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Prevalence of Self-Prescribed Propranolol among Healthcare and Non-Healthcare Students in Al-Ahsa, Saudi Arabia: A Cross-Sectional Study

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ABSTRACT

Introduction: Few studies have investigated propranolol usage among university students and its relation to the level of performance anxiety. Moreover, it has been shown that performance anxiety level increases among health science students. There is no comparison between healthcare and non-healthcare students regarding self-prescribed propranolol about performance anxiety. This research aims to study the prevalence of self-prescribed propranolol and compares healthcare students with non-healthcare students.

Materials & Methods: A cross-sectional study with a sample size of 506 was conducted. The inclusion criteria were King Faisal university students enrolled in the academic year 2020-2021.

The Exclusion criteria were any subject taking prescribed propranolol. The data were collected using an electronic questionnaire between 20 September to 18 October 2020. Data were analyzed using SPSS program version 22. The collected data included Beck Anxiety Inventory, gender, nationality, marital status, college, academic level, grade point average, a questionnaire about propranolol usage.

Results: 506 King Faisal university students from different colleges completed the questionnaire; 212 (41.9%) were healthcare students, while 294 (58.1%) were non-healthcare students. Only four single females (0.8%) used self-prescribed propranolol, and three of them were healthcare students and one non-healthcare student. According to our study, the academic level has significantly affected the usage of propranolol (p=0.007). However, Beck Anxiety Inventory, gender, nationality, marital status, college, and grade point average were not significant.

Conclusion: In this study, the prevalence of propranolol usage is very low among King Faisal university students. Also, a higher academic level is associated with the usage of self-prescribed propranolol.

Key words: Performance anxiety, Anxiety, University students, Beck anxiety inventory

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INTRODUCTION

Anxiety disorders are one of the most researched topics in healthcare, yet they represent a challenge for those interested in studying them. For instance, DSM V has reclassified many disorders such as obsessive-compulsive disorder and post-traumatic stress disorder into new classifications even though they were thought to be under the umbrella of anxiety [1]. Anxiety disorders differ from normal feelings of nervousness or anxiousness and involve excessive fear or catastrophic unrealistic anticipations [2]. Their significance in the research field stems from the fact that they are the most common mental disorders worldwide. Although there is a discrepancy between studies on estimating the exact prevalence, there is a consensual agreement on how prevalent they are. Some studies, for instance, estimate their prevalence to be 16.6% lifetime. More importantly, some groups are at a higher risk of anxiety than others. For example, college students have a prevalence of 12.4% as the most common mental disorder for them [3,4]. They are highly susceptible to anxiety due to many reasons that include academic stress, financial stress, and social stress. Moreover, the stress can be exaggerated in some conditions like being in a highly demanding college such as medical school or being a female [5,6].

College students try to cope with such stressors and avoid being trapped in any psychological disorder such

as anxiety. Therefore, it was shown that there are suitable coping mechanisms such as praying and meditating, which were in 52.6% of the students. Also, some students tend to use the emotional coping strategy in which they try to accept the situation. Social support and exercising are also used and appear to have an inverse relationship with anxiety [4]. On the other hand, some students try drugs without a prescription to alleviate anxiety or mask its symptoms. Those symptoms can be psychological, such as fear of losing control, dying, and torrefying [7].

Physical symptoms of anxiety such as palpitations, tremors, and flushes are caused by overstimulation of the adrenergic system. Therefore, the students tend to use beta-adrenergic blockers to overcome this state of overstimulation due to their ability to reduce their heart rate and reduce arterial blood pressure [8]. Much research reported that 92.3% of students use medications, including beta-blockers, without prescription or doctor's consultation. It is worth mentioning that this percentage increases among healthcare students compared to non-healthcare [9].

Since there is a lack of data in Saudi Arabia that describes the relationship between anxiety and the use of self-prescribed beta-blockers among college students, this study aimed to find out if there is such a relation and compare healthcare with non-healthcare students.

METHODS

Study design and participants

A cross-sectional study targeting undergraduate students at King Faisal University in the eastern province of Saudi Arabia containing more than 50000 students in 15 colleges was conducted from 20 September 2020 till 18 October 2020 to evaluate the anxiety level and its relation with self-prescribed beta-blockers use. Both genders were included in the study, and only those enrolled in the academic year of 2020-2021 were included, while those using beta-blockers with a prescription or who have not completed the questionnaire were excluded from the study.

Data collection method

An electronic self-administered questionnaire was distributed via social media to all the students in the university. The sample size was calculated to be 385 using Richard Geiger equation with a confidence interval of 95%, margin error of 5%, and response rate of 50%. The questionnaire contained three main parts; the first one was about the demographical data of the participants, the second one was about the anxiety level, which was determined using Becker anxiety index (BAI) and divided into mild, moderate, and severe, and the third one was about beta-blockers use. The questionnaire was adopted from Al-Mohrej et al. study after taking written authorization from the corresponding author [5].

Statistical analyses

Data analysis was done using the Statistical Package for social sciences (SPPS) version 25. Chi-square test was used for qualitative data, while Mann Whitney test was used for qualitative to quantitative data, and the level of significance was determined to be (p-value = 0.05) for all tests used in the study.

Ethical considerations

The ethical approval was gained from the research ethics committee of the medical college of King Faisal University. Consent and ethical considerations were ensured for each participant before starting the questionnaire.

RESULTS

Demographical data

The study included all students at King Faisal University. The responses reached 506 participants. As shown in Table 1, 28.5% of the responses were males, while females constituted 71.5%. Most of the participants were from the college of medicine (21.7%), followed by the College of Art (12.1%). On the other hand, the community college and Abaqiq were the minor participants constituting only (0.6%) for each.

Regarding the academic level, 31.8% of the participants were in their second year of college. Following them, the third-year participants constituted 22.5% of the participants. 61.5% of the participants in the study scored a mild level of anxiety on Beck Anxiety Inventory. Contrarily, 15.2% of them scored a severe level of anxiety while the others, which represented 23.3%, scored a moderate level. More details are shown in Table 1.

Demographic data of propranolol users

As Table 2 shows, out of 506 participants, there were only four who used the beta-blocker (Propranolol). All of the 4 participants, which represent 0.79% were females. 2 (50%) of them were in the college of medicine while 1 (25%) was in the college of clinical pharmacy and the other 1 (25%) was in the college of computer science. None of the propranolol users were in the first year, while only 1 (25%) of the users were in their second year, and the other 3 (75%) were in their fifth year. 1 (25%) of the users scored a mild level of anxiety on Beck Anxiety Inventory, 1 (25%) scored moderate, and 2 (50%) scored a severe level. Their all-year academic average GPA was 4.65 out of 5, while the average of the last two semesters decreased to 4.60 out of 5. On the other hand, the all-years average GPA of the non-users was 4.22 out of 5, which increased in the last two semesters to 4.31.

The effect of gender, nationality, college, academic level, marital status, smoking on propranolol usage

Table 3 shows in detail the multivariate analysis of propranolol use predictors. It has been found that there was no significant relationship between gender and the use of beta-blockers as the (P-value = .205). Also, the type of college and GPA did not have significant relationships as the (P-value = .864) and (P-value = .132). More importantly, the stress level was not associated with the use since the (P-value = .130). Smoking and marital status were not associated with the use since the

Table 1: Sociodemographic data of the participants.

		Count	%
Gender	Male	144	28.50%
	Female	362	71.50%
Nationality	Saudi	499	98.60%
	Non-Saudi	7	1.40%
College	Medicine	110	21.70%
	Education	8	1.60%
	Law	24	4.70%
	Art	61	12.10%
	Agricultural and food sciences	28	5.50%
	Applied studies & community service	3	0.60%
	Community college in Abaqiq	3	0.60%
	Dentistry	21	4.20%
	Clinical Pharmacy	34	6.70%
	Applied Medical Science	47	9.30%
	Veterinary Medicine	4	0.80%
	Engineering	28	5.50%
	Business	56	11.10%
	Computer Science	31	6.10%
	Science	48	9.50%
Academic Level	Preparatory year	34	6.70%
	2nd year	161	31.80%
	3rd year	114	22.50%
	4th year	102	20.20%
	5th year	55	10.90%
	6th year	21	4.20%
	Internship	19	3.80%
Marital status	Single	426	84.20%
	Married	72	14.20%
	Divorced	7	1.40%
	Widowed	1	0.20%
Do you smoke?	Yes, till now	25	4.90%
	Yes, but I quit	19	3.80%
	No	462	91.30%
Beck Anxiety Inventory	Mild	311	
	Moderate	118	
	Severe	77	

Table 2: Demographic data and propranolol use.

		Previous propranolol usage			
		Yes		No	
		Count	Mean	Count	Mean
Gender	Male	0		144	
	Female	4		358	
Nationality	Saudi	4		495	
	Non-Saudi	0		7	
College	Medicine	2		108	
	Education	0		8	
	Law	0		24	
	Art	0		61	
	Agricultural and food sciences	0		28	
	Applied studies & community service	0		3	
	Community college in Abaqiq	0		3	
	Dentistry	0		21	
	Clinical Pharmacy	1		33	
	Applied Medical Science	0		47	
	Veterinary Medicine	0		4	
	Engineering	0		28	
	Business	0		56	
	Computer Science	1		30	
	Science	0		48	
Academic Level	Preparatory year	0		34	
	2nd year	1		160	
	3rd year	0		114	
	4th year	0		102	
	5th year	3		52	
	6th year	0		21	
	Internship	0		19	
Marital status	Single	4		422	
	Married	0		72	
	Divorced	0		7	
	Widowed	0		1	
Do you smoke?	Yes, till now	0		25	
	Yes, but I quit	0		19	
	No	4		458	
Beck Anxiety Inventory	Mild	1		310	
	Moderate	1		117	
	Severe	2		75	
Academic GPA			4.65		4.227
Academic GPA for the last two semesters			4.6		4.31

(P values were 0.825, 0.860) respectively. On the other hand, the academic level seemed to be the only factor associated with the high Propranolol usage by 17.625 times since the (P-value = .007).

Regarding propranolol usage

Table 4 shows that only one user (25%) started taking the propranolol in the first year, while no one has taken it in the second year, the sixth year, and the internship. On the other hand, one user (25%) started taking it in the third year, one user (25%) started taking it in the fourth year, and one user (25%) started taking it in the fifth year. Two of the users (50%) reported using it five times or less, while the other two (50%) reported using it more than ten times. Regarding the occasions that pushed the users to consume the propranolol, 2 (50%) admitted they use before practical exams (OSPE/OSCE), 2 (50%) prior to oral exams, 3 (75%) before posters or oral presentations, and only 1 (25%) admitted they use during the written exams period. Furthermore, three users (75%) admitted that they increased the dose; Two before the practical exams, two before the oral exams, and one before a poster or oral presentation. Moreover, all of the users found the drug effective against anxiety, while only (75%) of them were aware of the side effects (75%). The users reported experiencing side effects such as hypotension, slow heart rate, fatigue, and constipation. Regarding how they heard about the drug, (50%) of the users reported that they heard from social media.

Relationship between gender and beck anxiety inventory

Figure 1 shows that out of 362 females who participated

Table 3: The effect of gender, nationality, collage, academic level, marital status, smoking on propranolol usage.

Pearson chi-square tests		
		Previous propranolol usage
Gender	Chi-square	1.604
	df	1
	Sig.	0.205a
Nationality	Chi-square	0.057
	df	1
	Sig.	0.812a,b
College	Chi-square	8.468
	df	14
	Sig.	0.864a,b
Academic Level	Chi-square	17.625
	df	6
	Sig.	0.007a,b,*
Marital status	Chi-square	0.757
	df	3
	Sig.	0.860a,b
Do you smoke?	Chi-square	0.384
	df	2
	Sig.	0.825a,b
Beck Anxiety Inventory	Chi-square	4.082
	df	2
	Sig.	0.130a,b

Table 4: Different questions regarding propranolol usage.

		Count
When did you start taking Propranolol (Inderal)?		502
Preparatory year		1
2nd year		0
3rd year		1
4th year		1
5th year		1
6th year		0
Internship		0
How many times you have consumed Propranolol (Inderal)?		502
5 times or less		2
6-10		0
More than 10 times		2
When do you use the Propranolol (Inderal) the most?		502
Before practical exams (OSCE/ OSPE)		2
Before Oral exams		2
Before poster or oral presentation		3
During written exams period		1
Do you still use Propranolol (Inderal)?		502
Yes		2
No		2
How did you know about propranolol (Inderal)?		502
Social media		2
Medical websites		1
Medical prescription		0
The pharmacist		1
Your colleague		0
My curriculum		1
Have you increased your dose at any time?		502
Yes		3
No		1
If your previous answer was Yes, What activity requires you to use higher than usual dose?		502
Before practical exams (OSCE/OSPE)		2
Before Oral exams		2
Before poster or oral presentation		1
During written exams period		0
I need to increase the dose because of reduce efficacy		1
I did not increase the dose		1
Did you find Propranolol (Inderal) effective to reduce anxiety?		502
Yes		4
No		0
Would you recommend it for other colleague?		502
Yes		1
No		3
Are you aware of the complications resulting from taking Propranolol (Inderal) without medical supervision?		502
Yes		3
No		1
In your opinion, does Propranolol (Inderal) cause the following:		502
Hypotension	Yes	4
	No	0
	I do not know	0
Slow heart rate	Yes	3
	No	1
	I do not know	0
Constipation	Yes	4
	No	0
	I do not know	0
Shortness of breath	Yes	2
	No	2
	I do not know	0
Erectile dysfunction	Yes	0
	No	0
	I do not know	4
Fatigue	Yes	2
	No	2
	I do not know	0
Cold extremities	Yes	3
	No	0
	I do not know	1
Hypoglycemia	Yes	1
	No	1
	I do not know	2
Bad dreams	Yes	1
	No	1
	I do not know	2
Have you ever had some of Propranolol (Inderal)'s side effects/ complications?		502
Yes		3
No		1
If your previous answer was yes, What were the complication you had?		502
Hypotension		2
Slow heart rate		1
Constipation		2
Shortness of breath		2
Erectile dysfunction		0
Fatigue		2
Cold extremities		1
Hypoglycemia		0
Bad dreams		1

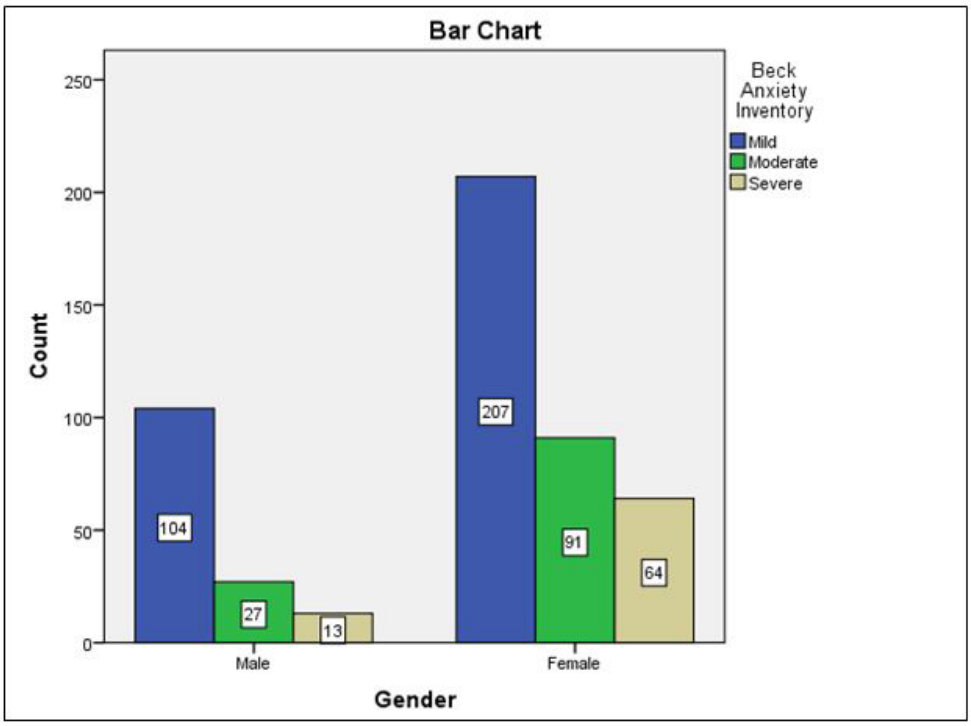

Figure 1: Gender and BAI score.

in the study, 64 females scored severe scores in BAI, which constituted 17.68% of them. On the other hand, only 13 males out of 144 scored high, which constituted 9.03% of the male participants. Significant difference between genders in BAI scores in favor of females (P-value = 0.005).

DISCUSSION

This cross-sectional study was done using a convenient sampling technique among King Faisal University students enrolled in the academic year 2020-2021.

The study investigated the use of unprescribed propranolol among 506 participants and its relation to high-performance anxiety through a previously validated questionnaire. The questionnaire developer authorized the study conductors to use his questionnaire and translate it to Arabic, and it was conveniently distributed through social media (WhatsApp, Twitter). The study results found that 17.68% of the female participants suffer from severe anxiety while 25% of them suffer from a moderate level of anxiety on BAI. On the other hand, the male participants showed better anxiety regulation. For instance, only 9.03% of them have been categorized under severe anxiety score on BAI. It is shown that only 0.79% of the participants in the study have used propranolol; all of them were females. Unexpectedly, the number of female users is insufficient to indicate a gender association with propranolol use (P-value =0.205).

To our knowledge, this is the first study to be conducted in the region to comprehensively demonstrate prevalence, patterns, attitude, and knowledge of the use of propranolol among healthcare and non-healthcare students for anxiety relying on an objective measure and stress relief.

The findings of this study will provide a baseline of attitudes and knowledge about using propranolol among King Faisal University students and anxiety levels and emotion regulation among them. The study results assess the adequacy of the educational campaigns in anxiety and awareness of the adverse effects and complications of propranolol misuse. These findings are expected to understand better the students' emotional states and the events that make them liable to misuse propranolol. Furthermore, the findings are expected to direct future interventions to specific, focused areas and make them fruitful.

Various studies have shown that unprescribed propranolol use is relatively common among medical students. While the prevalence of propranolol varies between studies, it is thought that the drug usage in the current study's sample is the lowest, with about 0.79% of the sample using propranolol during their college years. Such results are consistent with what was reported in Switzerland, which was (1.2%), but incomparable with what was reported in Riyadh, Saudi Arabia (30%) [5,10]. Contrary to Al-Mohrej found, all propranolol users in the current sample were females, while males were less likely to use propranolol. Furthermore, in the Iranian study, female students used propanol at a higher rate than male students (5,10). This finding can be attributed to how males and females cope differently with stressful life events. According to Mona A Alfadeel's research, females tend to use emotion-focused coping, an inefficient coping strategy [11]. Furthermore, Krishna Subhash Vyas reported that females exhibit a higher level of anxiety than males [6].

Even though there is no significant difference in drug abuse between healthcare and non-healthcare students (P-value =0.825), 75 % of users are healthcare students. This can be explained by the assumption that knowing about beta-blockers increases the likelihood of abusing them, but it is not a drug that is appealing to try. In the Switzerland study, for example, it was discovered to be the least used drug among methylphenidate (4.1%), sedatives (2.7%), alcohol (5.6%), cannabis (2.5%), and beta-blockers (1.2%) [9].

There were no propranolol users in the first year and only one user in the second year. On the other hand, (75%) of the users were in their fifth year of study. These findings are highly comparable with what Al-Mohrej found in his observations [5]. This could be attributed to increasing pressure throughout the academic years and the difficulty of the curriculum in the final years. According to research from Germany, anxiety affects older students more than younger students. They also reported more substance abuse and, in some cases, more consumption of prescription requiring drugs such as beta-blockers [12].

Most of the propranolol users in the current sample, constituting around (75%), used it before poster or oral presentations, while only (25%) consumed it before a written exam. This discrepancy can be attributed to a comorbid psychiatric disorder known as social anxiety. Because social anxiety decreases with masculine gender role orientation, it may explain why all of the users in the sample were females [13]. Moreover, (50%) increased the dose before OSCE, and others (50%) increased it before oral exams. On the other hand, only (25%) increased the dose before a poster presentation. Such findings suggest that, in addition to social anxiety shared by OSCE, oral exams, and oral presentations, OSCE exams are incredibly stressful and force users to increase their doses. This explanation is constant with Iranian research, which has found that (63%) of the students considered OSCE exams very stressful [14].

Although the knowledge about propranolol is not significantly correlated with its misuse (P-value = .178), the drug was introduced to (75%) of the users through social media and medical websites. Even though all of the samples considered the drug effective, (75%) would not recommend it to a friend. This can be explained by their knowledge about the side effects in which all of them are aware that it can cause hypotension and constipation, (75%) of them are aware of the slow heart rate, and (50%) are aware of fatigue and shortness of breath.

Our study has some limitations due to the lack of organizational support and funds, but we did not spare any effort to overcome them as possible. First, although we achieved very high response rates, reducing the possibility of response bias, data sampling was convenient because the survey was distributed through existing networks, which may necessitate a cautious interpretation of our data. Furthermore, the sample is from a single university; more extensive studies involving students from multiple universities may be more beneficial and provide more accurate data about the behavior of Saudi university students. Finally, the findings should not be generalized to the whole population because that is beyond the scope of our study.

Future studies should broaden the scope of this study to investigate the prevalence of using propranolol and other types of drugs in the general population to determine whether prescription drugs are used only by health sciences and university students or by employees. Furthermore, future research should focus on students' attitudes toward using such drugs and whether they believe such behavior is acceptable, depending on subject characteristics and context. More studies into the prevalence of other more dangerous drugs used by university students to overcome performance anxiety or improve academic achievement are needed to determine its prevalence and improve educational and awareness campaigns in the community.

CONCLUSION

The prevalence of propranolol use among King Faisal University students was very low in this study. Also, a higher academic level is significantly associated with the usage of self-prescribed propranolol. Furthermore, it was noticeable that females suffer from anxiety more than males.

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