

KNOWLEDGE AND AWARENESS OF OPIOID ADDICTION AMONG MEDICAL STUDENTS

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Abstract

Introduction: In developed and developing nations alike, opioid use disorders (OUDs), including the most severe form (opioid addiction) represent a significant public health concern. Opioid addiction is a chronic mental condition that results in relapses and remissions numerous times throughout the course of an addict's life which generates a host of uncomfortable symptoms, such as withdrawal and tolerance development. Despite all of their advantages, using medications incorrectly can have negative health effects. Evidence that medication side effects are a major, though frequently avoidable, source of sickness and even death is now becoming more and more clear. **Objectives:** To assess the level of knowledge and awareness regarding opioids use, risks among medical students. **Methodology:** This is an observational cross-sectional study conducted between July - December 2024 in KSA. The study's population consisted of Saudi medical students from all six years of medical school, along with those in their seventh year of internship, aged 18 and above. **Results:** The study assessed the knowledge and awareness of opioid addiction among 435 medical students in Riyadh, revealing significant findings. Participants, predominantly single (87.8%) and aged 23.4 years on average, exhibited varied educational backgrounds, with 48% achieving excellent GPAs. Notably, 45% identified pharmacists as their primary source of information on opioid medications, highlighting a reliance on professional guidance. While 85.7% recognized the risks of opioids during pregnancy, over half (54%) were unaware of proper dosages. Additionally, 27.6% reported self-managing symptoms warranting opioid use without medical supervision, underscoring the urgent need for enhanced education on opioid safety and management. **Conclusion:** In conclusion, the findings of this study underscore the critical importance of enhancing

the understanding of opioid addiction among future healthcare providers. The knowledge gaps identified in this study highlight the need for comprehensive educational interventions that address the complexities of opioid prescribing, addiction management, and the implications of opioid use on vulnerable populations

Keywords: opioids, knowledge, awareness, use, medical students, Saudi Arabia.

Introduction:

In developed and developing nations alike, opioid use disorders (OUDs), including the most severe form (opioid addiction) represent a significant public health concern [1]. Opioid addiction is a chronic mental condition that results in relapses and remissions numerous times throughout the course of an addict's life which generates a host of uncomfortable symptoms, such as withdrawal and tolerance development [2]. Despite all of their advantages, using medications incorrectly can have negative health effects. Evidence that medication side effects are a major, though frequently avoidable, source of sickness and even death is now becoming more and more clear [3].

Substance addiction is a major global public health concern that affects people at all socioeconomic levels and geographic regions. Young people, especially medical college students, are the major issue, resulting in poor academic performance, disciplinary issues, and psychological disorders. Such behavior among future healthcare professionals may have a substantial impact on their professional ethics and abilities, putting patient safety at risk [4].

Medical students who are continuously under the simultaneous burden of academic and clinical responsibilities may be more vulnerable to substance abuse, aided by easy access to these substances. Studies on substance usage are especially important because there is currently a paucity of comprehensive research in this area. The purpose of this study is to investigate the prevalence of substance use among medical students in order to gain useful insights into this significant public health issue in their educational environment [5].

To the best of our knowledge, there have been few studies in Saudi Arabia that address this topic thoroughly among students from a variety of health science disciplines. While prior research has focused on student views and self-medication habits, our study takes a big step toward better understanding opioid addiction among medical students. Thus, the purpose of our study is to investigate and assess the level of knowledge and awareness about opioid addiction among medical students from several universities in Riyadh, Saudi Arabia [6].

In 2024, a study shows Just a minority of participating physicians (724 respondents) showed correct opioid dosage calculations, even though 84% of them reported starting opioid treatment. There were notable differences found between the clinical skills of physicians in managing pain and prescribing opioids and their self-perceived knowledge in these areas. Overall, 41% of doctors gave false information on the dose conversion rates for tramadol, which 65% of respondents said was the drug they used the most frequently.[7]. The survey comprised 63 (42.2%) male and 57 (57.8%) female medical students. Of them, 99 (65.9%) had a solid understanding of drug addiction, 21 (15.6%) acknowledged having used medications without a prescription, and 33 (24.4%) said they had undergone a drug test in the past. Among the pupils, substance misuse was prevalent (15.6%). 11 to 18 years old was the age group with the greatest prevalence of drug misuse. The most often misused substance among the students was tramadol, while the most popular method of drug abuse was oral route 20 (14.8%) [8].

A study published in 2022, Findings: Information gathered and examined came from 1808 surveys. According to the findings, 61% of the participants used over-the-counter analgesics; 67% saved them for very severe pain; 72% said they could take analgesics along with other prescription drugs; 68% said analgesics had an antipyretic effect; and 1% said they had an anti-inflammatory effect. In addition, 77% of participants were cautious about the expiration date, and 80% of participants examined the information on medicinal products often [9]. Conducting research on the knowledge and awareness of opioid addiction among medical students in Saudi Arabia (KSA) is important for several reasons: First, due to insignificant number of studies related to evaluate medical students' understanding and awareness of opioid addiction in Saudi Arabia. Second, medical students are future healthcare professionals who will play a crucial role in diagnosing, treating, and preventing opioid addiction. Assessing their knowledge can reveal gaps in their education and highlight areas where the curriculum may need improvement. Third, by understanding medical students' awareness and knowledge levels, targeted interventions can be designed to improve their understanding of opioid addiction. This can lead to better prevention strategies and more effective treatment plans for patients. Furthermore, Medical students with a high level of knowledge about opioid addiction are better equipped to provide informed care to patients. Ensuring they have a strong understanding can enhance patient outcomes and contribute to safer prescribing practices. In addition, ensuring that future healthcare professionals are well-informed about opioid addiction can have long-term positive effects on public health, reducing the overall burden of addiction and improving the quality of care provided.

Objectives:

This study aims to assess the level of knowledge and awareness regarding opioids use , risks among medical students.

Methodology:

Study design and Setting:

This is an observational cross-sectional study conducted between July - December 2024 in Saudi Arabia. The study's population consisted of Saudi medical students from all six years of medical school, along with those in their seventh year of internship, aged 18 and above.

Sample size:

For sample size calculation of unknown population size, we used the following formula: $n = z^2 \cdot [p \cdot q] / d^2$, which is used to calculate the sample size of cross-sectional studies. In this formula, n is the sample size, P is the estimated proportion of the study variable or construct based on previous studies or pilot studies (70%), q = 1-P (30%), and d is the margin of error (5%). z is the Z-score or a standard normal deviation corresponding to (100%, $\alpha/2\%$), where α refers to the significance level or the probability of making a type I error. The z score for different significance levels is 1.96 for 5%, 1.28 for 10%, and 2.58 for 1%. I have added some hypothetical values and the sample size would be 323.

Method for data collection, instrument and score system:

An independently administered paper-based questionnaire was utilized to gather the data. Involvement

in the study was completely optional. This cross-sectional study was carried out among medical students in the capital of Saudi Arabia between July and September of 2024. An electronic questionnaire with eighteen questions was employed in the course of study. A pair of versions of the questionnaire were written: one that was written in Arabic and another in English. After receiving permission to participate, participants received the questionnaire

Data collection:

An independently administered paper-based questionnaire was utilized to gather the data. Involvement in the study was completely optional. This cross-sectional study was carried out among medical students in the capital of Saudi Arabia between July and September of 2024. An electronic questionnaire with eighteen questions was employed in the course of study. A pair of versions of the questionnaire were written: one that was written in Arabic and another in English. After receiving permission to participate, participants received the questionnaire and told about the purpose of the study. Evaluating medical students' knowledge, awareness, and worry about opioid addiction was the main goal. The survey consisted of three sections [9].

Analytical statistics:

The Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) for Windows 23.0 software application was utilized to perform the statistical analysis of the collected data. the data were shown as percentages and frequencies.

Results:

Table (1) displays various demographic parameters of the participants with a total number of (435). They had a mean age of 23.4 years and standard deviation of 3.7 years. Notably, most of them are single (87.8%), indicating a massive population of younger people who are likely focused on education or career development. The gender distribution is slightly female biased (56.6% female, 43.4% male) suggesting potential for social dynamics and social networks among this cohort. Calculations of living arrangements reveal 89.4 percent of the population lived with one or both parents, suggesting a reliance on familial support — often cultural norms or economic factors — which makes these findings accurate. Their educational attainment is quite varied (22.3% in fifth year of study), with also a large percentage (48.0%) having an excellent GPA, suggesting overall strong academic performance. According to employment status, an overwhelming majority (86.4%) are students without jobs, possibly correlating with their income which only 42.1% make between 500 to 1000 SAR per month.

Table (1): Sociodemographic characteristics of participants (n=435).

<i>Parameter</i>		<i>No.</i>	<i>Percent (%)</i>
<i>Age</i> (<i>Mean:23.4, STD:3.7</i>)	20 years or less	101	23.2
	21 to 23	125	28.7
	24 to 25	120	27.6
	26 or more	89	20.5
<i>Gender</i>			
Female		246	56.6

	Male	189	43.4
<i>Marital status</i>	Single	382	87.8
	Married	50	11.5
	Divorced	3	.7
<i>Do you live with one or both of your parents?</i>	No	46	10.6
	Yes	389	89.4
<i>Are your parents alive?</i>	No	33	7.6
	One of them	44	10.1
	Yes	358	82.3
<i>Education level</i>	1st year	47	10.8
	2nd year	28	6.4
	3rd year	37	8.5
	4th year	65	14.9
	5th year	97	22.3
	6th year	18	4.1
	Intern	56	12.9
	Preparatory year	87	20.0
<i>Current GPA</i>	Excellent (at least 3.5 / 4) or (at least 4.5 / 5)	209	48.0
	Very good (2.75 - 3.49 out of 4) or (3.75 - 4.49 out of 5)	125	28.7
	Good (1.75 - 2.74 out of 4) or (2.75 - 3.74 out of 5)	82	18.9
	Satisfactory (1 - 1.75 out of 4) or (2 - 2.75 out of 5)	19	4.4
<i>Occupation</i>	Student with job	59	13.6
	Student without job	376	86.4
<i>Average monthly income</i>	<500	116	26.7
	500-1000	183	42.1
	1000-5000	50	11.5
	>5000	86	19.8

As shown in figure 1, The data on the sources of the opioid prescribing in the total sample of 435 respondents provides important insights into the determinates of opioid utilization. In addition, the number of those that reported to have received advice from friends of relative was notably high, approximately 22.4%, with 54 in total. On the other end, the media became a source of 101 respondents whose share was 23.2 percent of the sample. According to 197 people—roughly 45.3 percent of survey respondents—prescriptions got from pharmacists' recommendations were the most influential. The remaining 19.1% was made up from other sources, as 83 respondents indicated of them.

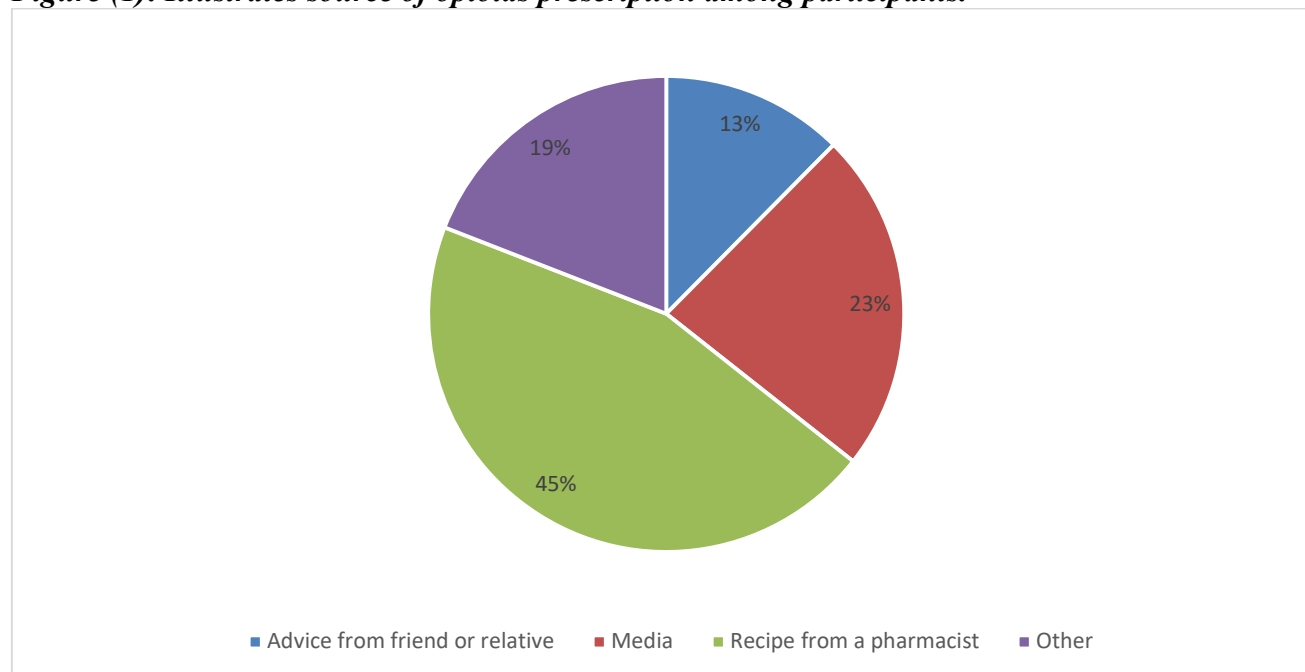
Figure (1): Illustrates source of opioids prescription among participants.

Table 2 represents some interesting thoughts concerning the knowledge and awareness of opioid addiction amongst a sample size of 435 medical students. More notably, 45% or more of respondents stated that the main source they have known of obtaining such medications was thanks to pharmacists, suggesting a need to depend on professional advice. At the same time, 85.7% of the students acknowledged harms possible with opioids on pregnancy indicating the need for education for keeping the vulnerable population safe. But most students admitted that they didn't know correct dosages for opioids (54%), but 75.9 per cent said they had read product information before using it, suggesting a good attitude to informed medication practice. It is interesting to note that even more prominently, a number of 27.6 percent of the data indicated that self-management has gone so far, with as much as abdominal pain as a symptom which professes to warrant the use of opioids without supervision of a medical professional.

Table (2): Parameters related to knowledge and awareness of opioid addiction among medical students (n=435).

Parameter		No.	Percent (%)
Source of opioids prescription	Advice from friend or relative	54	12.4
	Media	101	23.2
	Recipe from a pharmacist	197	45.3
	Other	83	19.1
Choose from the following the opioids you have heard of *	None	69	15.9
	Oxycontin	100	22.9

	Vicodin	92	21.1
	Codeine	147	33.8
	Morphine	209	48.0
	Fentanyl	149	34.3
	Methadone	124	28.5
	All of them	145	33.3
<i>Opioid can cause harm to pregnancy</i>	No	62	14.3
	Yes	373	85.7
<i>Other Indication of opioids</i>	Anti diarrheal	95	21.8
	Cough suppressant	133	30.6
	Helps to get you sleep	207	47.6
<i>Adverse effects of opioids</i>	Dependence	146	33.6
	Dizziness	94	21.6
	Nausea/ vomiting	74	17.0
	Sedation / CNS depression	121	27.8
<i>The most dangerous opioid and commonly used as an end of life</i>	Codeine	66	15.2
	Fentanyl	70	16.1
	Methodone	45	10.3
	Morphine	137	31.5
	Oxycontin	83	19.1
	Viocodin	34	7.8
<i>Do you know the correct dose that you need from the opioids?</i>	No	235	54.0
	Yes	200	46.0
<i>Appropriate age to start using opioids (years)</i>	12-year-old or more than that	295	67.8
	Less than 12 years	140	32.2
<i>Timing of intake of opioids</i>	On empty stomach	102	23.4
	With meals	333	76.6
<i>Read product information before using</i>	No	105	24.1
	yes	330	75.9
<i>Do you know the expiration date of the analgesic being used?</i>	No	128	29.4
	Yes	307	70.6
<i>Symptoms needing opioids without medical consultation</i>	Abdominal pain	120	27.6
	Allergies	59	13.6
	Any symptoms	65	14.9
	Headache	114	26.2
	Menstrual pain	77	17.7
<i>Severity of pain which forces the use of opioids</i>	Mild	148	34.0
	Moderate	110	25.3
	Severe	177	40.7
<i>Use of opioids concomitant with other types of medication</i>	No	125	28.7
	Yes	310	71.3

****Results may overlap***

As shown in figure (2), The data collected from a total sample of 435 individuals is analysed to determine that a substantial number of those respondents reported symptoms indicating that some sort of opioid is required without preceding medical consultation. Of the 120, nearly 28% reported experiencing abdominal pain, which is the most common symptom. Additionally, 114 (26.2%) reported headaches and 77 (17.7%) reported menstrual pain as a greater demand for opioids in the absence of professional medical advice. Additionally, 65 people reported 'any symptoms,' 59 with allergies, for a total of 15 percent.

Figure (2): Illustrates symptoms needing opioids without medical consultation among participants.

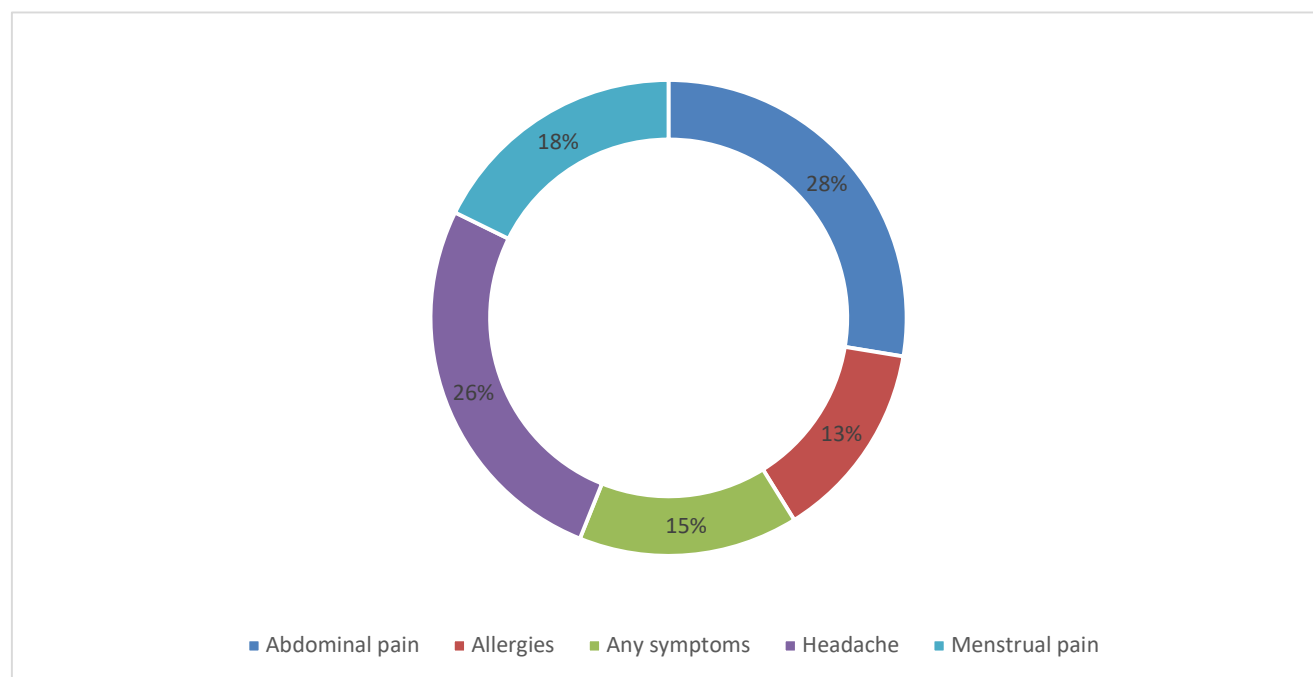


Table (3) shows that knowing the correct dose for opioids has statistically significant relation to gender (P value=0.0001), age (P value=0.0001), living with one or both of parents (P value=0.0001), whether parents are alive (P value=0.003), educational level (P value=0.0001), GPA (P value=0.023), occupation (P value=0.045), and average monthly income (P value=0.0001). It also shows statistically insignificant relation to marital status.

Table (3): Relation between knowing the correct dose for opioids and sociodemographic characteristics.

Parameters		Do you know the correct dose that you need from the opioids?		Total (N=435)	P value*
		No	Yes		
Gender	Female	166	80	246	0.0001
		70.6%	40.0%	56.6%	
	Male	69	120	189	

		29.4%	60.0%	43.4%	
Age	20 years or less	46	55	101	0.0001
		19.6%	27.5%	23.2%	
	21 to 23	81	44	125	
		34.5%	22.0%	28.7%	
	24 to 25	76	44	120	
		32.3%	22.0%	27.6%	
	26 or more	32	57	89	
		13.6%	28.5%	20.5%	
Marital status	Single	203	179	382	0.059
		86.4%	89.5%	87.8%	
	Married	32	18	50	
		13.6%	9.0%	11.5%	
	Divorced	0	3	3	
Do you live with one or both of your parents?	No	41	5	46	0.0001
		17.4%	2.5%	10.6%	
	Yes	194	195	389	
		82.6%	97.5%	89.4%	
Are your parents alive?	No	14	19	33	0.003
		6.0%	9.5%	7.6%	
	One of them	34	10	44	
		14.5%	5.0%	10.1%	
	Yes	187	171	358	
		79.6%	85.5%	82.3%	
Educational level	1st year	18	29	47	0.0001
		7.7%	14.5%	10.8%	
	2nd year	11	17	28	
		4.7%	8.5%	6.4%	
	3rd year	19	18	37	
		8.1%	9.0%	8.5%	
	4th year	42	23	65	
		17.9%	11.5%	14.9%	
	5th year	69	28	97	
		29.4%	14.0%	22.3%	
	6th year	18	0	18	
		7.7%	0.0%	4.1%	
	Intern	34	22	56	
		14.5%	11.0%	12.9%	
Cumulative GPA	Excellent	24	63	87	0.023
		10.2%	31.5%	20.0%	
	Very good	116	93	209	
		49.4%	46.5%	48.0%	
		77	48	125	

Occupation	Good	32.8%	24.0%	28.7%	0.045
		35	47	82	
	Satisfactory	14.9%	23.5%	18.9%	
		7	12	19	
		3.0%	6.0%	4.4%	
		39	20	59	
	Student without job	16.6%	10.0%	13.6%	
		196	180	376	
Average monthly income	<500	83.4%	90.0%	86.4%	0.0001
		31	85	116	
	500-1000	13.2%	42.5%	26.7%	
		119	64	183	
	1000-5000	50.6%	32.0%	42.1%	
		35	15	50	
	>5000	14.9%	7.5%	11.5%	
		50	36	86	
		21.3%	18.0%	19.8%	

***P value was considered significant if ≤ 0.05 .**

Table (4) shows that sources of opioids prescription has statistically significant relation to age (P value=0.0001), living with one or both of parents (P value=0.0001), whether parents are alive (P value=0.003), educational level (P value=0.0001), and average monthly income (P value=0.0001). It also shows statistically insignificant relation to gender, GPA, occupation, and marital status.

Table (4): Source of opioids prescription in association with sociodemographic characteristics.

Parameters		Source of opioids prescription		Total (N=435)	P value*
		Friends, media or others	Recipe from a pharmacist		
Gender	Female	126	120	246	0.095
		52.9%	60.9%	56.6%	
	Male	112	77	189	
		47.1%	39.1%	43.4%	
Age	20 years or less	83	18	101	0.0001
		34.9%	9.1%	23.2%	
	21 to 23	45	80	125	
		18.9%	40.6%	28.7%	
	24 to 25	57	63	120	
		23.9%	32.0%	27.6%	
	26 or more	53	36	89	
		22.3%	18.3%	20.5%	
Marital status	Single	202	180	382	0.062
		84.9%	91.4%	87.8%	
	Married	33	17	50	

	Divorced	13.9%	8.6%	11.5%	
		3	0	3	
		1.3%	0.0%	0.7%	
<i>Do you live with one or both of your parents?</i>	No	32	14	46	0.032
		13.4%	7.1%	10.6%	
	Yes	206	183	389	
		86.6%	92.9%	89.4%	
<i>Are your parents alive?</i>	No	30	3	33	0.0001
		12.6%	1.5%	7.6%	
	One of them	29	15	44	
		12.2%	7.6%	10.1%	
	Yes	179	179	358	
		75.2%	90.9%	82.3%	
<i>Educational level</i>	1st year	34	13	47	0.0001
		14.3%	6.6%	10.8%	
	2nd year	28	0	28	
		11.8%	0.0%	6.4%	
	3rd year	29	8	37	
		12.2%	4.1%	8.5%	
	4th year	19	46	65	
		8.0%	23.4%	14.9%	
	5th year	45	52	97	
		18.9%	26.4%	22.3%	
	6th year	7	11	18	
		2.9%	5.6%	4.1%	
	Intern	24	32	56	
		10.1%	16.2%	12.9%	
<i>Cumulative GPA</i>	Excellent	107	102	209	0.505
		45.0%	51.8%	48.0%	
	Very good	73	52	125	
		30.7%	26.4%	28.7%	
	Good	46	36	82	
		19.3%	18.3%	18.9%	
	Satisfactory	12	7	19	
		5.0%	3.6%	4.4%	
<i>Occupation</i>	Student with job	38	21	59	0.108
		16.0%	10.7%	13.6%	
	Student without job	200	176	376	
		84.0%	89.3%	86.4%	
<i>Average monthly income</i>	<500	66	50	116	0.0001
		27.7%	25.4%	26.7%	
	500-1000	103	80	183	

		43.3%	40.6%	42.1%	
	1000-5000	39	11	50	
		16.4%	5.6%	11.5%	
	>5000	30	56	86	
		12.6%	28.4%	19.8%	

***P value was considered significant if ≤ 0.05 .**

Table (5) shows that knowing the correct dose for opioids has statistically significant relation to gender (P value=0.0001), age (P value=0.0001), marital status (P value=0.005), whether parents are alive (P value=0.0001), educational level (P value=0.0001), GPA (P value=0.001), occupation (P value=0.041), and average monthly income (P value=0.001). It also shows statistically insignificant relation to living with one or both parents.

Table (5): Source of opioids prescription in association with sociodemographic characteristics.

Parameters		Read product information before using		Total (N=435)	P value*
		No	Yes		
Gender	Female	43	203	246	0.0001
		41.0%	61.5%	56.6%	
	Male	62	127	189	
		59.0%	38.5%	43.4%	
Age	20 years or less	50	51	101	0.0001
		47.6%	15.5%	23.2%	
	21 to 23	28	97	125	
		26.7%	29.4%	28.7%	
	24 to 25	13	107	120	
		12.4%	32.4%	27.6%	
	26 or more	14	75	89	
		13.3%	22.7%	20.5%	
Marital status	Single	93	289	382	0.005
		88.6%	87.6%	87.8%	
	Married	9	41	50	
		8.6%	12.4%	11.5%	
	Divorced	3	0	3	
		2.9%	0.0%	0.7%	
Do you live with one or both of your parents?	No	12	34	46	0.744
		11.4%	10.3%	10.6%	
	Yes	93	296	389	
		88.6%	89.7%	89.4%	
Are your parents alive?	No	22	11	33	0.0001
		21.0%	3.3%	7.6%	
	One of them	18	26	44	
		17.1%	7.9%	10.1%	
	Yes	65	293	358	
		61.9%	88.8%	82.3%	

Educational level	1st year	26	21	47	0.0001
		24.8%	6.4%	10.8%	
	2nd year	18	10	28	
		17.1%	3.0%	6.4%	
	3rd year	17	20	37	
		16.2%	6.1%	8.5%	
	4th year	7	58	65	
		6.7%	17.6%	14.9%	
	5th year	8	89	97	
		7.6%	27.0%	22.3%	
	6th year	8	10	18	
		7.6%	3.0%	4.1%	
Cumulative GPA	Excellent	8	48	56	0.001
		7.6%	14.5%	12.9%	
	Preparatory year	13	74	87	
		12.4%	22.4%	20.0%	
	Excellent	41	168	209	
		39.0%	50.9%	48.0%	
	Very good	20	62	82	
		19.0%	18.8%	18.9%	
	Good	0	19	19	
		0.0%	5.8%	4.4%	
	Satisfactory	44	81	125	
		41.9%	24.5%	28.7%	
Occupation	Student with job	8	51	59	0.041
		7.6%	15.5%	13.6%	
	Student without job	97	279	376	
		92.4%	84.5%	86.4%	
Average monthly income	<500	24	92	116	0.001
		22.9%	27.9%	26.7%	
	500-1000	55	128	183	
		52.4%	38.8%	42.1%	
	1000-5000	17	33	50	
		16.2%	10.0%	11.5%	
	>5000	9	77	86	
		8.6%	23.3%	19.8%	

***P value was considered significant if ≤ 0.05 .**

Discussion:

The objective of this present study was to determine the knowledge and awareness among medical students regarding the issue of Opioid addiction in Riyadh, Saudi Arabia. The rising prevalence of opioid use disorders worldwide presents a public health challenge, so this investigation is important. This study presents critical insights into how future healthcare professionals think about and feel about opioid addiction, how well educated they are on this issue, the things they think we should teach them,

and what they do not think we should teach them. The results also are in line with literature that has already been published on the knowledge and attitudes of medical students and health care professionals towards opioid use and addiction, and provide further support to the need for further dissemination and educational interventions.

In our study, we found over 45 percent of respondents received information about opioid medications from pharmacists as their primary source. This follows previous research suggesting that healthcare professionals often rely on pharmacists for advice regarding medication management, particularly regarding opioids [10]. As noted by a study, patients and providers often share their worries about addicts for opioid prescriptions, which can deter them to take critical steps regarding opioid prescriptions [11]. Perhaps it suggests that medical students, for whatever reason, already rely on pharmacists for information about managing addiction or prescribing opioids. This is consistent with the findings of Tompach et al., who found that a large proportion of dental students also exhibited similar knowledge deficits of opioid use and abuse [12].

Additionally, our study demonstrated overwhelming knowledge on the opioid related harms as 85.7% of students perceived the risk of opioids use while pregnant. This is important because it aligns with Williams et al who reported educating the healthcare professionals about the consequences of opioid use on maternal and fetal health [13]. Despite their awareness, a scary 54% of students confessed to not knowing the correct dosages for opioids. This is alarming as it reflects a trend seen in other studies, such as the Schwarz et al study that shows that both faculty and students often have a difficult time discerning between classes of opioids and their addictiveness [14]. The fact that there is no knowledge of correct dosages leads to great risks such as misuse and potential addiction, explaining the necessity of elaborative educational approaches.

With 27.6% of respondents reporting that they use opioids for self-management of symptoms without medical supervision, this is an alarming statistic that raises serious concerns about possible misuse and addiction. This is in agreement with observations made by a study who have noted that many patients are poorly clinically educated about the risk of opioid use, attracting harmful influences [15]. Larger issues surrounding stress, coping, and population prevalence of self-medication among medical students may be represented in the prevalence of this use among medical students, as has been indicated in other studies of healthcare student substance use [16]. As self-medication norms become normalized, self-medication cycles of misuse and addiction are perpetuated and the need for targeted interventions for promoting healthy coping behaviors becomes a focus.

Statistical analyses in our study revealed significant relationships between knowledge of correct opioid dosages and various demographic factors, including gender, age, and educational level. These findings echo the results of previous studies that have identified demographic disparities in knowledge and attitudes toward opioid use among healthcare professionals. For instance, their study found that exposure to addiction medicine topics during medical training significantly influenced students' knowledge and attitudes regarding opioid use disorders [17]. The identification of demographic factors that correlate with knowledge gaps can inform the development of tailored educational programs that address the specific needs of different student populations.

While our study provides valuable insights into the knowledge and awareness of opioid addiction among medical students, it is not without limitations. The reliance on self-reported data may introduce biases, as participants may underreport or overreport their knowledge and experiences related to opioid use. Furthermore, the study's sample was drawn from a single city, which may limit the generalizability of the findings to other regions in Saudi Arabia or internationally. Future research should aim to include a more diverse sample and longitudinal designs to better understand the evolution of knowledge and attitudes regarding opioid addiction among medical students over time.

In our study, there were significant relationships between knowledge of proper opioid dosages and demographics including gender, age, and educational attainment with statistical analyses. The findings here mirror previous work revealing disparities in awareness and attitudes about opioid use among healthcare professionals, based on their demographic characteristics. For example, the authors of their study reported that medical students' knowledge and attitudes towards opioid use disorders in abusers were much shaped by training in addiction medicine [17]. Demographic factors that correlate with knowledge gaps are identified, which provide information to develop targeted educational programs that address the needs of particular student populations.

However, our study is of course not without limitations, and provides valuable insight into the knowledge and awareness of opioid addiction among medical students. Yet self-reported data carries the risk of bias, where participants may under or over report their knowledge and experiences as regards opioid use. Additionally, since the sample was based in one city, these results may or may not be generalizable to other areas in Saudi Arabia as well as elsewhere internationally. I advocate for future research to build on the use of larger samples, longitudinal designs, to gain a better understanding of the trajectory of knowledge and attitudes about opioid addiction amongst medical students over time.

Conclusion:

The significance of providing future providers of healthcare with a better understanding of opioid addiction is one conclusion of this study. As such, this study identifies the gaps in the current knowledge bases that require high quality educational interventions addressing the confluence of opioid prescribing, management of addiction, and the effects of opioid use on vulnerable populations. Through educating medical students in the right knowledge and skills needed, we can help create safer prescribing practices, and in turn help reduce prescription opioids misuse and addiction in the wider community.

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Ethical approval:

After fully explaining the study and emphasizing that participation is optional, each participant gave their informed consent. The information gathered was safely stored and utilized exclusively for study.

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Conflict of interests:

The authors declare no conflict of interest.

Informed consent:

Written informed consent was acquired from each individual study participant.

Data and materials availability:

All data associated with this study are present in the paper.

References:

1. Kreek MJ, Reed B, Butelman ER. Current status of opioid addiction treatment and related preclinical research. Vol. 5, Sci. Adv. 2019.
2. Wang SC, Chen YC, Lee CH, Cheng CM. Opioid addiction, genetic susceptibility, and medical treatments: A review. *Int J Mol Sci.* 2019;20(17).
3. Bekele KM, Abay AM, Mengistu KA, Atsbeha BW, Demeke CA, Belay WS, et al. Knowledge, Attitude, and Practice on Over-the-Counter Drugs Among Pharmacy and Medical Students: A Facility-Based Cross-Sectional Study. *Integr Pharm Res Pract.* 2020;Volume 9:135–46.
4. Kipchumba Kurui D, Ogoncho IM. Prevalence of Substance Abuse among Students in Medical Training. 2021;2:1–6.
5. Kushwaha RP, Rauniar GP, Koirala B, Mandal NK. Prevalence of substance use among undergraduate students in a medical college of Nepal. *Journal of the Nepal Medical Association.* 2019;57(219):315–9.
6. Al Essa M, Alshehri A, Alzahrani M, Bustami R, Adnan S, Alkeraidees A, et al. Practices, awareness and attitudes toward self-medication of analgesics among health sciences students in Riyadh, Saudi Arabia. *Saudi Pharmaceutical Journal.* 2019 Feb 1;27(2):235–9.
7. Biesiada AM, Ciałkowska-Rysz A, Mastalerz-Migas A. Opioid Treatment in Primary Care: Knowledge and Practical Use of Opioid Therapy. *Healthcare (Switzerland).* 2024 Jan 1;12(2).
8. Okpalanma NN, Ogbonna BO, Enwelunta Ikenna G, Ogbonna Brian O, Okpalanma Nneoma N. Identification of substance abuse among medical students in a Nigerian University [Internet]. 2022. Available from: www.ijms.co.in
9. Schmidt SK. Interactive and sculptural printmaking in the renaissance. Vol. 270/21, Brill's Studies in Intellectual History. Brill Academic Publishers; 2018. p. 1–467.
10. Anderson, D., Zlateva, I., Davis, B., Bifulco, L., Giannotti, T., Coman, E., ... & Spegman, D. (2017). Improving pain care with project echo in community health centers. *Pain Medicine*, 18(10), 1882-1889. <https://doi.org/10.1093/pm/pnx187>
11. Hurstak, E., Kushel, M., Chang, J., Ceasar, R., Zamora, K., Mi askowski, C., ... & Knight, K. (2017). The risks of opioid treatment: perspectives of primary care practitioners and patients from safety-net clinics. *Substance Abuse*, 38(2), 213-221. <https://doi.org/10.1080/08897077.2017.1296524>
12. Tompach, P., Vincent, S., & Peterson, A. (2021). A dental school survey assessing dental student knowledge, attitudes and prescribing behavior regarding opioid use and abuse. *J Dental Sci Res Rep*, 1-6. [https://doi.org/10.47363/jdsr/2021\(3\)111](https://doi.org/10.47363/jdsr/2021(3)111)
13. Williams, J., Syed, M., Adesanya, A., Gardner, G., Chaguturu, V., & Coppola, K. (2022). Educating the community about the opioid epidemic and medications for opioid use disorder. *American Journal on Addictions*, 31(5), 433-440. <https://doi.org/10.1111/ajad.13287>

14. Schwarz, E., Replogle, K., McLemore, K., & Kohli, R. (2021). Faculty and dental student knowledge, attitudes, and practices concerning the prescribing of opioids: informing curricular change. *Journal of Dental Education*, 86(6), 689-699. <https://doi.org/10.1002/jdd.12858>
15. Chakravarthy, B., Somasundaram, S., Mogi, J., Burns, R., Hoonpongsimanont, W., Wiechmann, W., ... & Lotfipour, S. (2018). Randomized pilot trial measuring knowledge acquisition of opioid education in emergency department patients using a novel media platform. *Substance Abuse*, 39(1), 27-31. <https://doi.org/10.1080/08897077.2017.1375061>
16. Yogendra, U., Gattavali, D., Chowdary, C., & Anoop, K. (2022). A study on students and marijuana, attitudes and beliefs: a comparative study. *International Journal of Research in Psychiatry*, 2(1), 23-25. <https://doi.org/10.22271/27891623.2022.v2.i1a.23>
17. Riser, E., Holterman, L., Maruti, S., Brooklyn, J., DeVoe, S., Tompkins, B., ... & Sobel, H. (2021). Integrating data 2000 waiver training into undergraduate medical education: the time is now. *Substance Abuse*, 42(2), 236-243. <https://doi.org/10.1080/08897077.2021.1903653>