

Research article

Gender Differences in Emotional Intelligence Among Medical Students in Pakistan: A Cross-Sectional Study

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Abstract: Emotional intelligence (EI) is a component of social intelligence involving the ability to perceive, understand, and regulate emotions. It plays an important role in the personal and professional development of medical students. Previous studies on gender differences in EI have shown inconsistent results. To examine gender differences in EI among medical students in Pakistan. A cross-sectional questionnaire-based study was conducted among 224 medical students using convenience sampling. Data were collected through a self-administered online questionnaire, and Data were analyzed using IBM SPSS Statistics version 27. Independent samples t-tests and chi-square tests were performed, with $p < 0.05$ considered statistically significant. Of the 224 participants, 139 (62.5%) were female and 85 (37.5%) were male. There was no significant difference in overall EI scores between males (26.26 ± 4.99) and females (26.43 ± 3.55 ; $p = 0.764$). However, females scored significantly higher in empathy ($p = 0.001$), while males scored higher in self-management ($p = 0.007$). No significant differences were observed in other domains. Although overall EI did not differ significantly between genders, differences were observed in specific domains. These findings highlight the need for targeted EI development strategies in medical education.

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Introduction

Emotional intelligence (EI) is an important determinant of medical students' professional development, influencing communication, empathy, and stress management. Previous studies have reported inconsistent findings regarding gender differences in EI, with some suggesting higher empathy and social skills among females. In contrast, others report superior emotional regulation and stress management among males [1, 2]. Understanding these variations is important for informing competency-based medical education strategies.

Emotional intelligence is defined as a form of social intelligence that involves the ability to perceive, understand, and regulate one's own emotions as well as those of others, and to use this information to guide behavior [3]. It is commonly conceptualized through

domains such as self-awareness, self-management, motivation, empathy, and social skills, which contribute to effective interpersonal functioning in clinical and academic settings [4].

Emotional intelligence has been associated with academic performance, leadership, communication skills, and clinical competence in healthcare settings [5, 6]. It also plays a key role in stress management and professional development among medical students.

Despite growing international research, findings regarding gender differences in EI remain inconsistent. Moreover, evidence from Pakistan is limited, with few studies examining domain-specific components of EI among medical students. Sociocultural factors unique to Pakistan may influence emotional expression and regulation differently from other populations. Therefore, this multicenter study aimed to evaluate both overall EI and individual EI domains among

Pakistani medical students, providing evidence that may help guide curriculum development and EI training in medical education.

Materials and Methods

A cross-sectional questionnaire-based study was conducted from March 2024 to August 2024 to assess gender differences in EI among undergraduate medical and dental students in Pakistan. A total of 224 participants were included. Undergraduate medical and dental students were recruited through institutional class representatives and official student social media platforms. Participation was voluntary, anonymous, and no incentives were offered. The sample size was calculated using the WHO sample size calculator with a 95% confidence interval, 5% margin of error, and an assumed prevalence of 60% [7]. A convenience sampling technique was used because participants were recruited voluntarily through institutional class representatives and official student social media platforms.

Undergraduate medical and dental students enrolled at medical colleges across Pakistan, including Watim Medical and Dental College, Rawalpindi, participated in the study. The questionnaire was distributed electronically using Google Forms between March and August 2024. As the questionnaire was distributed through multiple institutional platforms, the exact response rate could not be determined.

Emotional intelligence was assessed using a questionnaire based on Goleman's EI framework. The tool demonstrated acceptable internal consistency (Cronbach's alpha = 0.78 in previous studies). The questionnaire included five domains: self-awareness, self-management, motivation, empathy, and social skills. Responses were recorded on a Seven-point Likert scale (1 = strongly disagree to 7 = strongly agree), with higher scores indicating higher EI. Because the EI domains contained different numbers of items, the score for each domain was calculated as the mean of the responses to the items within that domain. These mean domain scores were then used for the statistical analyses, with mean scores standardized to the same 1–7 scale, allowing valid comparisons across domains containing different numbers of items.

Data were analyzed using IBM SPSS Statistics version 27.0.1. Descriptive statistics were calculated, and an independent samples t-test was used to compare EI scores between genders. A chi-square test was used for categorical variables. Mean differences, 95% confidence intervals, and Cohen's d effect sizes were calculated for comparisons of continuous variables. Normality assumptions were assessed

before applying parametric tests. A p-value < 0.05 was considered statistically significant.

Inclusion criteria were undergraduate medical students who provided informed consent. Exclusion criteria included postgraduate students, non-medical students, and individuals with cognitive impairment. Ethical approval was obtained from Watim Medical and Dental College, Rawalpindi, and informed consent was obtained from all participants.

Results

Phytochemical contents

A total of 224 medical students participated in the study. Among them, 139 (62.5%) were female, and 85 (37.5%) were male. Most participants (73%) were aged between 20 and 25 years, and the remaining were either younger (16–20 years; 18%) or older (25–30 years; 11%). The demographic characteristics of participants are summarized in **Table 1**.

Table 1. Demographic Characteristics of Participants (n = 224).

Variable	Category	Frequency (n)	Percentage %
Gender	Male	85	37.5
	Female	139	62.5
Age group	15-20 years	55	24
	20-25 years	163	73
	25-30 years	6	3
Year of Study	First year	47	21
	Second year	34	15
	Third year	29	13
	Fourth year	99	44
	Fifth year	15	7

Independent t-tests showed no significant gender difference in total EI (p = 0.764). However, females scored significantly higher in empathy (p = 0.001), while males scored higher in self-management (p = 0.007). Overall, EI scores did not differ significantly between male and female students (**Table 2**).

Table 2. Comparison of Overall EI Scores by Gender.

Gender	Mean ± SD	Mean Difference (CI 95%)	Cohen d	p-value
Male	26.26 ± 4.99	-0.17 (-1.3 to 0.95)	-0.04	0.764
Female	26.43 ± 3.55	---	---	0.764

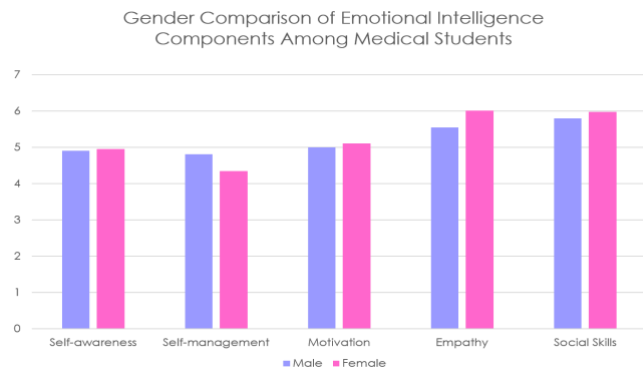


Figure 1. Comparison of EI component scores by gender.

Table 3. Comparison of EI Components by Gender.

EI Component	Male (Mean ± SD)	Female (Mean ± SD)	Mean Difference (CI 95%)	Cohen d	p-value
Self-awareness	5.35 ± 1.47	5.6 ± 1.10	-0.27(-0.61 to 0.70)	-0.216	0.119
Self-management	4.81 ± 1.20	4.34 ± 1.25	0.47(0.13 to 0.80)	0.38	0.007
Motivation	5.15 ± 1.25	5.04 ± 1.03	0.11(-0.20 to 0.41)	0.09	0.496
Empathy	5.55 ± 1.22	6.01 ± 0.86	-0.46(-0.74 to -0.19)	-0.46	0.001
Social skills	5.39 ± 1.3	5.40 ± 1.08	-0.16(-0.34 to 0.30)	-0.13	0.923

Table 4. Correlation Between EI Components and Demographic Variables.

Variables	EI Component	Pearson's Correlation (r)	p-value
Age	Overall EI	0.09	0.14
Year of Study	Overall EI	0.12	0.09
Empathy	Social Skills	0.62	<0.01

Discussion

The present study found no significant difference in overall EI between male and female medical students. However, significant differences were observed in specific domains, particularly empathy and self-management, suggesting that although overall EI may be comparable between genders, individual emotional competencies may differ.

Similar findings have been reported in recent systematic reviews and studies among medical students, where overall EI scores did not differ significantly between genders despite differences in specific EI domains [8]. These findings may reflect the comparable academic environment, clinical exposure, and educational experiences shared by male and female medical students.

In contrast, gender differences in EI subdomains were evident. Female students demonstrated significantly higher empathy scores, consistent with findings from recent systematic reviews reporting

Significant gender differences were observed in empathy and self-management, while no statistically significant differences were identified in self-awareness, motivation, or social skills (**Table 3**). Correlation analysis showed no significant relationship between overall EI scores and age or year of study ($p > 0.05$). However, empathy and social skills were positively correlated ($r = 0.62$, $p < 0.01$), indicating that students with greater empathy also demonstrated stronger social abilities (**Table 4**).

greater empathic abilities among female medical students [9-11]. Higher empathy may be influenced by biological, psychological, and sociocultural factors that promote emotional awareness and interpersonal sensitivity, qualities that are fundamental to effective physician–patient communication and patient-centered care.

Male students demonstrated significantly higher self-management scores, suggesting relatively stronger emotional regulation under stressful situations. Although evidence regarding gender differences in self-management remains inconsistent, previous studies suggest that variations in coping strategies and stress management may contribute to differences in emotional regulation between male and female medical students [8, 12].

The observed variation across EI domains highlights the multidimensional nature of EI. Rather than representing a single construct, EI is influenced by complex interactions among personal characteristics, educational experiences, and sociocultural factors. Consequently, overall EI scores alone may not fully capture important competencies relevant to professional development and clinical performance [8, 13].

Emotional intelligence has consistently been associated with improved communication, teamwork, resilience, leadership, stress management, and academic performance among medical students and

healthcare professionals [8, 14]. A recent meta-analysis further demonstrated that EI is positively associated with academic achievement in medical education, although the strength of this relationship appears modest and is influenced by multiple personal and educational factors [14]. Collectively, these findings support the growing recognition of EI as an essential competency that should be integrated into competency-based undergraduate medical education [8].

The findings of the present study have important implications for medical education. Rather than focusing solely on overall EI, educational interventions should target specific domains, particularly empathy development and emotional regulation. Structured educational strategies, including communication skills workshops, reflective practice, mentorship programs, and simulation-based learning, have been shown to improve empathy and emotional competencies among medical students [15].

Cultural expectations and gender roles may also influence emotional expression and coping behaviors, particularly within collectivist societies such as Pakistan [10]. Understanding these contextual influences is important for designing culturally appropriate educational interventions that foster EI among future healthcare professionals.

Overall, the findings suggest that although overall EI does not differ significantly between male and female medical students, meaningful gender differences exist within specific EI domains. These findings support incorporating targeted EI training into undergraduate medical curricula to enhance empathy, emotional regulation, communication skills, and professional competence.

Study limitations: This study has several limitations. The use of a self-reported questionnaire may introduce response bias, potentially affecting the accuracy of reported EI levels. The cross-sectional design limits causal inference between gender and EI domains. Additionally, convenience sampling and online data collection via Google Forms may have introduced selection bias, as participation depended on students' willingness and access to institutional online platforms. Students with greater interest in EI may have been more likely to participate, potentially limiting the representativeness and generalizability of the findings. Furthermore, the use of a structured EI questionnaire, while demonstrating acceptable reliability, may not fully capture the complexity of EI across diverse cultural contexts. Future research should employ longitudinal designs, random sampling techniques, and mixed-method approaches to provide a more

comprehensive and generalizable understanding of EI across genders in medical students.

Conclusion

This study found no significant difference in overall EI between male and female medical students. However, gender differences were observed in specific EI domains, with females demonstrating higher empathy and males showing stronger self-management. These findings suggest that EI is a multidimensional construct in which gender differences are more evident at the domain level than in overall scores. The results support the incorporation of targeted EI training within undergraduate medical education. Incorporating structured EI training into undergraduate medical curricula may enhance empathy, emotional regulation, communication skills, and professionalism among future physicians. Future multicenter longitudinal studies are warranted to further evaluate the impact of EI training on academic and clinical performance.

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