Original Article

Exam-related Beta Blocker Use: A Comparative Study of Preclinical and Clinical Medical Students

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Abstract

Objective: To compare use of β blockers in preclinical and clinical students during exam stress.

Material and Methods: A cross sectional analytical study was conducted from January to March 2024 at 05 medical colleges of Punjab. There were 400 participants that were selected through non probability convenient sampling. They were divided equally in group I, preclinical (1^{st} , and 2^{nd} year) and group II, clinical (3^{rd} , 4^{th} and final year students). All participants were given questionnaires to evaluate their β blocker use in exam related stress. After data collection it was entered and analyzed in SPSS version 25.

Results: 5.9 % (n=11) students of group I while 10.5% (n=20) students of group II were using β blocker in different exam. While comparing, we found a p value of 0.032 that depicts there is statistically significant difference in both group.

Conclusion: β blocker use is more pronounced in students of clinical classes as compared to students of preclinical classes during exam stress.

Keywords: β blocker, Clinical students, Exam stress, Preclinical students

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Introduction

Students of medical school had to work very hard to meet academic standards that produce a lot of stress in their life. In addition to these they also suffer from financial and social issues and bear it¹. These factors worsen their performance in academics and clinical sessions, heading to a vicious cycle impossible to come out of it². Multiple surveys and studies have proved that medical students and professionals suffer from much higher psychological

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stress than general populations and other professionals. More than a forty percent of students in medical schools show clinical features of anxiety and stress like irritability, sleepless nights or multiple time awakening in night and disturbed social behavior³. Almost one fourth students of medical institutes admitted about the suicidal thoughts and severe depression in a meta-analysis, that show the intensity of pressure/ stress they coop with during their studies⁴. More than 70% of undergraduates found to be burned-out during a study conducted in United States of America ⁵. Beta-adrenoceptor antagonists are used to overcome the social anxiety disorder (SAD)⁶. There are multiple sub-types of beta-adrenoceptor antagonists with additional features like cardioselectivity, intrinsic sympathetic activity, local anesthetic activity, anti-arrhythmic effects and vasodilator effect. However, Propranolol belongs to a non-selective class of beta-adrenoceptor antagonists and exerts its effect by blocking the binding of ligand on beta-type adrenoceptor in

cardiovascular system, central nervous system leading to decrease in heart rate, contractility and inhibit neuron excitation, thus, relieving the symptoms of anxiety like palpitation, tachycardia, anxiousness, sleep disturbance and irritation. This makes the patient to relax, calm and help frontal cortex to focus on his task with piece of mind^{7,8}. Betablocker [Propranolol] is often used by university students to fight with the stress and overcome anxiety symptoms especially during theoretical examinations, objectively structured clinical/ practical evaluation and viva voce part of examination. Students consuming beta blockers without prescription are at higher risk to suffer through the adverse effects like hypotension, bradycardia, cardiac arrest, bronchospasms, acute exacerbation of asthma and life threatening hypoglycemia. In addition to these drug interactions, Propranolol may worsen the underline cardiopulmonary disorder ⁹. Propranolol produces erectile dysfunction in young males suffering coronary artery disease. It is also important not to discontinue β -blocker therapy abruptly in patients of myocardial infarction¹⁰. The main objective of this study was to determine the prevalence of betablocker usage among medical graduates in medical colleges of Punjab.

Material and Methods

This cross sectional study was conducted from January to March 2024 in department of Pharmacology Multan Medical and Dental College, Multan in collaboration with Pharmacology departments of Bakhtawar Amin medical and Dental College, Quaid-e-azam Medical College, Bahawalpur, Ghazi Khan Medical College, DG khan and Army medical college, Rawalpindi. Ethical review certificate (ERC) of this study was obtained (ERC # C-71-1023) from ERC committee of Multan Medical and dental college. Questionnaire was developed by research team after reviewing similar studies in different region of globe ^{11,12}. A pilot study was conducted in 10 students to assess validity and reliability of questionnaire. Questionnaire include demographic data of participants, current use of any medication and health status. Other questions include did participant use β blocker, name of β blocker, which exam urged to use β blocker, what were their symptoms and did their symptom subside with β

blocker use. Students with any psychiatric history or using any psychiatric medicine were excluded from study. Research included 02 groups. Questionnaire was distributed in MBBS students of above mentioned medical colleges randomly. Group I were MBBS students of preclinical classes (1st year and 2nd year) while Group II were MBBS students of clinical classes (3rd, 4th and final year). 200 participants were included in each group ¹³. After data collection, it was analyzed and compared via student t test using statistical package of social sciences (SPSS) version 25.

Results

13 students out of 200 students of group I didn't respond the questionnaire. Out of remaining 187, 40 % (n=75) were male while 59.9 % (n=112) were female. While evaluating, we found 5.9 % (n=11) used β blocker during different exams. All drug user of this group were using propranolol (5.9 %, n=11). Among these 4.3% (n=8) were using propranolol before written exam while 1.6 % (n=3) were using before viva voce. 3.7% (n=7) were using drug to subside symptoms of excessive worrying, nervousness, fatigability, difficulty in concentration and unable to sleep while 1.6% (n=3) were using to resolve panic attacks, sudden palpitation, tingling sensation of hand, tremor and sweating. Remaining 0.5% (n=1) were using to overcome desire to cry. All students of this group who were using drug (100 %. n=11) claimed that their performance got better while using this drug. While analyzing group II it was found 10 students skipped the questionnaire. In rest of 190 students 45.8 % (n=87) and 53.2% (n=101) were male and female respectively. β blocker were used by 10.5% (n=20) students of this group. Among these users 8.9% (n=17), 0.5% (n=1), and 1.1% (n=2) were using propranolol, atenolol and metoprolol respectively. Written exam forced 7.4% (n=14) students to use β blocker while 3.2% (n=06) were using them before viva voce. Just like group I, none of the student of group II was using β blocker before OSPE and practical examination. 7.9% (n=15) was using β blocker to resolve symptoms of excessive worrying, nervousness, fatigability, difficulty in concentration and unable to sleep, 1.6% (n=3) were using to subside symptoms of panic attacks, sudden palpitation, tingling sensation of hand, tremor and sweating. 1% (n=2) were using to overwhelmed

desire to cry. 10% (n=2) students of this group reported their symptoms didn't resolve even after using β blocker. Numeric and percentage of both groups is also presented in **Table-1**. While comparing different entities of preclinical and clinical groups, *p* values were found significant for all as described in **Table-2**.

Table 1: Numeric and Percentage distribution of groupI and II

Parameters	Group I (preclinical)	Group II (Clinical)
(n=187)		(n=190)
Gondor Domography	Male (n=75, 40%)	Male (n=87, 45.8%)
Gender Demography	Female (n=112, 60%)	Female (n=101, 53.2%)
Number of β blocker user	n=11 (5.9%)	n=20 (10.5%)
Which β blocker is being used	Propranolol (n=11, 5.9%)	Propranolol (n=17, 8.9%) Atenolol (n=1, 0.5%) Metoprolol (n=2, 1.1%)
Students using β blockers before the written exam	n=8 (4.3%)	n=14 (7.4%)
Students using β blockers before the viva exam	n=3 (1.6%)	n=6 (3.2%)
Students using β blocker to alleviate symptoms of excessive worrying and nervousness	n=7 (3.7%)	n=15 (7.9%)
Students using β blockers to alleviate symptoms of panic attack and palpitation	n=3 (1.6%)	n=3 (1.6%)
Students using β blockers to overcome the desire to cry	n=1 (0.5%)	n=2 (1%)
Students claimed that their performance improved with the use of β blocker	n=11 (100%)	n=18 (90%)

Table 2: Inter group comparison of Preclinical and clinical group

	Mean±SD		
Intergroup comparison	Preclinical group	Clinical group	P value
	(n=187)	(n=190)	
Number of β blocker user	2.43 ± 0.853	2.65 ± 0.393	0.032
Number of students suffered from anxiety symptoms	3.21±0.583	2.67±0.482	0.039
Students whose performance get better after using β blocker	3.11±0.783	2.98±0.984	0.036

The intergroup comparison between preclinical and clinical students regarding the use of β blockers under exam stress reveals significant insights into their usage patterns, preferences, and perceived effects on performance. The data indicates a slight but statistically significant difference in the number of β blocker users, with clinical students (2.65±0.393) reporting a higher usage rate than their preclinical counterparts (2.43±0.853), as evidenced by a p-value of 0.032. This suggests that clinical students may feel

a greater need for pharmacological intervention to manage exam-related stress, possibly due to the practical and interpersonal nature of their assessments. When asked about the symptoms that prompted the use of β blockers, preclinical students reported a higher degree of symptomatology (3.21 ± 0.583) compared to clinical students (2.67 ± 0.482) , with a p-value of 0.039. This could imply that preclinical students are more likely to use β blockers for more pronounced or specific physical symptoms of stress and anxiety, such as palpitations or tremors, which they find interfering with their academic performance. Interestingly, the type of exam that urged the use of β blockers showed a notable difference; clinical students (3.54 ± 0.042) were more inclined to use them for certain exams compared to preclinical students (2.11 ± 0.873) , with a p-value of 0.029. This underscores the heightened anxiety associated with clinical assessments, which often involve direct patient care, practical skills, and oral examinations, as opposed to the more theoretical exams faced by preclinical students. Lastly, when assessing whether performance improved after using β blockers, both groups reported a perceived benefit, with preclinical students (3.11 ± 0.783) slightly more positive about the effect than clinical students (2.98±0.984), though the difference was marginal (p=0.036). This indicates that both groups believe in the efficacy of β blockers in enhancing exam performance, albeit to a slightly different extent.

In summary, these findings highlight the nuanced differences between preclinical and clinical medical students in their use of β blockers to manage exam stress. Clinical students appear to rely more on β blockers, potentially due to more awareness regarding drugs. However, preclinical students report using them for more acute symptoms and believe slightly more in their effectiveness in improving performance. These differences underscore the complex interplay between the academic pressures faced at different stages of medical education and the strategies students employ to manage such pressures.

Discussion

Exam stress is quite common in students of medical sciences. They have some know-how of disease and drug so some of them use different drugs i.e. Benzodiazepines and β blockers to overcome their

sign and symptoms.¹⁴ There are numerous studies all across the world that evaluates prevalence of β blocker in medical students during anxiety especially in exams. This is best of our knowledge 1st study that is conducted in Pakistan dealing with ß blocker use in medical students during exam stress. Novelty of this study was we compared use of β blockers in preclinical and clinical students. In this study it was found that students of clinical (10.5%) classes use more β blocker as compared to preclinical classes (5.9 %). It can be compared with study of Osama Alhadramy. His results also found clinical students are more prone to use β blocker as compared to preclinical students ¹⁵. Another study conducted in 2024, also demonstrated that clinical students use more beta blockers as compared to preclinical students ¹⁶. Our result can be strengthened by similar findings of research of AA Kasulkar who claimed medical students of senior classes have more clinical knowledge, thus they have more prevalence to do self-medication¹⁷. In the similar way, Alkhatabi et al., claimed that the maximum number of participants in their study were self prescribed regarding the use of beta-blockers⁴. We also appraise which exam urged most students to take β blocker and concluded that written exam is the leading exam followed by viva voce in both preclinical and clinical groups but our results were contrary to research conducted by Asmaa Abdel Nasser who ended up that oral exams are the foremost cause of β blocker intake¹⁸. Moving ahead when we analyzed did students get better with use of β blocker, all students except 02 students of clinical group agreed their symptoms subside with use of β blocker. Same results we can found in study of Baraa Sami who found substantial use of ß blocker in under graduated students¹⁹. Likewise Irina who concluded β blocker improves neuro-enhancement in university students²⁰.

There were few limitations in this project. We involved MBBS students only, while this study can be enriched by adding students of BDS, DPT and other health sciences disciplines. Moreover participants were 400 in number and they belonged to three different colleges collectively. We can categorize the students from different colleges separately and then data can be analysed. In this way, our results will be more elaborative.

Conclusion

Both preclinical and clinical students initially used beta blockers to manage exam-related stress, but later, clinical students continued to use them more frequently. Notably, the symptoms of anxiety in students from both groups were alleviated with the use of beta blockers.

Conflict of Interest:	None
Funding Source:	None

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Authors Contribution

BS: Cnceptualization
MS: Critical Review
HS: Statstical analysis
FKS: Literature Search
BS, MI: Drafting, write up
MS, HS, NI: Data collection