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Pre and Post Mentoring Comparative Analysis of Academic Performance of MBBS Students in the Subject of Biochemistry

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ABSTRACT

Background & Objective: Mentorship plays a significant role for successful academic development and work fulfillment. The objective of the study was to evaluate the role of one-on-one mentoring sessions in their biochemistry exam performance compared to their initial term results.

Methodology: A comparative cross-sectional study was conducted at Rashid Latif Medical College, Lahore, after taking approval from Institutional Review Board (IRB), to compare the impact of mentoring sessions on the academic performance of students. Students from 1st year and 2nd year MBBS participated in the study after an informed consent. Eleven faculty members from biochemistry department, who were trained and had been made aware of the regulations and protocols of the mentorship program prior to its initiation were involved in the study. An equal number of students were assigned to each mentor. In addition, the students received training regarding their role as mentees before conducting the study.

Results: The comparison of pre and post mentoring academic performance of students revealed a significant improvement in performance for both below-average and above-average students ($p<0.001$). Effect of mentoring was also evaluated class-wise. Mean results of both classes were estimated before and after mentoring. Comparison of means by t-test revealed a significant rise the score of students after mentoring sessions. A significant association was found between mentoring and performance of students ($p<0.001$, $x2=64.490$).

Conclusion: Mentoring helps students to improve their academic performance significantly.

KEY WORDS: Biochemistry, Mentoring, Academic Performance, Medical Students.

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INTRODUCTION

Since the days of Greek mythology, mentoring in academia has progressed into the method of helping with career choices. The significance of mentorship for successful academic development and work fulfillment has grown over the past few decades. In professional medical education settings, formal mentoring program first appeared in the 1990s, these initiatives allowed medical students to conduct more research.[1] Mentor is a wise and trusted guide/advisor who counsel and assist to a less experienced person over time, particularly as part of a formal programme in a medical college, company, university, etc. by encouraging young people (mentee or student) to understand and ensure that they are not alone in interacting with day today challenges. Most people agree that mentoring creates a relationship between mentor and mentee (students) and gives an opportunity to the mentees to receive guidance, advice from an experienced mentor.[2]

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Mentoring is either formal or informal. Formal mentoring is when a mentor and mentee are professionally matched, typically with organizational commitment or assistance. Contrarily, informal mentoring arises naturally as a result of mutual interests and a healthy relationship between the mentor and the mentee. The most successful and mutually rewarding mentoring relationships are a two-way street. "'We must acknowledge again that the most important, indeed, the only, thing we have to offer our students is ourselves. Everything else they can read in a book or discover independently." Mentorship skills are learned through observation, experience and training.[3]

A comprehensive survey conducted in colleges of USA reported the positive impact of supportive mentoring in preparedness within the college and life outside college. Mentoring has been proved to be an important career advancement tool for medical students. Contrary to teaching, mentoring involves developing a relationship with a student that focuses on achieving specific goals including improvement of students' clinical skills and promoting interest in underrepresented specialty.[4]

Mentorship program of the students of first two years of medical college have demonstrated that a mentor with the key qualities of competence, character, confidence, connection, and compassion will strengthen the abilities and attitudes of the students. A similar study conducted on fourth year medical students in the Obstetrics and Gynecology department of a teaching hospital in UK, reported a

positive impact of mentoring that helped the students to achieve the defined goals by positive impact on their personal and professional growth.[5]

According to a study, one-on-one mentoring achieved a success rate of about 78.6%, which was higher compared to other mentoring models like peer mentoring, junior-senior student pairings, and their combinations.[6] Moreover, interactions between mentors and mentees integrates teaching, coaching, tutoring, mentoring, supervision, and instruction into a comprehensive support system. The main benefit of this method is its ability to help students, residents and junior physicians to navigate new situations and challenges effectively.[6]

This study was specifically designed to evaluate the impact of mentoring on students' performance following the first-term examination. The mentoring sessions addressed the key areas such as time management, study strategies, concentration, exam-related nervousness, and effective response techniques.

The objective of our study is to significantly enhance students' understanding of foundational concepts and improve their overall performance. By addressing individual learning needs and knowledge gaps through personalized support, the program aims to build students' confidence and competence, equipping them to apply biochemistry effectively in clinical and laboratory settings. We hypothesize that medical students who participated in one-on-one mentoring sessions addressing time management, study strategies, and exam-related challenges and low performance will show a significant improvement in their biochemistry exam performance compared to their initial term results.

METHODOLOGY

This comparative cross-sectional study was conducted at Rashid Latif Medical College, Lahore.286 participants from the first and second year MBBS students at Rashid Latif Medical College were recruited for the study. 153 students were from 1st year MBBS and 133 were from 2nd year MBBS. Mentors were 11 faculty members from the department of Biochemistry. The objective was to evaluate the correlation between the participation of first and second year medical students in a mentoring program and the effect of pre- and post-mentoring sessions on their academic performance. Every student in the mentorship program met with their designated mentor for at least 30 minutes fortnightly. The exam was administered at the end of six months to evaluate the effectiveness of this program. The level of difficulty remained unchanged from the first term assessment. The faculty members evaluated the students, assessing their influence on improving their academic performance, without knowing which students attended the mentoring sessions.

The students from the 1st and 2nd year MBBS were equally divided among eleven mentors. The marks obtained in the first internal exam. 1st group included students who scored <50% in the first internal exam and the other group included students who scored >50% in the first internal exam. Pass percentage of the exam was 50%. Departmental mentoring program was initiated after the first result. Equal number of students were assigned to each mentor. We created an open and supportive environment where students felt comfortable discussing their academic and career concerns. Regular meetings with students were scheduled to discuss academic progress, addressed challenges of key biochemistry topics and their application in medical contexts.

Guidance was provided to students in terms of resources such as textbooks, research articles, handouts and online materials. Mentors assisted the mentees with study strategies, including effective note-taking, exam preparation, and problem-solving techniques. Case studies and practical sessions were organized where students could apply biochemical knowledge to patient scenarios.

Personalized constructive feedback were provided to the students for improvement of their performance. The data were analyzed using the Statistical Package for the Social Sciences (SPSS) v 25.0. Following data collection, a paired t test was used to compare the students' mean scores before and after the mentoring sessions. The chi-square test was employed to determine whether mentoring is associated with academic performance of the students. P values of less than 0.05 were considered statistically significant.

RESULTS

Study included 1st year and 2nd year MBBS students. Among 153 1st year MBBS students 64 (41.8%) were males and 89 (58.2%) were females. 133 students of 2nd year MBBS took part in the study. 49 (36.8%) of them were males and 84 (63.2%) were females (Table. I).

Table I: Student Demographics by Class and Gender

Class	*Gender*	*Number of students n (%)*	*Total*
1st year MBBS	Male	64 (41.8%)	153
	Female	89 (58.2 %)	
2nd year MBBS	Male	49 (36.8 %)	133
	Female	84 (63.2 %)	

Table II: Pre-Mentoring Score Categorization: Below Average vs. Above Average

Categories	**Number of categorized students / total number of students** (%)	
	1st year MBBS	**2nd year MBBS**
Below average (<50% score in first internal exam)	56/153 (36.6%)	60/133 (45.1%)
Above average (>50% score in first internal exam	97/153 (63.4%)	73/133 (54.9%)

Before commencement of mentoring program, students were categorized into two groups according to their performance in the first internal exam. 1st group of students

included below average performers (<50% score in 1st internal exam). 2nd group of students included above average performers (>50% score in 1st internal exam)

Among 1st year MBBS students, 36.6% of students performed below average (<50%) while 63.4% performed above average (>50%) (Table 2, Fig. 1). Among 2nd year MBBS students, 45.1% students were below average performers while 54.9% students were above average performers (Table 2, Fig. 1).

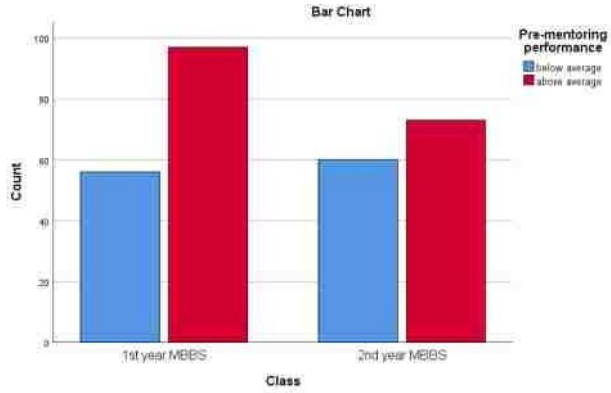

Fig. 1. Graphical representation of 1st year and 2nd year MBBS students accordingtotheirpre-mentoringperformance

Moreover, comparison of pre-mentoring performance among the male and female students revealed that a greater number of female students performed above average than male students in both 1st & 2nd year MBBS students (Fig. 2).

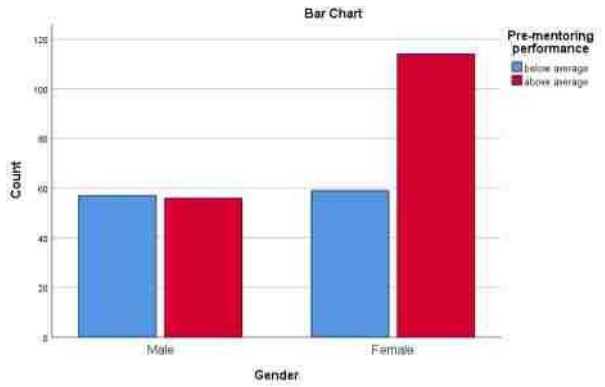

Fig. 2. Graphical representation of pre-mentoring performance of male and female students

A comparison of students' academic performance before and after mentoring revealed that mentoring led to a significant improvement in performance for both below-average and above average students (Table 3). The mean pre mentoring score of below average students was 32.81 ± 12.29 and post mentoring result was 46.66 ± 12.88. A significant improvement (p<0.001) in the scores of the students was observed.

Mentoring also proved to have a positive impact on the performance of students who performed above average (61.71 ± 8.40) before mentoring. The average score was considerably increased (64.13 ± 11.43) after mentoring sessions.

Table III: Comparison of pre and post mentoring test score

Performance of students (test score %)	Test Scores (Mean ±SD)		t	p value
Below average (<50%)	Pre-mentoring	32.81 ± 12.29	-9.12	0.001*
	Post-mentoring	46.66 ± 12.88		
Above average (>50%)	Pre-mentoring	61.71 ± 8.40	-3.36	0.001*
	Post-mentoring	64.13 ± 11.43		

*SD= Standard Deviation, t= t-test value, *p-value= <0.001 is significant.*

Effect of mentoring was also evaluated class-wise. Mean results of both classes were estimated before and after mentoring. Comparison of means by t-test revealed a significant rise in the score of students after mentoring sessions (Table 4). In 1st year MBBS students pre mentoring, mean test score of 51.43 ± 15.09 was improved to 57.04 ±14.38 (p< .0.001) after mentoring. In 2nd year MBBS students pre mentoring mean test score raised to 57.22 ± 15.23 (p<0.001) from 48.62 ± 19.70 after mentoring.

Table IV: Comparison of Pre and Post mentoring test Scores of 1st and 2nd year MBBS students.

1st year MBBS	Mean ±SD	t	p value
Pre-mentoring test score	51.43±15.09	-5.214	<0.001*
Post-mentoring test score	57.04±4.38		
2nd year MBBS			
Pre-mentoring test score	48.62±19.70	-6.980	<0.001*
Post-mentoring test score	57.22±15.23		

*SD= Standard Deviation, t= t-test value, *p-value= <0.001 is significant*

Table V: Pre and post mentoring comparison of number of students by performance

Class	Pre mentoring performance		Post mentoring performance		χ^2	p-value
	Below average n (%)	Above Average n (%)	Below average n (%)	Above Average n (%)		
1st year MBBS	56 (36.6%)	97 (63.4%)	23 (15%)	130 (85%)	34.908	<0.001*
2nd year MBBS	60 (45.1 %)	73 (54.9%)	26 (19.5%)	107 (80.5%)	29.071	<0.001*

*n= number of students, χ2 = Chi square value, *p-value= <0.001 is significant*

Mentoring exhibited a positive impact in all students as the number of below average performing students decreased after the commencement of mentoring program (Table 5).

Chi-square test revealed that a significant association was found between mentoring and performance of students ($p<0.001$). The academic performance was substantially improved and mentoring showed a positive impact on the performance of the students.

DISCUSSION

This study was designed to evaluate the impact of mentoring on the academic performance of 1st and 2nd year MBBS students in the subject of biochemistry. Our study highlights that mentorship experience improves the alignment of student and faculty values, especially in personal mentorship, the area most in need according to students. These findings support the development of faculty training and structured mentorship programs that align expectations to better address students' evolving mentorship needs throughout medical school.[7] Mentoring had a positive impact on the academic performance of the students. Atlas et al, inferred in his review that mentoring is essential for students' professional growth.[1]

Our study showed increase in grades of the below average performing students. Same is depicted in a study conducted on remedial students in New York.[8] A study conducted in Malaysia inferred that communication and support positively and significantly improves the academic performance of the students.[9] In a recent study the effects of mentorship were identified. These effects included improved academic and career planning, improved communication among mentors and mentee, improved research skills and academic outcomes.[10]

Present study in consistence to a similar study conducted at a Private Medical College in Rawalpindi in 2023 by Aziz et al , focused on the need and usefulness of mentoring and how structured mentoring & relationship between mentor and mentee can affect the successful outcome of the programme.[11]

An earlier study by Ng et al in 2020, described the experiences of students, depicting how mentorship helped them to become good professionals and practicing doctors.[5] Similar results were observed in our study as the relationship between the mentor and the mentee resulted in building up of their faith & confidence with the mentor and kept them motivated, as depicted by the improvement of their academic grades. According to the a study's findings held in Nigeria, academic success and mentoring have a strong and positive correlation.[12]

Previous studies by Mysorekar in 2012, 13 and Pagan in 20028, highlighted how the low-performers can gain help and guidance from personalized therapy programs i.e. mentorship. Our mentorship strategies such as assignments, one to one meetings motivated the students to study and thus making them learn the subject in a unique way. It helped them to build up their communication skills, time and pressure management, demonstrating a positive correlation and improvement in academic grades of the low performers as well as the good performers. Leidenfrost et al, findings indicate that, in terms of average grade and number of courses completed, students who took part in the mentoring program outperformed those who did not. However, the various mentoring methods had no apparent impact on the academic achievement of the mentees.[14] Nimmons in his review stated that the decline of academic medicine can be reversed in part by positive mentoring, which grabs interest through early research experiences.[15]

In this study the average score of students before mentoring and after mentoring was analyzed. Mean score was significantly increased as evidenced in the post mentoring exam result. It was observed that performance of girls was better that the boys in both 1st and 2nd year MBBS students. Similar findings were observed in a study conducted at Al-Azhar medical college, India. In their study the mean score of students in the exam conducted after mentorship program was significantly higher ($P<0.001$) than that conducted before commencing mentorship program. This increment in performance is appreciated more in girls rather than the boys. Furthermore, the mentorship program significantly ($P<0.001$) helped to boost the academic performance in below average students who had scored <50% marks in pre-program assessment.[16]

So, it is concluded that mentoring definitely improves the academic performance and confidence of the mentees.
Limitation: The study was conducted at one center only. Further research can be conducted evaluating the impact of mentoring on academic performance at multiple centers for generalizability of the results.

CONCLUSION

Mentoring has a significant role in improving the academic performance of the students.

Ethical Approval: Ethical approval was obtained from the Rashid Latif Medical College, Lahore IRB No. IRB/2022/36 dated: 16-6-2022.

Conflict of interest: None

Financial Disclosure: None

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Authors' Contributions:

FH & SQ: Conceptualization & study design.

SA: Data Collection and manuscript drafting.

SS: Data Analysis and critical review.

AS: Supervision &Manuscript drafting & proof reading.

All authors have read and approved the final version of the manuscript and are responsible and accountable for the accuracy and integrity of the work.

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