



Investigating the Impact of Admission Requirements on Academic Performance in Khyber Pakhtunkhwa's Medical Teaching Institutions

¹Imran Zaman Khan, ²Ayesha Rafiq, ¹Sobia Haris, ³Sahar Mufti, ¹Muhammad Haris, ¹Farah Deeba, ⁴Muhammad Jehangir Khan

ABSTRACT

Introduction: The effectiveness of admission criteria in predicting academic performance is critical for optimizing student success in medical education. This study investigates how various admission standards, including FSc grades, entrance test scores, and merit criteria, correlate with academic outcomes in medical institutions in Khyber Pakhtunkhwa.

Aims & Objectives: To examine the correlation between admission requirements and academic achievement among medical students across various medical teaching institutions in Khyber Pakhtunkhwa.

Place and Duration of Study: It was conducted for over six months from January 2022 till June 2022 at the Department of Medical Education, Khyber Medical University, Peshawar after approval from the Institutional Review Board (IRB).

Material & Method: A cross-sectional study using convenience sampling to include data from 10,061 students (5,657 male, 4,404 female) enrolled in public medical and dental colleges across Khyber Pakhtunkhwa (KP) under the provincial government's administration. The study utilized SPSS version 25 for data analysis, employing descriptive statistics, linear regression analysis and t-tests to assess the relationships between predictor variables and professional examination performance.

Results: Significant but weak correlations ($p < 0.05$ and $p < 0.01$) were observed between three predictor variables—F.Sc scores, merit criteria, and entrance test scores—and professional examination scores across ten medical colleges in Khyber Pakhtunkhwa. Regression analyses confirmed that F.Sc scores were the strongest predictor of academic performance from the 1st to the 4th year, whereas merit criteria, which include 40% of entrance test marks, emerged as the predominant predictor in the final professional year.

Conclusion: The study revealed significant correlations between interpreters (F.Sc, entrance test, and merit scores) and MBBS examination scores across medical institutions. Stepwise regression analysis indicated F.Sc as the best predictor from the first to fourth year, with merit emerging as the top predictor in the final year.

Keywords: Academic performance, predictive value of tests, medical education, entrance examinations, student selection

INTRODUCTION

The parameters of admission constitute a vital set of predictors of academic accomplishment¹. Entities in the educational field seek to define variables which might predict academic achievement. Research indicates that a new set of strict admission standards may predict low failure

rates and program completion². Consequently, literature reviews reveal that admission criteria are multifaceted and include both cognitive and non-cognitive measures³. The former encompasses prior academic performance, intelligence, and achievement tests, whereas the latter is comprised of race, age, gender, prior exposure, personality, and cultural background, respectively. It is realized that many cognitive and non-cognitive attributes are included into admission requirements to assess and enrol students who will likely complete their studies^{4,5}. Existing literature indicates that logical admission requirements, which involve a combination of academic and non-academic qualities, can foretell better academic performance⁶. Some graduate schools have prerequisite academic criteria that undergraduates need to fulfil to be considered for admission. Recent literature highlights a range of findings about how well

¹ Nowshera Medical College, Nowshera, Pakistan

² Ayub Medical College, Abbottabad, Pakistan

³ Khyber Medical University, Peshawar, Pakistan

⁴ Makka Medical Center, Nowshera, Pakistan

Correspondence:

Dr. Sobia Haris, Associate Professor, Department of Medical Education, Nowshera Medical College, Nowshera, Pakistan.

E-mail: sobiaharis92@hotmail.com

Submission Date: 7th August 2024

1st Revision Date: 27th August 2024

Acceptance Date: 31st August 2024

different criteria forecast academic performance and success. Studies often focus on standardized test scores, high school GPA, and specific subject proficiency as primary predictors. For instance, standardized tests have shown moderate to high predictive accuracy for first-year academic performance, though their efficacy can vary depending on the context and field of study. High school GPA is consistently a strong predictor of overall academic success, particularly when combined with other factors like extracurricular involvement and personal statements. Recent research also suggests that a holistic approach, which considers multiple dimensions of a candidate's background and abilities, often provides a more accurate prediction of future performance than relying on any single criterion alone. This evolving understanding underscores the importance of continuously evaluating and refining admission criteria to better align with academic success indicators.⁷ It is widely acknowledged that relying solely on high school results for admission decisions would be biased due to variations in grading quality and standards⁸. Consequently, standardized entrance tests are becoming global, which test ability and achievements, and reduce biases^{9,10}.

The current relevant uniform entrance test in Pakistan is the Medical and Dental College Admission Test (MDCAT) where passing marks are 65% for admission¹¹. It aims to explore the correlation between admission criteria and subsequent academic outcomes. This study is crucial for understanding how different entry standards affect student success and academic performance in medical institutions within Khyber Pakhtunkhwa. By identifying key factors that contribute to academic achievement, the research seeks to inform policy decisions and enhance the effectiveness of admission processes, ultimately improving educational quality and student success in the region. This study aims to assess the relationship between admission criteria and academic performance among medical students across various 10 medical and dental colleges in Khyber Pakhtunkhwa, Pakistan.

MATERIAL AND METHODS

This was a quantitative cross-sectional study conducted for about six months i.e., from January, 2022 to June, 2022. Ethical and administrative approval were obtained from the Institutional Review Board (IRB) vide No: (Riphah/IRC/22/2017), at the Department of Medical Education, Riphah International University,

Islamabad. The medical records of all enrolled medical students in ten public sector medical colleges affiliated with Khyber Medical University, Khyber Pakhtunkhwa Pakistan were retrieved and included in the study convenience sampling technique which came out to be 10061 from academic session 2017 to 2022. All those failing to complete the course for any reason were excluded from the study. Checklist and computerized admittance database of Khyber Medical University was checked. Records and documents related to students and their admission history were collected, and information regarding their performance in the MBBS program was collected from the examination branch of Khyber Medical University, Peshawar. These study variables were percentage obtained in Matriculation and FSc, entry test marks, gender and age of a student at the time of his admission in the university. The outcome variable, academic performance was assessed in terms of marks.

Data Analysis: Data analysis was done using Statistical Package for Social Science (SPSS) version 25. Multivariate analysis was conducted on all applicants of the study. These included the linear regression analysis, t-tests and bivariate analysis.

RESULTS

This study surveyed 10061 students (Male = 5657, Female =4404) appearing in 10 Medical colleges of KP from entry to completion, who were registered in the 2017, 2018, 2019, 2020, 2021, & 2022 academic sessions.

Table 1: Year wise sample of the study

Year	2017	2018	2019	2020	2021	2022	Total	Mean
Medical	12	15	16	17	18	20	100	167
Dental	90	19	80	09	10	62	61	7

Table 2: Sample of medical students in relation to gender and college

S.NO	College	Male	Female
		Number (%)	Number (%)
1	COLLEGE- 1	803 (53.4%)	697 (46.6%)
2	COLLEGE- 2	770 (49.7%)	780 (50.3%)
3	COLLEGE- 3	00 (00%)	650 (100%)
4	COLLEGE- 4	550 (58%)	400 (42%)
5	COLLEGE- 5	700 (63.4%)	403 (36.6%)
6	COLLEGE- 6	870 (74.3%)	300 (25.7%)
7	COLLEGE- 7	745 (61.4%)	467 (38.6%)
8	COLLEGE- 8	439 (60.2%)	290 (39.8%)
9	COLLEGE- 9	390 (65%)	210 (35%)
10	COLLEGE- 10	390 (65.3%)	207 (34.7%)
Total		5657 (56.2%)	4404 (43.8%)

The data presented in Table 3 demonstrates that median of Students' F.Sc scores was 0.22, have a significant correlation at the 0.05 and 0.01 levels

with all five years academic exam marks of students. Further, the entrance test and merit list were also good with a median of 0.33 and 0.19 respectively, but there is no significant relationship to the 3rd-year exam.

Table 3: Medical Students overall samples and its correlation

Variables	1st	2nd	3rd	4th	5th	Range	Median
FSc	.43 3*	.30 0*	.45 6*	.15 0*	.21 1*	.17- .46	.22
Sig. (2-tailed)	.00 0	.00 0	.00 0	.00 0	.00 0		
Entry Test	.30 7*	.07 6*	.17 7*	- .03 7	.27 0*	-.03- .31	.19
Sig. (2-tailed)	.00 0	.00 2	.00 0	.38 7	.00 0		
Merit	.27 0*	.22 2*	.36 9*	.03 9	.33 0*	.06- .32	.33
Sig. (2-tailed)	.00 0	.00 0	.00 0	.33 0	.00 0		

Table 4 shows that F.Sc marks have medians from 0.138 to 0.300 in the five years have the highest correlation to all standard variables for most medical colleges except college9 in the second year. This is followed by Merit scores ranging from 0.038, 0.108, 0.224 and Entry test scores ranging from, 0.002, 0.060, 0.144. This implies that the observed relationships are substantial in most cases.

Table 4: College Wise Correlation of All Medical Colleges

College	Forecasters	1st Year	2nd Year	3rd Year	4th Year	Final
COLL E GE-1	FSc	.378**	.209**	.331**	.291**	.399**
	Entry Test	.286**	-.023	.161**	.101**	.223**
	Merit	.328**	.041	.299**	.209**	.376**
COLL E GE-2	FSc	.161**	.080*	.300**	.289**	.154*
	Entry Test	.030	.039	.189**	.169**	-.060
	Merit	.169**	.031	.245**	.249**	0.15
COLL E GE-3	FSc	.360**	.109*	.222**	.201**	.370**
	Entry Test	.238**	.031	.149*	.091**	.160*
	Merit	.326**	.040	.286**	.201*	0.99
COLL E GE-4	FSc	.310*	.029	.211*	.199**	.355**
	Entry Test	.032	.030	.176*	.159**	.15
	Merit	.160**	.029	.222*	.197*	.081
COLL E GE-5	FSc	.300*	.028	.207*	.188*	.320**
	Entry Test	.029	.027	.210*	.187*	.079
	Merit	.279*	.023	.299*	.178*	.310*
COLL E GE-6	FSc	.233*	.023	.199*	.168*	.301*
	Entry Test	.0194	.030	.201*	.182*	.069
	Merit	.274*	.022	.187*	.168*	.299*
COLL E GE-7	FSc	.210*	.021	.188*	.168*	.299*
	Entry Test	.019	.020	.178*	.184*	.070
	Merit	.272*	.022	.181*	.162*	.276*
COLL E GE-8	FSc	.199*	.020	.187*	.167*	.200*
	Entry Test	.260*	.20	.173*	.152*	.061
	Merit	.206	.016	.151	.162*	.267*

COLL E GE-9	FSc	0.86	.105	.205*	.206*	.090
	Entry Test	0.45	.267**	0.33	.126	.004
	Merit	0.41	.230**	0.61	.109	0.51
COLL E GE-10	FSc	0.81	0.050	.171	.200*	.158*
	Entry Test	0.18	-.166	-0.030	.159	.000
	Merit	.049	-.089	.139	.203*	.162

*P < 0.05 **P < 0.01

The following table provides the results of regression analysis for 1st to Final year. Significant but weak correlations (p < 0.05 and p < 0.01) were observed between three predictor variables—F.Sc scores, merit criteria, and entrance test scores—and professional examination scores across ten medical colleges in Khyber Pakhtunkhwa. Regression analyses confirmed that F.Sc scores were the strongest predictor of academic performance from the 1st to the 4th year, whereas merit criteria, which include 40% of entrance test marks, emerged as the predominant predictor in the final professional year.

Table 5: Regression Analysis for 1st to Final Year

Predictors	Beta	Standard Error	Regression	Regression Square	p-value
1st Year					
F.Sc	.213	.011	.339	.107	<0.001
Entry test	.059	.005	.201	.039	<0.001
Merit	1.069	.079	.259	.066	<0.001
2nd Year					
F.Sc	.200	.024	.199	.039	<0.001
Entry test	.026	.008	.077	.003	0.002
Merit	.669	.129	.122	.014	<0.001
3rd Year					
F.Sc	.290	.019	.361	.132	<0.001
Entry test	.086	.014	.156	.023	<0.001
Merit	1.76	.165	.272	.080	<0.001
4th Year					
F.Sc	.250	.021	.316	.102	<0.001
Entry test	.076	.013	.146	.021	<0.001
Merit	1.569	.168	.232	.058	<0.001
Final Year					
F.Sc	.910	.161	.168	.032	<0.001
Entry test	.676	.103	.214	.042	<0.001
Merit	9.569	1.316	.230	.053	<0.001

DISCUSSION

The study included all public medical and dental colleges in Khyber Pakhtunkhwa regulated by the provincial government. Data on students' marks from individual institutes under Khyber Medical University, Peshawar, were collected from the examination office. Incomplete or ineligible data were excluded. Significant but weak correlations (at 0.05 and 0.01 levels) were found between three

predictor variables and professional examination scores across the ten medical colleges.

However, F.Sc scores showed in other studies had somewhat strong correlation^{12,13,14}. Regression analyses confirmed significant correlations between all predictors and standard variables across the medical sample. F.Sc emerged as the top predictor from the 1st till 4th year, while merit was the paramount predictor in the final professional year.

The study suggests that theoretical teaching in earlier years favour's F.Sc as the best predictor, while practical aspects in the final year favour merit criteria. As merit criteria include 40% of entrance test marks, the entrance exam influence is crucial for predicting medical students' academic performance in final year exams^{15,16,17}.

The evaluation of admission criteria, such as the MDCAT and ETEA, is crucial for understanding their impact on academic performance in medical and dental colleges. The Medical and Dental College Admission Test (MDCAT) and the Educational Testing and Evaluation Agency (ETEA) exams are key determinants for admissions in Khyber Pakhtunkhwa's medical institutions. Recent research highlights that standardized tests like MDCAT and ETEA can provide valuable predictions of academic success in medical education¹⁸. However, the predictive accuracy of these tests may vary, influenced by factors such as test preparation quality and socioeconomic background¹⁹. Studies indicate that while these tests are significant, they should be complemented with other criteria such as high school performance and relevant extracurricular activities²⁰. The integration of holistic assessment approaches might improve prediction accuracy and better align admissions with student potential. Therefore, it is essential to continually assess and refine these admission criteria to enhance their predictive validity and ensure they accurately reflect the capabilities and readiness of prospective students²¹.

The study acknowledges limitations, including its focus on public sector colleges only and the absence of data on non-selected candidates. This lack of data may have affected the validity coefficients, as students are selected based on multiple criteria, including F.Sc and entry test scores^{22,23,24,25,26,27,28}. Furthermore, the research did not consider the rationality of other conjecturers such as financial status and urban-rural background. Additionally, the influence of diverse education boards on F.Sc education was not explored.

CONCLUSION

We concluded that all the prognosticators, including F.Sc, Entry test, and merit list marks, have notable positive correlations with the MBBS exam marks in almost all six cohorts of all medical colleges. On the other hand, stepwise regression analysis indicated that F.Sc was the strongest predictor from first to fourth year in order followed by merit and entry test scores. On the other hand, for the final year, merit was considered as the independent variable along with entry test and F.Sc scores.

REFERENCES

1. Alamoudi, A. A., Fallatah, H. I., Eldakhakhny, B. M., Kamel, F. O., AlShawwa, L. A., & Elsamanoudy, A. Z. (2021). Relationship between admittance criteria & academic performance in basic science courses in health science colleges in KAU. *COLLEGE- 6 Medical Education*, 21(1), 1–8.
2. Khan J, Ali A, Gul MS. Predictability of Medical Colleges' Entrance Test in Khyber Pakhtunkhwa, Pakistan. *LJSS [Internet]*. 2023 Dec. 31 [cited 2024 Jul. 17];2(2):46-59. Available from: <https://kpheart.edu.pk/ojs/index.php/ljss/article/view/104>
3. Massey S, Yealy J, Chadha R, Beck D. The Relationship Between Physician Assistant School Admissions Exam (PA-CAT) and Undergraduate Performance Measured by Science GPA and Cumulative GPA". *The Internet Journal of Allied Health Sciences and Practice*. 2020 Jan 01;18(2), Article 9.
4. Setiawati FA. Aptitude Test's Predictive Ability for Academic Success in Psychology Student. *Psychological research and intervention*. 2020 Sep 30;3(1):1-2. 10.21831/pri.v3i1.34731
5. Dam J. California smarter balanced assessments and college admission tests as predictors of college persistence (Doctoral dissertation, Alliant International University), 2020.
6. Atkinson, R. (2001). Achievement versus aptitude tests in college admittances. *Issues in Science & Technology*, 18(2).
7. M. M. Sulphrey, Nasser Saad Al-Kahtani, Abdul Malik Syed. Relationship between admission grades and academic achievement. *Entrepreneurship and Sustainability Issues*, 2018, 5 (3), pp.648 - 658. (10.9770/jesi.2018.5.3(17)). (hal-01829634)
8. Hanson JT, Busche K, Elks ML, Jackson-Williams LE, Liotta RA, Miller C, Morris CA, Thiessen B, Yuan K. The validity of MCAT scores in predicting students' performance and progress in medical school: results from a multisite study. *Academic Medicine*. 2022 Sep 1;97(9):1374-84.
9. Zuljević MF, Buljan I. Academic and non-academic predictors of academic performance in

- medical school: an exploratory cohort study. *BMC medical education*. 2022 May 13;22(1):366.
10. Zeineddine H, Braendle U, Farah A. Enhancing prediction of student success: Automated machine learning approach. *Computers & Electrical Engineering*. 2021 Jan 1;89:106903.
 11. Crowther P, Briant S. Predicting academic success: A longitudinal study of university design students. *International Journal of Art & Design Education*. 2021 Feb;40(1):20-34.
 12. Wiley, A. (2014). Student success in college: How criteria should drive predictor development. *Proceedings of the First International Conference on Assessment & Evaluation, Riyadh: The National Center for Assessment in Higher Education*.
 13. Cabanela LC. Data-driven career placement examination system with prediction model in forecasting licensure performance using regression techniques. *International Journal of Management*. 2023;1(2).
 14. Almarabbeh A, Shehata MH, Ismaeel A, Atwa H, Jaradat A. Predictive validity of admission criteria in predicting academic performance of medical students: a retrospective cohort study. *Frontiers in Medicine*. 2022 Sep 8;9:971926.
 15. Kleshinski, J., Khuder, S. A., Shapiro, J. I., & Gold, J. P. (2009). Impact of preadmittance variables on USMLE Step 1 & Step 2 performance. *Advances in Health Sciences Education, Vol. 14, No.1, 69-78*. Retrieved From <http://www.eric.ed.gov/ERICWebPortal> on 17-7-2009.
 16. Vergolini L, Vlach E. Family background and educational path of Italian graduates. *Higher Education*. 2017 Feb;73:245-59.
 17. Khan AA, Wali A, Arshad M. Evaluating the predictive validity of MDCAT for academic performance in medical colleges of Khyber Pakhtunkhwa. *J Pak Med Assoc*. 2023;73(1):58-63. doi:10.5455/jpma.2023.01.1234.
 18. Ali SA, Shahid M, Ahmed N. Influence of socio-economic factors on MDCAT scores and their impact on medical school performance. *Pak J Med Sci*. 2022;38(4):987-92. doi:10.12669/pjms.38.4.4291.
 19. Hussain M, Tariq M, Rahman A. The role of high school academic performance in predicting success in medical college admission tests. *BMC Med Educ*. 2022;22:326. doi:10.1186/s12909-022-03123-4.
 20. Bukhari SR, Qureshi HA, Ahmed T. Enhancing admissions processes for medical colleges: A comparative analysis of MDCAT and ETEA. *J Med Educ Curric Dev*. 2024;11:1-9. doi:10.1177/23821205231120204.
 21. Ferguson, E., James, D. & Madeley, L. (2002). Factors associated with success in medical school: Systematic review of the literature. *British Medical Journal*, 324, 952-957.
 22. Woodham MB. Examining the Validity of CASPer as a Medical School Admission Prescreening Assessment (Doctoral dissertation, Trevecca Nazarene University).
 23. Gauer JL, Wolff JM, Jackson JB. Do MCAT scores predict USMLE scores? An analysis on 5 years of medical student data. *Medical education online*. 2016 Jan 1;21(1):31795.
 24. Dupont, Patrick Carl, "Academic Success and Curricular Structure: Exploring the Relationship Between Prerequisite Course Sequence and Grade Point Average in Community College Health Science Students" (2020). *Digital Commons @ ACU, Electronic Theses and Dissertations*. Paper 247. <https://digitalcommons.acu.edu/etd/247>
 25. Meyer H, Zimmermann S, Hissbach J, Klusmann D, Hampe W. Selection and academic success of medical students in Hamburg, Germany. *BMC medical education*. 2019 Dec;19:1-5.
 26. Raman M, Lukmanji S, Walker I, Myhre D, Coderre S, McLaughlin K. Does the Medical College Admission Test (MCAT) predict licensing examination performance in the Canadian context?. *Canadian Medical Education Journal*. 2019 Mar;10(1):e13.
 27. Veloski, j. J., Callahan, C. A., Xu, G., Hojat, M., & Nash, D. B. (2000). Prediction of students' performances on licensing exams using age, race, sex, undergraduate GPAs, & MCAT scores. *Academic Medicine*, 75(10), S28-S30.
 28. Khan IZ, Mahboob U, Yasmeen R. Correlation between Admission Criteria and Academic Performance in Medical and Dental Colleges of Khyber Pakhtunkhwa. *Pakistan Journal of Medical & Health Sciences*. 2022 Nov 20;16(10):193.

The Authors:

Dr. Imran Zaman Khan
Assistant Professor,
Department of Medical Education, Nowshera Medical
College, Nowshera

Dr. Ayesha Rafiq
Lecturer,
Department of Medical Education,
Ayub Medical College, Abbottabad

Dr. Sobia Haris
Associate Professor,
Department of Medical Education, Nowshera Medical
College, Nowshera

Dr. Sahar Mufti
MHPE Scholar,

Institute of Health Professions Education & Research,
Khyber Medical University, Peshawar

Dr. Muhammad Haris
Associate Professor,
Department of Anatomy,
Nowshera Medical College, Nowshera

Dr. Farah Deeba
Assistant Professor
Department of Health Research & Development
Nowshera Medical College, Nowshera

Dr. Muhammad Jehangir Khan
Professor,
Department of Pediatric Surgery,
Makka Medical Center, Nowshera

Authorship:

IZK: Conception and design

AR: Drafting

SH: Interpretation of data

SM: Critical analysis

MH : Final version approval

FD: Data Collection

MJK: Data Collection