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ORIGINAL ARTICLE

EMOTIONAL QUOTIENT OF MEDICAL STUDENTS IN FAISALABAD, PAKISTAN: OVERALL AND BY SEX, AGE GROUPS AND RESIDENCE

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ABSTRACT

Background: Importance of emotional quotient (EQ) is growing globally in field of medical educational systems. Our objectives were to determine EQ of medical students in Faisalabad, Pakistan and their differences by sex, age groups and residence.

Materials & Methods: This cross-sectional study was performed at Aziz Fatimah Medical and Dental College, Faisalabad, Pakistan from July to August 2021. Including 367 medical students; EQ was assessed by Emotional Intelligence Scale. EQ was a research variable on ratio scale. Sex, age groups and residence were demographic variables on nominal scale. Nominal variables were described as count and percentage. Skewed data for EQ was described by median and IQR and normal data by mean and SD. Hypotheses with skewed data were verified by Wilcoxon signed-rank and Mann Whitney tests, while hypotheses with normal data were verified by independent samples t test at alpha .05.

Results: The sample of 367 medical students included 112 (30.5%) boys & 255 (69.5%) girls and 176 (48%) in age group 20-22 & 191 (52%) in age group 23-25 years, and 232 (63.2%) boarders & 135 (36.8%) day scholars. Median EQ score of sample was 101, lower than test value (p=<.00001). Median EQ score of boys 102 was similar to girls 101 (p=.22). Mean EQ score of age group 20-22 years 102.61 was similar to age group 23-25 years 102.40 (p=.887) and of boarders 101.6±14.423 was similar to day scholars 104.02 (p=.116).

Conclusion: Emotional quotient scores of medical students of Faisalabad, Pakistan were same for boys and girls and for age group 20-22 and 23-25 years and for boarders and day scholars.

KEY WORDS: Emotional Quotient; Cognition; Doctor Patient Relations; Leadership; Problem Based Learning; Patient Care; Medical Students; Sex; Age Group; Pakistan.

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1. INTRODUCTION

1.1 Background: The emotional quotient (EQ) is a collection of competencies and skills that boost one's capability to overcome environmental pressures and to deal with compulsion and dissatisfaction.[1] Nowadays, EQ is crucial part of the educational system as students have to deal with challenging tasks, hardships, tight deadlines, navigating change, and working through setbacks and failures. Additionally they have to cope with the challenging environments of universities. Recent studies suggest that non-cognitive constructs have more crucial role than cognitive ability in developing students' wellbeing for better academic performance.[2] It has been observed that numerous students with high intelligence quotient (IQ) may not perform up to the mark in exams.[3] However some educationalist still have the conventional view that the students with high IQ always performed up to the excellence.[4] There is mounting consensus concerning this debate among the policy makers and curriculum developers in this decade, where the conventional teaching is being replaced by activity based leaning.[5] Some educationalists have suggested the need for effective social and emotional learning programs in institutes for enhancing EQ that forms the juncture

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between cognition and emotion, a vital prerequisite for excellence in academic performance.[6]

In recent decades, transition in learning strategies i.e. shift of teacher-centered learning to student centered learning (activity based leaning) fosters the effective learning practices.[7] In medical education, teaching strategies like problem based learning, case based learning, changes in mode of assessment and skill-based tasks require team work,[8,9] self-awareness, and understanding owns and others emotions. These enhances emotional stability, empathy, motivation, manages relations and commitments with group fellows that is vital for successful group activities and learning, that is reflected in their academic grades. It is evident that EQ can foster a variety of skills like teamwork, communication, reasoning and decision making among the students. Therefore, universities are gradually attempting to embed personal, social and leadership competencies in curriculum for developing interpersonal relationships of students to enhance team work for group activities and academic excellence.[10,11] Moreover, EQ improves the physical, as well as psychological well-being of the people that enhances their self-satisfaction and reduces stress level and encourages academic achievements.[1,6] Studies provide evidence that EQ training programs inculcating emotional skill development into existing curricula would be beneficial for improving academic performance.[12] EQ helps pupils to cope with pressures and emotions in stressful academic environments, especially in the medical field where students encounter hurdles while learning new concepts. Huge burden of long hours and difficult studies along with clinical ward rotations in high-stress hospital environment can be difficult for the medical students.[13]

Students who are not able to study in isolation and need academic assistance from teachers and peers tend to study in groups. Also students staying in hostels away from their families are challenged with emotional and social problems and are prone to get stress and anxiety.[14] Many students become upset and feel frustrated when they fail to achieve good grades despite trying hard. Incapability of medical students to control their feelings may adversely affect their potential for academic success.[3] EQ can help students in maintaining close relationships with peers, teachers and family members, so they can share their problems with them and get help, emotional support and can learn from peers in group studies.

Six core competencies of a medical graduate are defined by the Accreditation Council for Graduate Medical Education (ACGME) in United State of America, including patient care, interpersonal professionalism, medical knowledge, communication skills, system based practice and practice based learning.[15] In this decade, the curriculum designers of the medical education are working hard to improve the EQ of medical students during undergraduate and postgraduate training to boost all above competencies. High emotionally quotient students are more sensitive and capable of making strategies according to situations thus coping with the stressful situations in their student as well as in their professional life, thus providing better care to the patients.[16]

1.2 Research Questions (RQ)

RQ 1: What is the emotional quotient (EQ) score of medical students in Faisalabad, Pakistan?

RQ 2-4: What is the difference in EQ score of medical students by sex, age groups and residence in Faisalabad, Pakistan?

1.3 Research Objectives (RO)

RO 1: To determine the EQ score of medical students in Faisalabad, Pakistan.

RO 2-4: To determine the difference in EQ score of medical students by sex, age groups, and residence in Faisalabad, Pakistan.

1.4 Research (Null) Hypotheses

H_{01}: EQ score of medical students is 120 in Faisalabad, Pakistan. (RO 1)

H_{02}: EQ score of medical students is same for boys and girls in Faisalabad, Pakistan. (RO 2)

H_{03}: EQ score of medical students is same for age group 20-22 and 23-25 years in Faisalabad, Pakistan. (RO 3)

H_{04}: EQ score of medical students is same for boarders and day scholars in Faisalabad, Pakistan. (RO 4)

1.5 Significance of the study: Today's medical students are tomorrow's doctors, and strong foundations in emotional quotient is a paramount for fostering a skillful and empathic doctor who is capable of maintaining precocious doctor-patient relationships, which would improve management by increasing trust and satisfaction on both sides. Emotional quotient can be improved throughout the medical education that enabling them to understand different points of view concurrently that is required for better handling of patients as well as their attendants. Furthermore students with emotional quotient are able to understand and manage their own emotions that help them to overwhelmed the stress and anxiety caused by heavy burden of studies and social problems specially faced by students staying in boards away from their families.

2. MATERIAL AND METHODS

2.1 Design, duration, setting & ethical considerations: This cross-sectional study was carried out at the Department of Physiology, Aziz Fatimah Medical and Dental College Faisalabad, Pakistan from July 2021 to August 2021.

Ethical Approval was taken from the Institutional Ethical Committee (Ref. No.IEC128-21). Participation was voluntary. Confidentiality was assured.

2.2 Population, eligibility, sample size & technique: There are five medical colleges in Faisalabad, with an approximate population of 4,000 medical students. 1,630 students of first and second year were excluded, as they did not had exposure to clinical rotation. Rest 2,370 students included our population of interest. Assuming the expected population standard deviation for "Emotional Quotient' to be 13, employing t-distribution to estimate sample size and a population size of 2,370, the study would require a sample size of 347 to estimate a mean with 95% confidence and a precision of 1.27, using an online calculator.[17] Students who had any psychological problems or were under the treatment of psychiatrist were also excluded. With convenience sampling, we selected Aziz Fatimah Medical and Dental College with 400 medical students. Although calculated sample size was 347, but for improving the validity and generalizability of the study, the questionnaire was administered among all these 400 students. The completely filled questionnaires were submitted by 367 (91%) students; the final sample size.

2.3 Conduct of procedure: The Emotional Intelligence Scale (EIS) Questionnaire was transformed on Google form and the link was shared in official WhatsApp class groups of 3rd year to final year MBBS. Google form had two sections. First section included informed consent and information about sex, age and residence. Second section EIS. They were guided to submit responses after completely filling the form. Data on excel sheet was retrieved from Google form responses and then all data was transferred to SPSS v.26 for further analysis.

2.4 Data collection plan

2.3.1 Variables: EQ was a research variable measured on ratio/ numeric scale. Sex (boys & girls), age groups (20-22 & 23-25 years) and residence (boarders & day scholars) were three demographic/ grouping variables on nominal scale.

2.3.2 Emotional Intelligence Scale (EIS): EQ was determined using a 34-items validated and reliable questionnaire 'Emotional Intelligence Scale' (EIS) by Hyde, et al.[18] on 5-point Likert Scale. It has 10 domains of empathy, self-awareness, emotional stability, managing relations, self-motivation, self-development, value orientation, altruistic behavior, integrity and commitment. 1-5 score was assigned to responses; strongly disagree, disagree, neutral, agree and strongly agree respectively. Total EQ score was calculated by summing the scores of all domains. Total score ranged from 34 to 170 with higher score reflecting higher EQ. Its reliability coefficient was 0.88 and content validity was 0.93.

2.4 Data analysis plan

2.4.1 Descriptive statistics & estimation of parameters: Nominal variables were analyzed by count and percentage. Ratio variable EQ was subjected to tests of normality; Skewness, Kurtosis and Kolmogorov-Smirnov test. Skewed data was described by median (Q 2), quartile 1 (Q1), Q3 and IQR (Q3-Q1) with 95% CI. Normal data was described by mean, minimum, maximum, range and SD with 95% CI, using an online statistical calculator by normal approximation method "Statistics Kingdom" (https://www.statskingdom.com/proportion-confidence-interval-calculator.html).

2.4.2 Hypotheses testing: H_{01} was verified by one-sample Wilcoxon signed-rank test, H_{02} by Mann Whitney U test, whereas H_{03} and H_{04} were verified by independent samples t test. Relevant data as sample size, mean/ median, SD/IQR, difference of mean/ median, 95%CI of difference of mean/ median, test statistic, degree of freedom and significance (p-values) are given with interpretation. The data was analyzed by IBM SPSS Statistics for Windows, v.26.0, (IBM SPSS Corp., Armonk, NY, USA) and Windows 10 Professional (Microsoft Corp., USA).

3. RESULTS

3.1 Sample demographics: The sample of 367 medical students included 112 (30.5%) boys & 255 (69.5%) girls and 176 (48%) in age group 20-22 years & 191 (52%) in age group 23-25 years, and 232 (63.2%) boarders & 135 (36.8%) day scholars.

3.2 Normality of data: Three tests were applied to determine the normality of ratio (numeric) data i.e. EQ score. (Table 3.2)

Table 3.2: Normality of data for EQ score of medical students in Faisalabad, Pakistan

Variable	Group	Skewness Statistic	Kurtosis Statistic	Kolmogorov-Smirnov test			Data distribution
				Statistic	d.f.	p-value	
Overall (full sample)		-.221	.116	.054	367	.011	Skewed
Sex	Boys	-.475	.515	.071	112	.200	Normal
	Girls	-.092	-.108	.058	255	.037	Skewed
Age groups	20-22 years	-.377	.692	.059	176	.200	Normal
	23-25 years	-.095	-.294	.059	191	.098	Normal
Residence	Boarders	-.270	.138	.057	232	.061	Normal
	Day scholars	-.083	-.017	.031	135	.095	Normal

3.3 Descriptive statistics & estimation of parameters for skewed EQ Score data: The median EQ score of medical students for the sample was 101 (95%CI, 100-103). The median EQ score of boys 102 (95%CI 99-109) was similar to girls 101 (95%CI 99-103) as their CIs overlap. (Table 3.3)

3.4 Descriptive statistics & estimation of parameters for normal EQ Score data: The mean EQ score of medical students of age group 20-22 years 102.61 (95%CI 100.54-104.58) was similar to age group 23-25 years 102.40 (95%CI 100.41-104.32) as their CIs are overlapping. Likewise it was similar for boarders and day scholars. (Table 3.4)

3.5 Hypotheses testing

3.5.1 EQ score of medical students (H_{01}): The data for EQ score was skewed, hence a non-parametric test; one-sample Wilcoxon signed-rank was used. The test value was taken from a study by Suleman, et al.[1] from Kohat, Pakistan as explained under Para 4.1 in discussion. With p-value <.00001, null hypothesis was rejected, so the observed median score was statistically significantly lower than the expected median score. Simply EQ score of our sample was lower than expected. (Table 3.5.1)

3.5.2 EQ score of medical students by sex (H_{02}): The median EQ scores of boys and girls were compared using independent samples Mann Whitney U test at alpha .05. As p-value .220 was higher than alpha level .05, so H_{02} was proved to be true and hence retained/ accepted, showing similar EQ for boys and girls. (Table 3.5.2)

3.3: Descriptive statistics & estimation of parameters for skewed EQ Score data of medical students in Faisalabad, Pakistan

Variables	Groups	Sample Statistics				95%CI of Median	
		Quartile 1 (Q1)	Median (Q2)	Q3	IQR	Lower	Upper
Overall (full sample)		93.00	101.00	113.00	20.00	100.00	103.00
Sex	Boys	95.00	102.00	114.75	19.75	99.00	109.00
	Girls	92.00	101.00	113.00	21.00	99.00	103.00

Q=Quartile, IQR=Inter quartile range (Q3-Q1), CI=Confidence Interval

Table 3.4: Descriptive statistics & estimation of parameters for normal EQ Score data of medical students in Faisalabad, Pakistan

Variable	Attributes	Sample Statistics					95% CI of Mean	
		Mean	Min.	Max.	Range	SD	Lower	Upper
Age groups	20-22 years	102.61	54	137	83	13.808	100.54	104.58
	23-25 years	102.40	62	4134	72	14.496	100.41	104.32
Residence	Boarders	101.61	54	134	80	14.423	99.71	103.34
	Day scholars	104.02	62	137	75	13.588	101.76	106.26

SD = Standard deviation, CI = Confidence interval

Table 3.5.1: EQ score of medical students in Faisalabad, Pakistan

Observed median score	Test value	Difference of medians	Test statistic	Standard error	Standardized test statistic	p-value
101	117	-16.00	5152.00	2033.588	-14.070	<.00001

Table 3.5.2: EQ score of medical students by sex in Faisalabad, Pakistan

Sex	Sample size	Median	Mann-Whiteny U	Standard error	Standardized test statistic	p-value (2-tailed)
Boys	112	102	13133.00	935.585	-1.226	.220
Girls	255	101				

Table 3.5.3: EQ score of medical students by age groups in Faisalabad, Pakistan

Age groups	Sample size	Mean	SD	Difference of means	95% CI of difference		t value	d.f.	p-value (2-tailed)
					Lower	Upper			
20-22 years	176	102.61	13.808	.21	-2.701	3.112	.142	365	.887
23-25 years	191	102.40	14.496						

Table 3.5.4: EQ score of medical students by residence in Faisalabad, Pakistan

Residence	Sample size	Mean	SD	Difference of means	95% CI of difference		t value	d.f.	p-value (2-tailed)
					Lower	Upper			
Boarders	232	101.61	14.423	-2.41	-5.414	.596	-1.577	365	.116
Day scholars	135	104.02	13.588						

3.5.3 EQ score of medical students by age groups (H_{03}): Mean EQ scores were compared between the two age groups using independent samples t test at alpha .05. As p-value .887 was higher than alpha level .05, hence H_{03} was proved to be true and retained/ accepted, showing equal EQ score for the two age groups. (Table 3.5.3)

3.5.4 EQ score of medical students by residence (H_{04}): Mean EQ scores were compared between the boarders and day scholars using independent samples t test at alpha .05. As p-value .116 was higher than alpha level .05, hence H_{04} was proved to be true and retained/ accepted, showing equal EQ score for the two groups. (Table 3.5.4)

4. DISCUSSION

4.1 EQ Score of medical students: In our study, median EQ score of medical students was 101 (95%CI, 100-103) on 34-170 points emotional intelligence scale (EIS). We have calculated sum of scores for 34 items. Taking 117 sum of scores as test value from Suleman, et al.[1], we verified our hypothesis. The expected median score of 117 was higher than our sample median score of 101 (p-value< .00001).

Similar aggregate mean score of 101.2±13.7 was reported by Todres, et al.[19] from London Medical School using a 141-item Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT) version 2 in 2010 (n=265).

Following nine studies have shown higher scores than our study.

Tariq, et al.[20] included 498 UG students from different faculties from University of Faisalabad, Pakistan from August 2016 to March 2017, using Self-Reported Trait Emotional Intelligence Questionnaire–Short Form (TEIQue-SF), having 30 items on 1-7 points Likert scale (30-210 range). Their mean EI for each/ single item was 4.45 ±0.61, equivalent to 133.5 for 30 items, higher than our population EI.

Imran et, al.[21] reported mean EI score of students from two medical institutes as 122.4 (95% CI 120.5-124.4) and 123.3 (95% CI 120.6-126.0) respectively in 2020 from Lahore Pakistan; both having higher EQ than us.

Higher mean score of 105.56±18.03 was reported by Johar, et al.,[3] including 347 students of Army Medical College, Rawalpindi. Their EQ was checked through "The Quick Emotional Intelligence Self-Assessment Questionnaire" adapted for San Diego City College MESA Program. It includes 40 items on 5-point Likert Scale, ranging from 0-4 corresponding to never, rarely, sometimes, often and always respectively with total score of 0-160.

Suleman, et al.[1] from Kohat, Pakistan in 2019 reported mean score of 3.43±0.51, equivalent to 116.62 (3.43*34=116.62) for 34 items for 186 students from Kohat University of Science & Technology. The score was measured on EIS, but analyzed as mean on 1-5 points scale.

Chaudhary, et al.[22] from COMSATS Institute of Information Technology, Abbottabad, Pakistan in 2013 (n=119) reported EI score of students as 3.85±0.337 on a scale developed by Schutte, et al. comprising 33 items (33-165 score range) on 5-points Likert scale. It would be 127.05 (3.85*33=127.05) as sum for 33 items; higher than our study.

Ranasinghe, et al.[15] reported mean EI scores of 2nd year, 4th year and 5th year UGs from University of Colombo, Sri Lanka from October-November 2015 as 122.4±12.1, 122.7±11.2 and 121.6±13.1 respectively; all higher than our population. SEIT was used with 33 items on 5-points Likert scale (33-165).

George, et al.[23 from] Central Kerala, India included 251 medical students from two medical colleges and used Schutte Self-Report Emotional Intelligence Test (SSEIT) with total 33 items on 1-5 points scale (range 33-165). Their Mean score was 121.43±19.065, higher than our population.

Puliyakkadi, et al.[24] included 70 doctors from a tertiary care centre in Kerala, India and revealed the mean EI score 116.08±14.76 (95%CI 112.62-119.53), using SSEIT.

Ewaiwi, et al.[25] included 692 medical students from

Al-Quds and Al-Najah universities in Palestine in year 2020. EM was evaluated by 33-item scale introduced by Schutte et al. (1998). The mean EI score was 3.83±0.41 on 1-5 point scale. The sum for 33 items will be 126.39 (3.83*33=126.39), higher than our study.

No study was found with lower EI than our study.

4.2 EQ Score of medical students by sex: In our study, median EQ score of boys 102 (95%CI 99-109) was similar to girls 101 (95%CI 99-103) (p=.220).

Similar to our study, Puliyakkadi, et al.[24] reported similar mean EQ for men 112.47±14.58 and women 117.63±14.71 (p=.88).

Similar results are reported by Foster, et al.[26] in 2018 from Australia with no significant difference in EI among 114.73±12.35 male and 115.37±14.07) female (n=57) nursing students (p-value=.89), 113.79±12.84 male and 108.62±18.33 female (n=112) pharmacy students (p-value=.12) and 113.09±12.00 male and 115.31±11.34 female (n=34) dental students (p-value=.59) respectively. They used 31-item GENOS Emotional Intelligence (EI) Inventory (concise version) on a 5-point Likert Scale.

Higher EI score in females than males are reported by following seven studies.

Imran et, al.[21] reported higher mean EI score of female students 123.4 (95%CI 121.5-125.2) than male students 121.4 (95%CI 118.4-124.3) from two medical institutes in 2020 from Lahore Pakistan (p=.48).

Fida, et al.[27] included 828 students from Abdul Wali Khan University, Mardan, Pakistan in 2018 and reported significant higher mean EQ score in female 3.55±0.851 vs. male 3.42± 0.896 students (p-value=.04). They used Wong and Law Emotional Intelligence Scale (2002) having 16 items on a Likert scale of 7 points.

Chaudhary, et al.[22] in 2013 from Abbottabad, Pakistan reported EI score of female 3.98±0.28 students (n2=42) higher than male 3.77±0.34 students (n1=77) (p=.001).

Shahzad & Bagum[28] reported higher trait EI in females 147.51±22.25 than males 135.33±21.65 (p=.007) in 100 students from University of Karachi, Pakistan in 2012 on Trait Emotional Intelligence Questionnaire by Petrides & Furnham (2003); a 30 items and 7-points scale (30-210 score range).

Ranasinghe, et al.[15] reported higher EI score in female 123.5±10.1 than male 120.7±14 students (p-value=.014) by using SEIT with 33 items on 5-points Likert scale with range of scores 33-165.

Meshkat, et al.[29] from Iran in 2017 reported higher EQ in female as compared to male by verifying through MANOVA. They used "The Bar-On Emotional Quotient Inventory" in 455 undergraduate university students majoring in English.

Todres, et al.[19] from London Medical School used a 141-item Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT) version 2 in 2010 (n=265). The aggregate EI of female students 102.6±13.4 was higher than male students 97.5±13.7 (p< 0.05).

Bhattacharjee, et al.[30] showed higher maturity in male 69.52±12.17 (lower score) than female 73.8±13.26 (higher score) (t=2.38, p<.05) students from Tripura University, India in 2016 on 48 items and 5-points (48-240 score range) Emotional Maturity Scale developed by Singh & Bhargava (1990). Here higher score shows higher immaturity.

4.3 EQ Score of medical students by age groups: In our study, the mean EQ score of medical students was similar for age group 20-22 years 102.61 (95%CI 100.54-104.58) and 23-25 years 102.40 (95%CI 100.41-104.32) as their CIs are overlapping (p=.887).

In contrast to our study, Todres, et al.[19] from London Medical School using a 141-item Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT) version 2 in 2010, showed that the aggregate EI of ≥25 years (older) students 105.4±13.1 was higher than <25 years (younger) students 99.6±13.6 (p< 0.05).

4.4 EQ Score of medical students by residence: In our study, the mean EQ score of boarders 101.61 (95%CI 99.71-103.34) was similar to day scholars 104.02 (95%CI 101.76-106.26) as their CIs are overlapping (p=.116).

Opposite to our results, Bhattacharjee, et al.[30] showed higher maturity in boarder 136±24.32 (lower score) than day scholar 150.64±30.08 (higher score) (t=3.78, p<.01) students from Tripura University, India in 2016 on 48 items/5-points (48-240 score range) Emotional Maturity Scale developed by Singh & Bhargava (1990). Here higher score shows higher immaturity.

Opposite to our results, Sowmyashree, et al.[31] from Bangalore, India in 2019 showed higher maturity in day scholars 87.43±14.51 than boarders 101.73±14.74 (t=3.78 at alpha .05). They used Emotional Maturity Scale by Singh and Bharagava (2012); the higher score indicating higher level of immaturity.

4.5 Marwat's Logical Trajectory of Research Process: We have followed this 8-steps logical and chronological process of identifying our research problems, digging for knowledge gaps, putting these into questions, narrating these as objectives, formulating these as hypotheses. Then going for relevant data collection, its analysis and its interpretation to sort our answers for questions, filling the knowledge gaps and solving our research problems; our rationale.[32-34]

5. CONCLUSIONS

Emotional quotient scores of the medical students of Faisalabad, Pakistan were same for boys and

girls and for age group 20-22 and 23-25 years and for boarders and day scholars. Emotions quotient is the key aspects of personality. It would be valuable to plan and conduct comprehensive studies in this domain for better understanding the impact of these factors on emotional quotient along with other domains of personality. Further the emotional quotient should be incorporated in medical curriculum to assist students in reaching academic excellence and becoming a competent healthcare provider.

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CONFLICT OF INTEREST
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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

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All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.