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Correlation of assessment scores and performance of students from admission to graduation at Liaquat College of Medicine and Dentistry

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ABSTRACT

BACKGROUND & OBJECTIVE: Gaining admission to medical school is highly competitive, requiring rigorous selection criteria by educational institutions. They carefully assess entry qualifications and eligibility tests to identify suitable applicants for their medical programs. The objective is to evaluate how well these criteria predict student's overall academic performance in medical colleges across Pakistan.

METHODOLOGY: The descriptive, observational study was conducted at a private medical and dental College, in Karachi. A multiple linear regression analysis was conducted to predict the final year score based on factors such as HSC score, entry test score, and scores from the first, second, third, and fourth years.

RESULTS: The study shows that the pre-medical scores of HSC and A levels have a moderate positive correlation with the first-year MBBS (r=0.403) and a strong correlation with the final-year scores (r=0.603). The entry test (MDCAT) has a moderately positive correlation with the first, third (r=0.348), and fourth-year (r=0.367) scores. On comparing pre-clinical year scores with clinical years, a strong positive correlation was seen between 1st year and 3rd year (r=0.721), 1st year and 4th year (r=0.570), 1st year and final year (r=0.619), 3rd year and 4th year (r=0.711), 3rd year and 5th-year scores (r=0.602), 4th year, and 5th-year scores (r=0.651).

CONCLUSION: This study shows that the pre-medical scores and medical college entry tests can predict student's overall future academic performance in professional examinations. Also, provides insight to medical educationists to identify weak students in their early medical college years.

KEYWORDS: Educational Measurement, Schools, Education, Students, Medical, Examinations, Professional.

INTRODUCTION

Previously in Pakistan, medical schools' admissions were based on the high school grades only [1]. The process of selecting students for medical schools has been continually evolving over the period of many years. Now, a combination of high school academic grades in science subjects (chemistry, physics, and Biology) and the scores from Medical and Dental College Admission Tests (MDCAT) are used for selecting the best candidates from the applicants [1]. Evidence supports the use of previous academic achievements as a powerful predictor of accomplishing admission to medical school [2].

On a global overview, an Australian study showed that both GPA in high school and GAMSAT score support medical program outcomes throughout the course [3]. However, there is a dearth of local literature that explores whether the criteria used in Pakistan fulfill the purposes of the selection process appropriately.

Similarly, students' performance in basic science years can predict their achievements in clinical years. Several studies have shown that students' performance in basic medical sciences (anatomy, biochemistry, pharmacology, physiology) in their undergraduate years can forecast students' performance during clinical years [4]. This correlation can be used, not only for predicting students' performances but also to guide educators in managing their curriculum for better future outcomes.

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Worldwide, multiple factors are considered by medical institutions while selecting students for admission, including their cognitive abilities, personality traits, and skills. The cognitive abilities are best assessed through GPA and the entry test scores. Entry tests like MCAT, GAMSAT, or MDCAT are unique tools standardized globally to choose the most appropriate candidate from diverse backgrounds. The idea behind using this standardized uniform test is that students applying for professional medical education come from diversified educational backgrounds and increasingly diverse academic backgrounds, and their marks cannot be entirely dependent on their GPA alone [5].

Admission to health professional colleges has always been competitive [6]. One possible explanation is that the students attaining proficiency in basic science subjects from the beginning of medical studies have the advantage of having a better grip of knowledge in clinical sciences later on. Out of these students, those who are remarkably skilled at test-taking are likely to maintain this ability throughout their professional medical school education .Student selection is one of the top priorities of most of the medical schools. It is a debatable and high-stakes process [7]. The selection criteria for admission adopted by various medical institutions globally include cognitive criteria such as premedical GPA and other standardized tests like the Medical College Admission Test (MCAT) used for medical student selection in North America, the Graduate Australian Medical School Admissions Test (GAMSAT) in Australia, UK Clinical Aptitude Test (UKCAT) and Undergraduate Medicine and Health Sciences Admission Test (UMAT) in Australia and New Zealand [8].

Whichever type of admission tests are used, there is an ongoing evolution in the selection criteria for medical schools worldwide [3,7]. While there is a persistent and valid need to define the best selection criteria for medical school aspirants, it is equally important to examine the predictive value of early performance once students commence their medical training [7]. The ultimate goal is to select the most appropriate students for developing competent physicians to meet future health needs [8].

There is a wide range of approaches used in medical school admission and selection criteria throughout the globe. Previous cognitive performance in preclinical years has revealed a forward planner of medical school performance [9]. However, the performance in the non-cognitive domain is correlated with clinical competency based on scores of Objective Structured Clinical Examinations (OSCEs) and the professional portfolio showing 360-degree feedback in terms of assessment of professionalism at clinics, evaluation of clinical internship and overall clinical examination methods in terms of licensing exam requirements [10].

Recent studies show that developing cognitive and non-cognitive skills helps students enhance emotional regulation to shape strong associations with their peers and focus more effectively on challenging academic tasks [11].

In addition, tools that measure the constructs underlying personality traits are valuable for selection purposes. Medical schools could consider tailoring examination formats to align with specific personality traits of medical students, which also play a significant role in the selection process as they correlate with their examination performance [12].

Presently, various universities globally have implemented the policies of admission into the medical institutes based on cognitive skills including premedical scores/ GPA and the entry test scores such as MDCAT in the Pakistani context [13].

Some medical schools in the United States, Belgium, and Canada have topped up additional criteria for evaluating candidates for admission to medical schools such as recommendation letters, personal statements, involvement in extra and co-curricular activities, multiple mini-interviews, psychological analysis, and situation judgment test [14].

Out of the different measures utilized in pre-selection criteria, previous academic performance at a medical school stands to be the most useful tool for predicting success in professional medical studies and other disciplines. After the Ottawa consensus statement in 2011 to date, a number of researches have been carried out in an effort to set up a guide that is “robust, defendable and fair” constructed for the selection process in a local native context. In the latest study, two pressing issues have been focused. First regarding the use of the psychometric domain and how to incorporate it in the selection process and the second focus is on objectives and local process of selection in medical school. This gap has been addressed in a guide based on international case studies and reflection on commonalities drawn on an ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). For example, according to NMC Act 2019 the NEET-UG (the National Eligibility cum Entrance Test (Undergraduate) has been declared as the only entrance test throughout India for admissions to medical colleges [15].

In the current study, we target to focus on a meaningful correlation assessed by summative exam scores between performance in preclinical medical school years with clinical years throughout the professional year exams.

METHODOLOGY

This descriptive, observational, data-based study was conducted at the Liaquat College of Medicine and Dentistry and Dar UL Sehat Hospital Karachi, Pakistan from December 2017 to December 2018. Assessment scores from admission to graduation of two cohorts of students were taken from two batches of recent graduates. A total of 158 student records were used for analysis. The sample size was calculated by an online calculator for Correlation Coefficient using z-transformation.

The calculation was done using a two-sided test where the significance level was 5% (α=0.05) with 80% power (β=0.2) and sample correlation was r=0.221. It has been replicated by a similar article, reported by Lubna et al (1). The required sample size hence calculated was approximately

158 (n=158). Ethical approval was obtained from the Institutional Review Board (IRB) from Dow University of Health Sciences on submission of the Synopsis (ref: IRB-1724/DUHS/Approval/2020/). The ethical approval was done on May 9th, 2020.

The data collection of entry test results, premedical school results, and the professional medical score results of two cohorts of students were required. Before the data collection, formal emails were written to the Principal, Department of Examination, and Admission Cell to get access to the Record room. All the data was identified before analysis, the student names were anonymized thereby ensuring confidentiality in the research process.

The students of LCMD from years 1 to 5 were considered as the study population. Inclusion Criteria included all the students who had done HSC or A levels in two selected cohorts. The results of students who had dropped out in any year, and where any of the results were not available were excluded from the analysis. The study took approximately two years. The data was completed in six months. Data was analyzed using the SPSS statistical software version 22. Simple descriptive statistics Pearson's correlation and multiple regression were used for analysis. The degree of statistical significance was denoted by the p-value of 0.05.

RESULTS

Out of the two cohorts (n=158), 78 students were from batch 6, and 80 students were from batch 7, who graduated in 2017 and 2018. Out of 158 students, 57 were males, and 101 were females.

The average HSC score of all the students was estimated as 826.07±46.76 (range: 666-885). The average entry test score of all the students was estimated as 79.17±3.66 (range: 72-85). In the first year of college, the average professional was 317.62, in the second year it was 313.80, in the third year it was 585.61, in the fourth year it was 721.60 and in the final year it was 1214.72. (Table- I).

The correlation between the HSC score and the entry test score is 0.570, which shows a strong positive correlation. The coefficient of determination (R2) indicates that 32.5% of the variation in entry test scores is predicted by the HSC score. (Table-II).

Moderately positive correlations are observed between HSC and first-year scores (r=0.403, p=0.001) and Entry Test and first-year scores (r=0.348, p=0.001). There is a weak negative correlation seen between HSC and 2nd-year scores (r=-0.232, p=0.001). Whereas a moderately negative correlation is observed between the entry test and second-year scores (r=-0.411, p=0.001). Moderately positive correlations are also observed in entry tests with the third (r=0.312, p=0.001) and fourth-year scores (r=0.367, p=0.001). There was a positive weak correlation between the HSC score and fourth-year score (r=0.260, p=0.001) whereas there was a positive moderate correlation between the entry test score and fourth-year score (r=0.367, p=0.001). There is a strong positive correlation between the HSC score and final year score (r=0.603, p=0.001) and the entry test score and final year score (r=0.640, p=0.001). (Table-III)

There was a negative weak correlation between the 1st-year score and 2nd-year score (r=-0.173, p=0.030), whereas a positive strong correlation between 1st year and 3rd-year score (r=0.721, p=0.001), 1st year and 4th-year score (r=0.570, p=0.001) and 1st year and final year score (r=0.619, p=0.001). There was a negative weak correlation between the 2nd-year and 5th-year scores (r=-0.222, p=0.005). There was a positive strong relationship between the 3rd-year and 4th-year scores (r=0.711, p=0.001) and the 3rd-year and 5th-year scores (r=0.602, p=0.001). There was a strong positive correlation between the 4th-year and 5th-year scores (r=0.651, p=0.001). (Table-IV)

A multiple linear regression analysis was conducted to predict the final year score based on factors such as HSC score, entry test score, and scores from the first, second, third, and fourth years. The R2 value reveals that 70.9% of the variability in the final year score can be explained by the independent variables, namely the HSC score, entry test score, and scores from the first, second, third, and fourth years. The overall regression model demonstrates a good fit for the data. Importantly, the independent variables exhibit statistically significant predictive power for the final year score, as evidenced by the F-value = 60.79, p = 0.001.

Examining the beta coefficients, significant relationships are observed for HSC (p=0.001), entry test (p=0.001), first-year (p=0.024), and fourth-year (p=0.001) scores with the final year score. However, second-year and third-year scores do not exhibit significant associations (Table-V).

Table-I:Descriptive statistics of student's scores at all levels.

	Entry test score	
HSC score	**r**	**p-value**
	0.570	0.001

Table- II: Correlation between HSC score and entry test score.

Scores	Minimum	Maximum	Mean	SD
HSC Score	666	885	826.07	46.763
Entry test score	72	85	79.17	3.668
First Professional Score	187	417	317.62	44.416
Second Professional Score	187	423	313.80	45.909
ThirdProfessional Score	407	772	585.61	77.485
Fourth Professional Score	549	908	721.60	72.940
Final Professional Score	1005	1420	1214.72	99.501

Table- III:Correlation between first to final professional scores with HSC and entry test scores.

Variables	HSC Scores		Entry test scores	
	r	p-value	r	p-value
First professional scores	0.403	0.001	0.348	0.001
Second professional scores	-0.232	0.001	-0.411	0.001
Third professional scores	0.312	0.001	0.367	0.001
Fourth professional scores	0.260	0.001	0.367	0.001
Fifth professional scores	0.603	0.001	0.640	0.001

Table- IV:Correlation between 1st, 2nd, 3rd, 4th, and final year score

	1st year		2nd year		3nd year		4nd year		5nd year	
	r	p-value	r	p-value	r	p-value	r	p-value	r	p-value
1st year	1	-	-0.173	0.03	0.721	0.001	0.57	0.001	0.619	0.001
2nd year	-0.173	0.03	1	-	-0.079	0.326	-0.034	0.675	-0.222	0.005
3rd year	0.721	0.001	-0.079	0.329	1	-	0.711	0.001	0.602	0.001
4th year	0.57	0.001	-0.034	0.675	0.711	0.001	1	-	0.651	0.001
	0.619	0.001	-0.222	0.005	0.602	0.001	0.651	0.001	1	-

Table-V:Multiple linear regression model for final score as dependent variable.

Variables	Beta coefficient	p-value	95% CI	
			Lower Bound	Upper Bound
HSC score	0.574	0.001	0.338	0.809
Entry score	7.736	0.001	4.513	10.960
First professional scores	0.348	0.024	0.047	0.649
Second professional scores	0.007	0.946	-0.203	0.218
Third professional scores	0.144	0.138	-0.047	0.335
Fourth professional scores	0.421	0.001	0.245	0.596
Coefficient of determination (R^2)	70.9%			

R^2= 70.9%

DISCUSSION

This study primarily focuses on the association of the premedical (HSC/A levels) and entry test (MDCAT) scores with medical students during their university years of academic performance. The premedical exams and the entry tests are appreciated for their uniformity, comparing potential university students from different secondary schools and diverse cohorts. Their results are thus seen as valid scores for selecting students in professional colleges.

The findings from this study show wide variations in the correlations within different examination results. Nevertheless, this study objectively examined the evidence from various test scores to observe the correlations.

According to this study's findings, premedical and entry test scores are good predictors of academic performance in the first and final professional MBBS year exams. The second, third, and fourth professional years' scores did not show a correlation with the premedical and entry scores. A meta-analysis of weighted effects sizes (r) reported a predictive validity coefficient for the entry test in the preclinical years of r- 0.39 [16]. The predictive power of HSC scores for medical school scores decreased from 0.403 in the first and second years to 0.232 in the third year0.259.

A report by Baig shows that combining the marks of HSC (Higher Secondary Certificate) with the entry test scores (admission test by IBA) raises the predictability of academic performance for the first three years of professional medical students [1]. According to her study, medical students' academic performance was independent of the SSC (Secondary School Certificate). She reports that the entry test has no role in predicting the final year performance, as exit competencies are the prime requirements to practice by these future physicians. Similarly, the grades in physiology and pharmacology predict scores in medicine. This suggests that poor basic sciences scores may be considered a red flag for future underperformance in associated clinical sciences [2].

In Pakistan, the Medical and Dental College Admission Test (MDCAT) was introduced in 2020 by the Pakistani Medical and Dental Council (PMDC). Due to the government turbulence, there has been constant reshuffling between PMDC and the Pakistan Medical Commission (PMC)in the last few years. Whether PMDC or PMC both declared MDCAT as a mandatory requirement for all students pursuing admission to medical or dental undergraduate programs anywhere in Pakistan.

Lately, PMDC is the standing governing body and strives to establish a uniform minimum standard of basic and higher health education and training, as well as the recognition of qualifications in medicine and dentistry. Students aspiring for a career in medicine or dentistry will not be allowed admission to professional colleges without passing the MDCAT in Pakistan. According to PMDC Medical and Dental Undergraduate Education (admissions, curriculum, and conduct) policy and regulations 2023, candidates will be chosen on merit, based on the F.SC (Pre-Medical)/ HSSC/Equivalent 40%, 50% of MDCAT and 10% SSC/ Matriculation/Equivalent. The relevant college will consolidate each candidate's SSC/ FSC/MDCAT cumulative score consigned by the PMDC and will then conclude a total merit score of the students [17].

Similarly, the National Achievement Assessment conducted in Saudi Arabia for entry into four diverse healthcare disciplines shows a strong predictive value of future performance in all disciplines. Medical students were found to perform the best in the tests and subsequently in medical schools compared to their health science counterparts [8].

A study in Australia reported that GPA at entry and GAMSAT score used for selection to medical, dental, and veterinary science programs is reported as a poor predictor of medical school performance and show association in the first and second year of the medical program. The Interview score weakly predicted performance later in the course and mainly in clinically based units. Australian studies [3] show a similar context to this research in which three entry criteria are involved. These criteria include the GPA of prior academic performances, assessment of GAMSAT scores, and interview scores to make the final selection of students. In one of the studies, a total of six cohorts of students were included from 2005 to 2012(n=421). The variables included entry scores, demographics, and outcome scores for performance. This was a quantitative study in which the Weighted Average Mark (WAM) was calculated for each of these levels expressed as percentages [3].

Out of the three studies 'Coates' shows that GAMSAT and GPA scores for selection to medical, dental, and veterinary science programs were poor predictors of medical school performance. The interview scores, however, each distinctively predicted first-year performance. Another study at Queensland University [3] showed GPA to be the strongest predictor of future performance where the interview score and GAMSAT scores were weak in their associations with course performance.

In Germany, The National Competence-based Learning Objectives Catalog for Medicine (NKLM) has been developed as an innovative framework in medical education. This Master Plan for Medical Studies 2020 complements a shift in the admission criteria from the traditional trend of relying on academic performance, such as A-level scores. The master plan aims at soft skills like effective communication between patients and healthcare providers as well as teaching scientific skills, which has been ignored so far [18,19].

On comparing the scores from different preclinical and clinical year exams in this study, it was found that the 1st and 2nd-year MBBS clearly shows a linear relationship with the 3rd, 4th, and final-year MBBS scores. This may have been affected by the integrated nature of curriculum delivery in the institute, as shown by other researchers in this area [3,4]. These studies show a significantly positive effect ($P<0.001$) of horizontally integrated curriculum on the academic performance of students in preclinical years in their program. They reported that the students who went through the integrated curriculum performed much better in the first year and second years, compared to the batch with a discipline-based curriculum.

A unique multisite study was carried out by researchers in 17 different US and Canadian Medical Schools examining multiple cohorts of medical students correlating the students' MCAT scores and Undergraduate grade point average (UGPA) at the time of admission with their subsequent academic performance in both preclinical and clinical courses. Using these metrics, it was found that students with similar MCAT scores and undergraduate GPAs irrespective of their diversified backgrounds tend to show comparable performance through the preclinical and clinical courses [20].

A study was carried out in Saudi Arabia to evaluate if undergraduate medical students' performance in preclinical years could predict performance in the clinical phase based on premedical scores. According to this study, students' performance in basic science years can predict their achievements in clinical years. Evidence shows that the best effectiveness of learning in basic medical sciences subjects (biochemistry, physiology, anatomy, pathology, and pharmacology) in the undergraduate years, can forecast their results during clinical rotations in forthcoming years [8]. This correlation can be used to predict students' performances and guide educators in managing their curriculum for better future outcomes. Thereby, students who perform with good marks in anatomy are also likely to do well in surgery, gynecology, and obstetrics.

Apart from early remediation, poor vertical integration in basic sciences with clinical application may weaken students' performance in these subjects [3]. The conclusion is that basic science knowledge without integrating its clinical aspect may result in jeopardy of knowledge retention and application [4]. Delivery of curriculum should foster learning and knowledge retention beyond just recalling and reiteration.

The findings from this study and the research process will guide educationists in critically evaluating the validity of selection criteria used in student selection and early identification of students who may struggle in their professional education in the local context. The inferences drawn in this research suggest a pre-emptive use of strategies to help students struggling throughout their medical program. One such strategy is to identify these students during their early years of medical education and provide them with

educational support. Targeted early support offered to the specific students could save time and resources for both the students and the institutes.

As an echo of suggestions by other researchers, the admission criteria should include assessment instruments for the first second-year year, and final-year exams. These assessment instruments should be different from the ones used in the first and second years. So, in addition to the present criteria for admitting students to medical colleges, another method should be added that tests the critical thinking skills, learning, and problem-solving abilities of the entering medical graduates, as has been adopted worldwide.

CONCLUSION

This study enhances the body of literature on correlations between exam scores from premedical, entry, and yearly professional assessments in medical institutes. The positive correlation between professional exam scores and with lack of such correlation with premedical or entry exam scores is a matter of concern in this research. The reasons for these differences can be multifactorial, which may include diverse curricula in different premedical schools and variations in assessment systems in HSC, A levels, and the entry exams. This initial evaluation of the entry test provides ample evidence to critically analyze the MCAT in future research endeavors.

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REFERENCES:

1. Baig LA. Predictive validity of the Medical College admission criteria for academic performance; results from the four MBBS batches of Karachi Medical and Dental College. Journal Pakistan Medical Association. 2001;51(9):312-316.
2. Adam J, Bore M, Childs R, Dunn J, Mckendree J, Munro D, et al. Predictors of professional behavior and academic outcomes in a UK medical school: a longitudinal cohort study. Medical Teacher. 2015;37(9):868-880. Doi:10.3109/0142159X.2015.1009023.
3. Puddey IB, Mercer A. Predicting academic outcomes in an Australian graduate entry medical program. BMC Medical Education. 2014 ;14:1-12. Doi: 10.1186/1472-6920-14-31
4. Pepple DJ, Young LE, Gordon-Strachan GM, Carroll RG. Pre-clinical grades predict clinical performance in the MBBS stage II examination at the University of the West Indies, Mona Campus. Nigerian Journal of Physiological Sciences. 2013;28(2):201-204.
5. Ali SK, Baig LA, Violato C, Zahid O. Identifying a parsimonious model for predicting academic achievement in undergraduate medical education: A confirmatory factor analysis. Pakistan Journal of Medical Sciences. 2017;33(4):903-908. Doi:10.12669/pjms.334.12610.
6. Ali R, Ali SK, Afzal A. Predictive validity of a Uniform Entrance Test for the health professionals. Pakistan Journal of Medical Sciences. 2019;35(2):330-336. Doi:10.12669/pjms.35.2.334.
7. Rahim S. Does high achievement in preclinical years predict similar achievement in clinical years in medical students? A correlational study. Health Professions Educator Journal. 2021;4(2):32-36. Doi:10.53708/hpej.v4i2.1225
8. Salem RO, Al-Mously N, AlFadil S, Baalash A. Pre-admission criteria and pre-clinical achievement: Can they predict medical student's performance in the clinical phase? Medical Teacher. 2016; 38(sup1):S26-S30. Doi:10.3109/0142159X.2016.1142511.
9. Ferguson E, James D, Madeley L. Factors associated with success in medical school: systematic review of the literature. BMJ. 2002; 324(7343):952-927. Doi:10.1136/bmj.324.7343.952.
10. DeVisser M, Fluit C, Cohen-Schotanus J, Laan R. The effects of a non-cognitive versus cognitive admission procedure within cohorts in one medical school. Advances in Health Sciences Education. 2018;23(1):187-200. Doi:10.1007/s10459-017-9782-1.
11. Mustafa N, Shehzadi K, Kiani S. Predictors of Academic Performance among potential medical students: A Cross-Sectional Study from Rawalpindi. Pakistan Armed Forces Medical Journal. 2023;73(3):826-828. Doi:10.51253/pafmj.v73i3.8650
12. Abbiati M, Cerutti B. Do students' personality traits change during medical training? A longitudinal cohort study. Advances in Health Sciences Education. 2023;28(4):1079-1092. Doi:10.1007/s10459-023-10205-2
13. Monroe A, Quinn E, Samuelson W, Dunleavy DM, Dowd KW. An overview of the medical school admission process and use of applicant data in decision making: what has changed since the 1980s? Academic Medicine. 2013;88:672–681. Doi:10.1097/ACM.0b013e31828bf252.
14. Siu E, Reiter HI. Overview: ''What's worked and what 'hasn't as a guide towards predictive admissions tool development. Advances in Health Science Education. 2009;14:759–775. Doi:10.1007/s10459-009-9160-8.
15. Cleland J, Blitz J, Cleutjens KB, Oude Egbrink MG, Schreurs S, Patterson F. Robust, defensible, and fair: The AMEE guide to selection into medical school: AMEE Guide No. 153. Medical Teacher. 2023;45(10):1071-1084. Doi:10.1080/0142159X.2023.2168529
16. Hanson JT, Busche K, Elks ML, Jackson-Williams LE, Liotta RA, Miller C, et al. The validity of MCAT scores in predicting students' performance and progress in medical school: results from a multisite study. Academic Medicine.2022;97(9):1374-1384.Doi:10.1097/ACM.0000000000004754

17. Updated Admission Regulations 2023.pdf Documents/law/Updated%20Admission%20Regulations %202023.pdf.
18. Erschens R, Herrmann-Werner A, Schaffland TF, Kelava A, Ambiel D, Zipfel S, et al. Association of professional pre-qualifications, study success in medical school and the eligibility for becoming a physician: A scoping review. Plos One. 2021;16(11):e0258941. Doi:10.1371/journal.pone.0258941
19. Tamimi A, Hassuneh M, Tamimi I, Juweid M, Shibli D, AlMasri B, et al. Admission criteria and academic performance in medical school. BMC Medical Education. 2023;23(1):273.Doi:10.1186/s12909-023-04251-y
20. Puddey IB, Mercer A, Carr SE. Relative progress and academic performance of graduate vs undergraduate entrants to an Australian medical school. BMC Medical Education. 2019;19(1):1-4.

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Faiza Siddiqui: Substantial contributions to the conception and design of the work.
Naila Baig: Acquisition, analysis, and interpretation of data for the work.
Zeelaf Shahid: Drafting the work.
Hanan Furqan Siddiqui: Reviewing it critically for important intellectual content.
Mohd Subhan Ali Siddiqui: Final approval of the version to be published.