also demonstrated the adaptive coping of all year 3 years' students during their respective academic blocks ($p < 0.05$). The 5-points Likert scale data for 1st year academic blocks, ME, MEM, GD, PD, and MSS were found to be 1.5, 1.7, 1.8, 1.7, and 1.6, respectively. Whereas the 5-points Likert scale data for the 2nd year students blocks, EB, HIS, CS, and RS were 2.8, 2.3, 2.4, and 2.6, respectively. The levels adaptive coping in 3rd year student during their blocks, DS, US, NSB, and IMT were found to be 3.9, 4.1, 4.0, and 3.8, respectively (Figure 2b). The 5-points Likert scale data for stress levels and the levels of adaptive coping were completely reserved in the 1st and 3rd years medical students during their respective blocks. Interestingly, the 5-points Likert scale data of stress levels and the adaptive coping were

almost the same for 2nd year students during their blocks (p > 0.05), indicating that 2nd year students moderately under stress but they were also moderately coping the stress (Figure 2). The data clearly pointed out that stress level was significantly low among the students of 3rd year as compared with the 1st year and 2nd year medical students (p < 0.05). To determine the factors associated with the level of stress and its adaptive coping among the studied students, the data for male and female students were separately analyzed. In this study, 54.3% were male students whereas as 45.7% were females. The 5-points Likert scale data for measuring the stress levels in male and female students were found to be 3.3 and 2.5, respectively (Figure 3a). Moreover, the adaptive coping potentials of studied male and female students were 2.2 and 3.9, respectively (Figure 3b). These results clearly pointed out that female medical student were better than males to handle the stress during their medical education (p < 0.05). To determine more factors associated with stress and coping, we determined the comparison between those students which were living alone with those, which were living with their families. The 5-points Likert scale data for measuring the stress levels in students living alone and students living with their families were found to be 3.7 and 1.3, respectively (Figure 4a). Moreover, the adaptive coping potentials of students living alone and students living with their families were 1.4 and 3.9, respectively (Figure 4b). These results clearly indicated that students living alone were more disturbed as compared with the

students living with their families (p < 0.05). Not only have these, results also pointed out that students living with their families were more stress adaptive as compared with those medical students which were living alone (p < 0.05).

Figure 4: Levels of stress (a) and adaptation coping (b) among medical students living alone and living with their families. Levels of stress and adaptive coping were measured by 5-point Likert scale

The data obtained by the Likert scale on stress and adaptive coping in medical students were further validated by DASS and Brief COPE scales, respectively. The DASS measurement of stress in 1st, 2nd, and 3rd years students showed that stress level was highest in 1st year students, followed by 2nd and 3rd years students. As the normality among 1st year students was only 17.4%, whereas the normality level in 2nd year and 3rd year students was significantly higher by 27.3% and 40.3%, respectively (p < 0.05). Specifically, severe stress levels and extremely severe stress levels were also found highest in 1st year students and lowest in 3rd year students (p < 0.05). The complete details of all stress levels including mild, moderate, severe, and extremely severe in all studied groups of students are summarized in Table 2. On the other hand, brief COPE measurements showed that the problem focused strategies such as active coping, positive reframing, planning, use of instrument support, and acceptance scores were highest in 3rd year students and lowest in 1st year students (p < 0.05), whereas 2nd year students showed moderate scored of these problem focused strategies. Not only have these, we also determined emotionally focused strategies such as self-destruction, behavioral disengagements, venting, substance use,
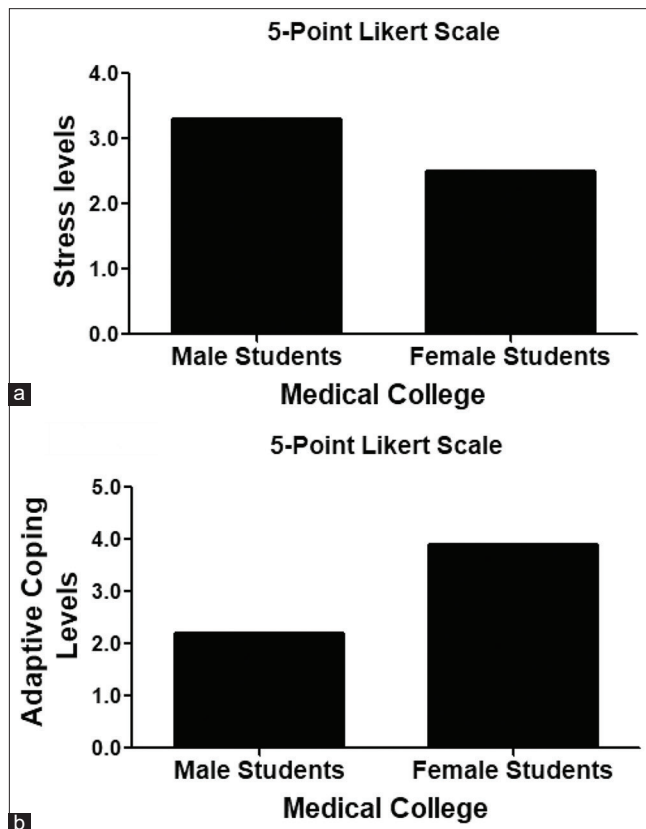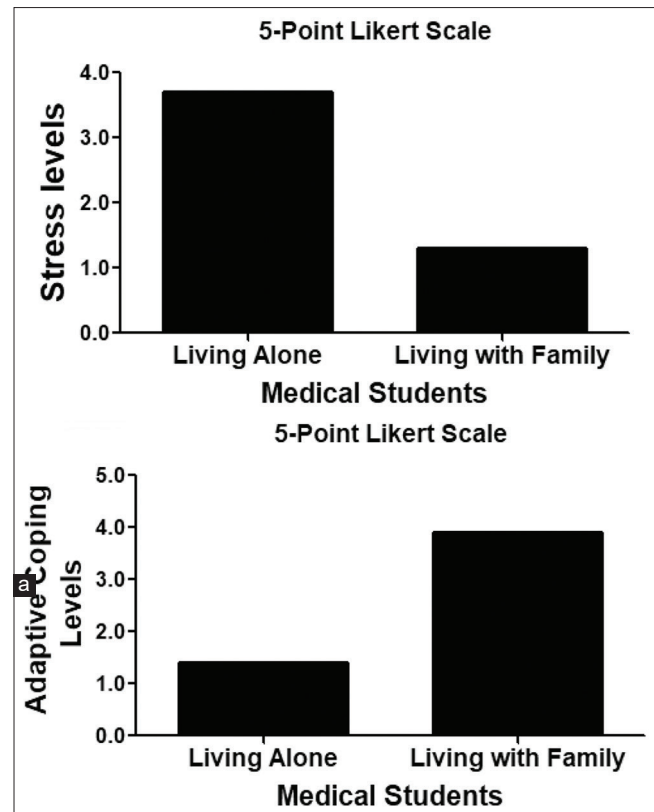

Figure 3: Levels of stress (a) and adaptation coping (b) among male and female medical students. Levels of stress and adaptive coping were measured by 5-point Likert scale

religion, self-blamed, humor, and denial in the studied groups of students.

Table 2: Levels of stress in 1st, 2nd, and 3rd year medical students. Stress levels were measured by DASS scale

Stress levels	1st year, n = 46		2nd year, n = 55		3rd year, n = 72	
	n	Percent	n	Percent	n	Percent
Normal	08	17.4	15	27.3	29	40.3[#]
Mild stressed	02	04.3	10	18.2	23	31.9[##]
Moderate stressed	08	17.4	18	32.7	13	18.0
Severe stressed	18	39.1*	09	16.4	04	05.5
Extremely severe Stressed	10	21.7**	03	05.4	03	04.2

N: number of students. Normal: [#]$p < 0.05$ versus 1st or 2nd year students; Mild stressed: [##]$p < 0.05$ versus 1st or 2nd year students; Severe stressed:*$p < 0.05$ versus 3rd or 2nd year students; Extremely severe stressed: **$p < 0.05$ versus 3rd or 2nd year students.

First year students scored highest for all these emotionally focused strategies, followed by 2nd and 3rd year students. The complete description of the data obtained by Brief COPE scale in 1st, 2nd, and 3rd years medical students is summarized in Table 3.

Table 3: Adaptive coping strategies of 1st, 2nd, and 3rd year medical students. Adaptive coping of the students was measured by Brief COPE scale

Adaptive coping strategy	1st year, n = 46		2nd year, n = 55		3rd year, n = 72	
	Mean	SD	Mean	SD	Mean	SD
Problem focused						
Active coping	5.6	1.82	6.03	1.57	6.31	1.47[#]
Positive reframing	5.8	1.32	6.11	1.41	6.41	1.82[#]
Planning	4.87	1.71	5.51	1.71	6.09	1.81[#]
Use of instrument support	5.19	1.83	5.24	1.82	5.92	1.32[#]
Acceptance	5.31	1.48	5.92	1.47	6.19	1.32[#]
Emotionally focused						
Self-destruction	6.39	1.28*	6.12	1.43	5.97	1.39
Behavioral disengagements	4.89	1.32*	4.32	1.41	3.96	1.82
Venting	5.41	1.72	5.28	1.82	5.01	1.38
Substance use	2.82	1.64	2.51	1.32	2.04	1.21
Religion	6.05	1.83*	5.05	1.82	4.98	1.81
Self-blamed	5.81	1.82*	4.71	1.31	4.02	1.42
Humor	5.37	1.82	5.15	1.73	4.96	1.81
Denial	4.29	1.41*	4.01	1.21	3.81	1.71

N, number of students; SD, Standard deviation. Problem focus: [#]$p < 0.05$ versus 1st year students; Emotional focus: *$p < 0.05$ versus 3rd year students.

Discussion

This is the first comprehensive study performed on medical students of Qassim University that showed an inverse correlation between the level of stress and its adaptive coping among first 3 years medical students. For the past two or three decades, it has been continuously reporting that the study at medical school is highly stressful as compared to the studies in non-medical schools [3], [20] and dropout rate of 1st year medical was considerably high as compared with the dropout rate of non-medical students [12]. As an example, a study conducted on Omam Medical students showed the dropout rate in 1st year students was 20% [21]. Similarly, several other studies have also shown moderate to severe levels of stress among medical students but extremely severe stress was reported in the 1st year just after transition from secondary school [1], [2], [3]. Furthermore, studies in multi-ethnic settings also showed that depression, anxiety, and stress among medical students [22]. In this study, we first compared the levels of stress among 1st 3 year medical students and then their adaptive coping potential were measured by a validated and reliable questionnaire [8], [13], [14] and

the scoring of the data was performed using the 5-points Likert scale. The 5-points Likert scale showed the highest degree of stress in 1st year medical students followed by 2nd year students, whereas the 3rd year medical students showed lower stress levels. At the same time, using the same 5-points Likert scale showed that the levels of adaptive coping among 3rd year students were highest, followed by 2nd and 1st year students. These data on the 1st 3 years of medical students were further verified using other scales DASS and Brief COPE. Both DASS and Brief COPE scales were well standard scales, their validity and reliability were proved by a number of investigators in their studies for measuring stress and the potential adaptive coping strategies, respectively [16], [17], [18], [19]. To validate the data on stress, we used the stress section of DASS scale for measuring the stress levels in medical students. Again, the data showed the highest degree of stress levels in 1st year medical students followed by 2nd year students, whereas the 3rd year medical students showed lower stress levels. In addition, the DASS scale also characterized the stress levels in medical students into mild, moderate, severe, and extremely severe and the data pointed out that most of the studied 1st year medical students were under severe or extremely severe stressed, whereas most of the 3rd year students showed mild stress or they were normal during their studies. These data again verified that the highest degree of stress was in 1st year medical students, followed by 2nd year students, whereas the 3rd year medical students showed lower stress levels or they were normal. These data are in full agreement with the view that the 1st year medical students were in more stress due to the transition from secondary school to medical school [23]. To verify the data of adaptive coping against the stress of medical students, the different adaptive coping strategies were applied using the Brief COPE scale. Our data showed that the scores of problem focused coping strategies such as active coping, positive reframing, planning, use of instrument support, and the levels of acceptance were highest in 3rd year students, followed by the 2nd year students. Whereas, the 1st year medical students showed the lowest score for these problem focused coping strategies. These data are in full agreement with the view that active coping, positive reframing, planning, use of instrument support, and the levels of acceptance have a positive relation with well-being and negative with stress [18], [19], [24]. Thus, these coping strategies were considered as adaptive or functional strategies. These data were consistent with what were found by a number of investigators in their coping studies that pointed out that these problem focused coping strategies could be conceived as adaptive coping [18], [19], [24], [25]. Therefore, we highlighted these adaptive coping strategies which directly or indirectly contributed to the well-being of 3rd year medical students as they scored highest points among all three medical students groups. On the other hand, the scores for the emotionally focused coping strategies such as self-destruction, behavioral disengagement, religion, self-blaming, and denial were highest in 1st year students,

followed by the 2nd and 3rd year medical students, clearly indicating that they have a negative relation with well-being and positive with stress. These data were also supported by the other studies conducted on different population groups [18], [26]. Therefore, these strategies are also considered as maladaptive or dysfunctional strategies as their highest scores were found in 1st year students. These findings clearly indicated that 3rd year medical students were having more potential to adapt coping against stress as compared to the 2nd and 1st year students. To study this fact in more detail, we analyzed the levels of stress and adaptive coping of medical students in their academic blocks. The data showed that the level of stress among 1st year medical students during their all academic blocks was significantly more followed by the academic blocks of the 2nd and 3rd years. In contrast, the data demonstrated the adaptive coping was highest in 3rd year students followed by 2nd and 1st year students. These results clearly indicated that the stress level and the level of adaptive coping were completely reserved in the 1st and 3rd year medical students during their respective blocks. Interestingly, the data of stress levels and the adaptive coping were almost the same for 2nd year students during their blocks, indicating that 2nd year students moderately under stress which was completely reversed by adaptive coping.

To investigate the factors associated with the level of stress and its adaptive coping among these students, the data for male and female students were separately analyzed. Results pointed out that the female medical students were better in adaptive coping against stress as of male students. These results are fully supported by the previous studies showing that male medical students were more in stress as compared with female students during their medical education [27]. Not only have these, we also determined the level of stress and its adaptive coping in those students which were living alone and their results were compared with those which were living with their parents. These results indicated that students living alone were disturbed and were less stress adaptive as compared with those students living with their families. These results are also supported by the findings that showed that the students received social support from their parents, relatives, and friends [28]. The studied medical students also reported that they received several types of support which include proper guidance and positive social interaction. These were the factors responsible for them to adopt coping against stress in a better way as compared with those students which were living without their parents.

Conclusion

This study showed that adaptation against stress among the 3rd-year students was the highest followed by 2nd and 1st year medical students. The data show that female students adapted well and students living alone showed worse adaptation against stress.

Acknowledgment

Declarations

Ethics approval and consent to participate

The ethical approval was taken from Qassim University. Written informed consents were taken from all participated medical students.

Consent to publish

N/A (data were collected via routine surveys).

Availability of data and materials

Available on request from the corresponding author.

Funding

Authors' contributions

All authors contributed to the conceptual setup of the study. ZR, AS, AAA, AA, MHA, and WA were involved in data analysis and manuscript drafting; AAs, SAm, SAh, MA, SAs, and SAk performed data collection.

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