



Awareness and Utilization Pattern of Over-the-Counter Painkillers amongst Health professional Students in a Medical University

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Authors' contributions

This work was carried out in collaboration among all authors. Authors AAA and AD designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript under supervision of author SP. Under the supervision of authors SP, AAA and AD managed the analyses of the study. Authors AAA and AD managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Objective: Pain relievers are one of the most frequently purchased over-the-counter medications and are vulnerable to be misused, leading to safety concerns. This study was conducted to assess the awareness and self-medication practices of over-the-counter analgesics amongst health professions students in a medical university.

Methods: A cross-sectional study was conducted, after obtaining ethical approval, using a self-developed, pilot tested (n=40), valid questionnaire comprising three sections; sociodemography, student awareness, analgesic use pattern. A sample of 379 (calculated sample size, n=400) covering all health stream students proportionately from Gulf Medical University, Ajman, UAE, were studied during October-December 2018 and data analysed using descriptive statistics (Mean±SD, frequency), Chi square test, and independent t test at alpha =0.05.

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#This work was done while the corresponding author was working at affiliation 1.

Results: Total 379 respondents (male 38.5%; n=146, female 61.5%; n=233 with mean \pm SD age of 19.76 \pm 2.109 years) were enrolled. Commonly used painkillers were paracetamol 47.3% (n=187), ibuprofen 24% (n=95) and aspirin 14.4% (n=57). Information available on package inserts were the source of information for 54.1% (n=119) respondents. Family and friends' recommendations was reason for use of painkillers in 27.3% (n=93) of the students. Adverse effects mostly known were nausea 11.5% (n=92), drowsiness 8.9% (n=71) and vomiting 7.2% (n=58). Contraindications known were pregnancy 14.5% (n=225), liver disease 13.4% (n=208) and bleeding 13.3% (n=207). Findings showed 61.5% (n=233) were not aware of painkillers' interactions with other medications.

Conclusion: Though students were aware of the usage of analgesics, the utilization pattern is high, suggesting the need for further in-depth investigations. Findings also showed the need for creating awareness among the students.

Keywords: Analgesics; knowledge; self-medication; students; United Arab Emirates.

1. INTRODUCTION

Pain is defined by the International Association for the Study of Pain (IASP) as 'An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage [1]. It is a common problem that affects many people daily and can have an impact on their daily life and activities. The common types of pain conditions include headache, joint and bone pain, muscle pain, dental pain, and abdominal pain etc. Analgesics, which are also commonly known as painkillers, are a class of drugs that are used for pain relief without losing consciousness. They are one the most frequently purchased over-the-counter (OTC) medications [2], which refers to all medications that can be purchased without a prescription and any medical supervision [3]. Acetaminophen, also known as paracetamol, is considered the safest drug among OTC pain relievers compared to Non-steroidal anti-inflammatory drugs (NSAIDs) as it has minimal gastrointestinal toxicity, minute effect on blood pressure, almost no association with myocardial infarction, no interaction with the antiplatelet effect of aspirin and does not affect asthma patients [2].

Generally, OTC analgesics are used for a short period time; not more than 10 days, to be safe [4]. They relieve different types of pain experienced by the body, specifically short-term pain, so they are mainly indicated for headache, migraine, lower back pain, musculoskeletal conditions, dysmenorrhea, abdominal pain, toothache, fever, osteoarthritis, rheumatoid arthritis and acute gout [2,4]

OTC analgesics are easily accessible to the public and usually very affordable and convenient in terms of time saving. Allowing these drugs to be obtained without a prescription

sends a message to the community that the drugs are safe, but unfortunately this message is not true as they have several important adverse effects which need to be considered [2,3]. OTC analgesics should be used responsibly in order to achieve the required efficacy without compromising their safety. Responsible use of medications requires enough information which is provided by the patient information leaflet available in the medication packages. It's necessary that the right patient takes the right medication at the right dose and time for a recognized indication [5]. Failing to do so may lead to some undesirable effects. For instance, analgesics can affect a variety of the body systems, mainly the gastrointestinal tract, which can cause primarily ulcer and bleeding that occurs without warning symptoms and may lead to death, and the overuse or frequent use of these drugs can lead to renal and hepatic damage [2]. Another disadvantage of using OTC analgesics irresponsibly is the risk of overlapping of certain ingredients when using multiple products. As a result, the overall cost of care might increase due to the harmful effects of using these medications unwisely, requiring medical interventions and hospitalization.

Generally, people rely on analgesics as a quick fix for their self-limiting pain conditions. However, not all of them use these medications responsibly. For this reason, we were encouraged to attempt an analysis of degree of awareness and among students about the adverse effect of the overuse of painkillers and its utilization. This study was conducted with an extensive review of similar studies and found some studies in countries like Bahrain [6], Saudi Arabia [7-9], Pakistan [10], Iran [11] and UK [12]. A similar study was conducted in Gulf Medical University (GMU) in 2014 which evaluated the self-medication with all non-prescription

medications. An article published in Khaleej Times which is a daily English newspaper published in Dubai, stated that a study was conducted in 2016 in the UAE showed that 51% of the young people who use OTC drugs were self-medicating with analgesics and putting themselves at risk of serious adverse effects associated with their use [13]. During our literature review, we found general studies on self-medication pattern in UAE, but no studies are available on analgesics in specific. A more detailed research about analgesics would give a better insight about the knowledge and utilization pattern, hence this research was conducted with the objectives of assessing the knowledge and awareness of painkillers among students from different educational programs and genders, to identify the most commonly used painkillers and their indication, and to determine the students' knowledge on the safety of painkillers.

2. METHODS

2.1 Study Design

A cross-sectional study was conducted among students attending Gulf Medical University.

2.2 Study Setting

Gulf Medical University, Ajman. GMU is a private university in UAE established in 1998. It offers various educational programs like medicine, pharmacy, dentistry, physiotherapy, nursing, medical laboratory sciences and anesthesia.

2.3 Study Duration

This study was conducted during October 2018 – December 2018.

2.4 Sample Size Calculation

The sample size for this study is 400 students studying in various programs. The total number of students enrolled in GMU at the time of this research is 1104. The sample size was calculated using Cochran formula [14].

$$\begin{aligned} \text{Calculated sample size} &= \frac{Z^2 * (p) * (1 - p)}{c} \\ &= 1 + \frac{nx}{1!} + \frac{(1.96)^2 * (0.5) * (0.5)}{(0.05) * (0.05)} \approx 400 \end{aligned}$$

2.5 Study Subjects

The students were approached personally and asked for their consent to participate in our study. Only those who signed the written consent were enrolled. Students from all of the 10 programs that are available in our university (Table 1) were stratified depending on the total number of students in each program. The programs that had most students had higher number of participants.

2.6 Study Tool

Self-administered questionnaire was developed by the authors that consisted of 3 parts; Sociodemographic details, Utilization of painkillers and Awareness of painkillers. The sociodemographic details included age, gender, nationality, program and year of study. The second part (utilization of painkillers) had 13 questions related to how students use painkillers. The last part (awareness of painkillers) had 8 questions about the general knowledge of students on painkillers.

2.7 Method of Data Collection

The questionnaire was distributed among health science students of GMU. The process continued till 379 students were interviewed. The respondents were given 10-15 minutes to fill the questionnaire. After that, the questionnaires were collected and checked for the completeness.

2.8 Data Analysis

The data was entered into MS Excel software and transferred to IBM SPSS-23 for further analysis. Descriptive analysis was conducted by calculating means and proportions for continuous and discrete data. The χ^2 test and independent t test were used to test statistical significance at alpha=0.05.

2.9 Pilot Study

Prior to starting the main study, a pilot study with approximately 10% of the study sample (40 students) was conducted to validate the process and the tools. Findings showed that students mostly from BSc. MIS program (100%, n=2) have failed to answer the question about long-term duration of painkillers intake. Similarly, students mainly from MBBS program (55.5%, n=5) did not give the correct side effects of painkillers. Almost all the students chose the correct contraindications of painkillers, however; BPT

students (100%, n=2) did not choose all the correct ones. Students from BBMS (66.7%, n=2), MBBS (22.2%, n=2), BSN (100%, n=2) and DMD (28.6%, n=2) haven't answered the question about the safe age of initiating aspirin. Students mainly from MBBS program (55.5%, n=5) were not aware of painkillers' drug-drug interactions. On the other hand, 18 students (45%, n=18) were aware of interactions and only 3 PharmD students (37.5%, n=3) were able to give examples of certain drugs. Students mostly from PharmD program (50%, n=4), DMD (42.8%, n=3) and MLS program (66.7%, n=2) have not answered the question about painkiller abuse correctly. Students mainly from MBBS program (44.4%, n=4) have failed to answer the question about painkillers storage correctly. The most commonly used painkiller was Paracetamol (86.9%, n=20), followed by Ibuprofen (47.8%, n=11) and Aspirin (34.8%, n=8). The most common indication for which students took painkillers were headache (78.3%, n=18), fever (56.5%, n=13) and joint and bone pain (30.4%, n=7). Out of the 23 students who used painkillers, 14 of them were females (60.9%, n=14). Females and males knowledge and awareness of painkillers was found to be equal. No changes in the methodology or study tool were performed after the pilot study. It was found that the study is feasible and practical.

3. RESULTS

3.1 Demographic Characteristics of the Respondents

Among the respondents 22.4% (n=85) belonged to the age 18 years and 26.1% (n=99) were aged above 20 years and females (61.5%; n=233) were more than the males (38.5%; n=146). Majority of the respondents belonged to MBBS program 33.8% (n=128), DMD program 22.7% (n=86) and PharmD program 11.1% (n=42) as these programs have higher number of students, while the rest were equally distributed between the other seven programs with various percentages. Out of all 379 respondents, 30.3% (n=115) were in their 1st year of study and the percentage of respondents in their 2nd and 3rd year was almost similar. The percentage of students from 4th and 5th year was less than the other years of study because they were not easily available at the time of data collection. More information about demographic characteristics of students is available in Table 2.

3.2 Analgesic Use Pattern by the Students

Of the total 379 students, 220 (58%) of them used analgesics in the recent past and the rest did not use. The following results were considered for only those 220 students who used painkillers. Of the painkillers, the most commonly used ones were found to be paracetamol 47.3% (n=187), ibuprofen 24% (n=95) and aspirin 14.4% (n=57). The least used ones were mefenamic acid and ketoprofen. These percentages are presented in Fig. 1.

Painkillers were most used for headache 30.3% (n=179) and fever 16.4% (n=97). Most students used painkillers when their pain was graded as 5 (19.5%) (n=43) on a scale of 10 of pain severity. Most of the 220 respondents who have used painkillers in past took them monthly 60.4% (n=133) once a day 48.2% (n=106) for one day only 47.7% (n=105) with food 77.7% (n=171). Duration of use of painkillers is presented in Fig. 2.

A higher percentage of the respondents didn't use two or more types of painkillers at the same time 90.4% (n=199) while 21 of them used other painkillers together like ibuprofen and paracetamol (9.5%, n=21). Instructions mentioned in patient information leaflet were followed by 54.1% (n=119) out of the 220 respondents. The two major factors affecting choice of painkillers among respondents were specific painkillers known for a specific indication 32.2% (n=110) and family and friends' recommendations 27.3% (n=93). The respondents used tablets 54.5% (n=213) and capsules 12.5% (n=49) most frequently. No alternative ways for pain management were used by most of the 379 students 27.8% (n=130), while the most common alternative way was found to be sleeping 21.4% (n=100). For more information about the use pattern of painkillers among students refer to Table 3.

3.3 Student Awareness on Painkiller Use

Majority of the 379 students practiced self-medication for their pain management (55.9%, n=219). Eighty-three percent (83.6%, n=317) of the students were aware that painkillers shouldn't be used for a long period of time. Adverse effects mostly known by students were nausea 11.5% (n=92), drowsiness 8.9% (n=71) and vomiting 7.2% (n=58). System-wise adverse effects are

presented in Fig. 3 and specific adverse effects are available in Table 4.

Contraindications to painkillers most known by students were pregnancy 14.5% (n=225), liver disease 13.4% (n=208) and bleeding 13.3% (n=207). Most of the respondents chose >18 years 36.7% (n=139) as the safe age for use of aspirin. Among the 379 students 61.5% (n=233) were not aware of painkillers' interactions with

other medications, while 38.5% (n=146) were aware of them and 55 (37.7%) of them gave examples. The examples of interacting drugs that were given by the students are available in Table 4. Most of the respondents think that painkillers can be abused 77.3% (n=293). Out of 379 students, 77% (n=292) were aware that painkillers should be stored at room temperature. More information regarding students' awareness of painkiller is presented in Table 4.

Table 1. Enrollment of study subjects

Program	Number of students	Percentage
MBBS	128	33.8%
DMD	86	22.7%
BBMS	28	7.4%
Pharm.D	42	11.1%
BPT	28	7.4%
ADPCS	22	5.8%
BSc. MLS	15	3.9%
BSc. MIS	13	3.4%
BSc-AST	11	2.9%
BSN	6	1.6%

*MBBS: Bachelor of Medicine and Bachelor of Surgery, DMD: Doctor of Dental medicine, BBMS: Bachelor of Biomedical Sciences, Pharm.D: Doctor of pharmacy, BPT: Bachelor of Physiotherapy, ADPCS: Associate Degree in Pre-Clinical Sciences, MLS: Medical Laboratory Sciences, MIS: Medical Imaging Science, AST: Anesthesia Technology, BSN: Bachelor of Nursing

Table 2. Demographic profile of the student respondents (n=379)

	Intervals	n	%	
Age (in years)	16	2	0.5	
	17	27	7.1	
	Mean±sd age:	18	85	22.4
	19.76±2.109	19	77	20.3
		20	89	23.5
	>20	99	26.1	
Gender	Female	233	61.5	
	Male	146	38.5	
Educational program enrolled	MBBS	128	33.8	
	DMD	86	22.7	
	Pharm.D	42	11.1	
	BBMS	28	7.4	
	BPT	28	7.4	
	ADPCS	22	5.8	
	BSc. MLS	15	3.9	
	BSc. MIS	13	3.4	
	BSc-AST	11	2.9	
	BSN	6	1.6	
Year of study	1 st	115	30.3	
	2 nd	108	28.5	
	3 rd	109	28.7	
	4 th	20	5.3	
	5 th	27	7.1	

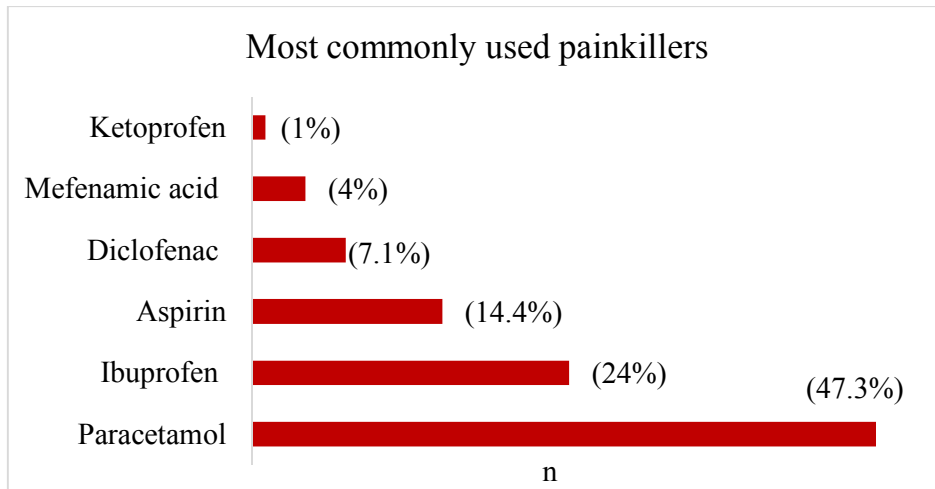


Fig. 1. Painkillers that are mostly used by the students

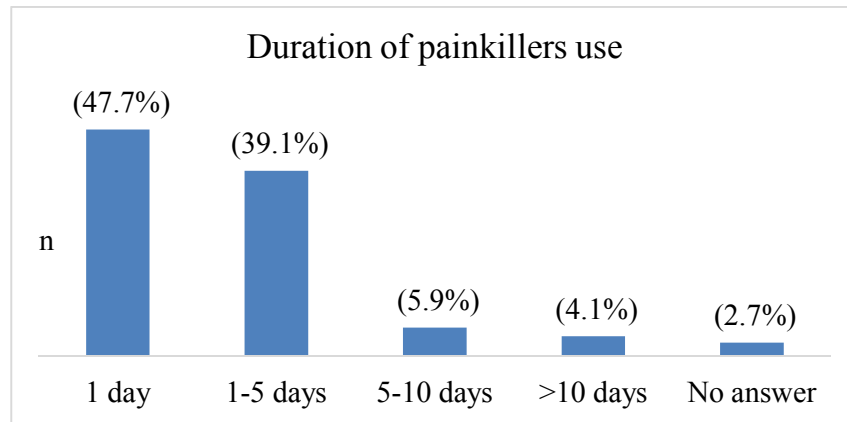


Fig. 2. Duration of use of painkillers

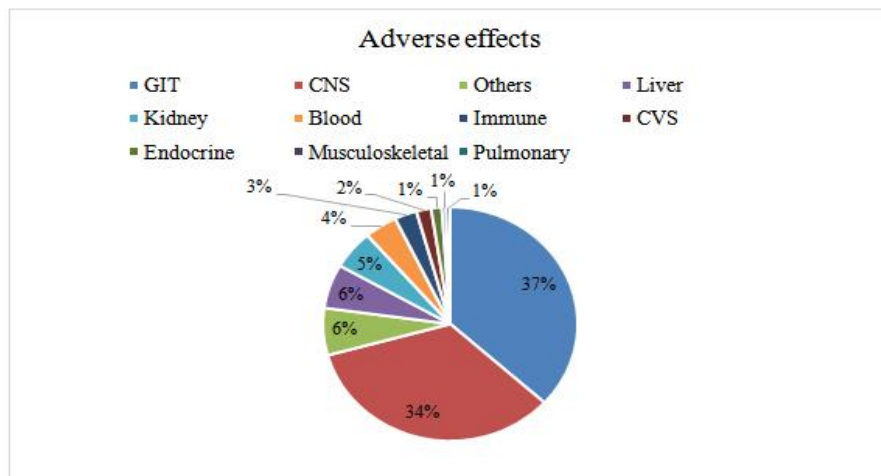


Fig. 3. Adverse effects of painkillers according to body systems mostly known by the students

* GIT: Gastrointestinal tract, CNS: Central nervous system, CVS: Cardiovascular system

Table 3. Analgesic use by the students

Items assessed		n	%
Utilization (n=379)	Yes	220	58.0
	No	159	41.9
	Paracetamol	187	47.3
Name of the painkiller commonly used (n=395)	Ibuprofen	95	24
	Aspirin	57	14.4
	Diclofenac	28	7.1
	Mefenamic acid	16	4
	Ketoprofen	4	1
	Others	2	0.5
	Unanswered	5	1.3
Indication (n=591)	Headache	179	30.3
	Fever	97	16.4
	Menstrual pain	94	15.9
	Muscle pain	62	10.5
	Toothache	59	9.9
	Abdominal pain	57	9.6
	Joint and bone pain	38	6.4
	Others	3	0.5
	Unanswered	2	0.3
Severity of recent pain (n=220)	1	3	1.4
	2	6	2.7
	3	16	7.3
	4	22	10.0
	5	43	19.5
	6	31	14.1
	7	36	16.4
	8	35	15.9
	9	15	6.8
	10	12	5.4
	Unanswered	1	0.4

Items assessed		n	%
How often (n=220)	Monthly	133	60.4
	Weekly	45	20.4
	Daily	4	1.8
	Others	38	17.3
	(when required)		
Frequency (n=220)	Once	106	48.2
	Twice	83	37.7
	Three times	25	11.4
	More than four times	2	0.9
	Four times	0	0
	Unanswered	4	1.8
Duration (n=220)	1 day	105	47.7
	1-5 days	86	39.1
	5-10 days	13	5.9
	>10 days	9	4.1
	Unanswered	6	2.7
Food (n=220)	With	171	77.7
	Without	49	22.3
Duplication (n=220)	No	199	90.4
	Yes	21	9.5
	If yes, specify	Paracetamol and Ibuprofen	
Patient information leaflet (n=220)	Yes	119	54.1
	No	100	45.4
	Unanswered	1	0.4
Factors affecting choice (n=391)	Specific indication	110	32.2
	Family/friends recommendations	93	27.3
	Certain brand name	76	22.3
	Whatever available	58	17
	Others	4	1.2

Items assessed		n	%
Dosage form (n=466)	Tablets	213	54.5
	Capsules	49	12.5
	Gel	46	11.8
	Cream	44	11.2
	Gel	24	6.1
	Cream	3	0.8
Alternative ways (n=467)	No alternatives	130	27.8
	Sleeping	100	21.4
	Heat or cold compresses	38	8.1
	Rest	28	5.9
	Tolerating pain	26	5.6
	Exercise	26	5.6
	Hot drinks	23	4.9
	Herbal medicines	18	3.9
	Massage	14	2.9
	Relaxation	11	2.4
	Traditional medication	9	1.9
	Food	9	1.9
	Hydration	9	1.9
	Shower	6	1.2
	Support from others	4	0.9
Antibiotics	1	0.2	
Other	15	3.2	

Table 4. Student awareness on painkiller use

Students' awareness	n	%	
Pain management strategies (n=392)	Self-medication	219	55.9
	Seek pharmacist's help	95	24.2
	Physicians help	76	19.4
	Unanswered	2	0.5
Long duration of therapy (n=379)	Yes	62	16.3
	No	317	83.6
Adverse effect (n=801)	Nausea	92	11.5
	Drowsiness	71	8.9
	Vomiting	58	7.2
	Liver damage	45	5.6
	Kidney failure/damage	40	4.9
	Headache	38	4.7
	Gastric discomfort	34	4.2
	Diarrhea	28	3.5
	Dizziness	26	3.2
	Peptic ulcer	24	2.9
	Abdominal pain	22	2.7
	Pain	15	1.9
	Bleeding	13	1.6
	Poisoning	11	1.4
Tolerance	11	1.4	
Mood swings	10	1.2	
Fatigue	10	1.2	
Arrhythmia	10	1.2	
Constipation	10	1.2	
Hypersensitivity	9	1.1	
Loss of appetite	8	0.9	
Dependence	7	0.9	
Anemia	6	0.7	
Immune deficiency	6	0.7	
Affects hormones	6	0.7	
Rash	5	0.6	

Students' awareness	n	%	
Cardiovascular impairment	5	0.6	
Memory problems	5	0.6	
Poor concentration	5	0.6	
Insomnia	5	0.6	
Fever	4	0.4	
Thrombosis	4	0.4	
Asthma	4	0.4	
Addiction	4	0.4	
Muscle weakness	3	0.4	
Depression	3	0.4	
Palpitations	3	0.4	
Kidney stones	2	0.2	
Acidity	2	0.2	
Gastric bleeding	2	0.2	
Tachycardia	2	0.2	
Diabetes	2	0.2	
Sweating	2	0.2	
Liver cirrhosis	2	0.2	
Nerve weakness	2	0.2	
Arrhythmia	1	0.1	
Hypotension/Hypertension	1	0.1	
Stroke	1	0.1	
Heart attack	1	0.1	
Weight loss/gain	1	0.1	
Bone resorption	1	0.1	
Others	36	4.5	
Unanswered	83	10.4	
Contraindications of analgesics (n=1551)	Bleeding	207	13.3
	Pregnancy	225	14.5
	Liver disease	208	13.4
	Renal disease	189	12.2
	Stroke	169	10.9
	Cardiovascular problems	155	9.9
	Active peptic ulcer	151	9.7

Students' awareness		n	%
	Asthma	128	8.2
	Diabetes	112	7.2
	Others	1	0.06
	Unanswered	6	0.4
Safe age for aspirin use (n=379)	>18 years	139	36.7
	10-12 years	97	25.6
	12-18 years	70	18.5
	8-10 years	37	9.7
	6-8 years	28	7.4
	4-6 years	6	1.6
	Unanswered	2	0.5
Interaction (n=379)	No	233	61.5
	Yes	146	38.5
	Examples (37.7%, n=55): Warfarin (4), ACEIs/ARBs (1), Alcohol (2), a & b blocker (3), Amphotericin B (1), Analgesics (10), Antibiotics (8), Anticoagulants (2), Antidepressant (1), Anti-inflammatory (1), Antiplatelet (2), Antipyretics (1), Benzodiazepine (1), Calcium (1), Chemotherapy (1), Coagulants (1), Corticosteroids (3), Grapefruit juice (1), H2 blockers (2), Furosemide (1), Iron (1), Muscle relaxants (1), OCs (2), Salbutamol (1), Hypnotics (1), Steroids (1), PPI (1)		
Abuse (n=379)	Yes	293	77.3
	No	85	22.4
	Unanswered	1	0.3
Storage temperature (n=379)	Room temperature	292	77.0
	Cool temperature	76	20.0
	Cold temperature	11	2.9

The association between utilization of painkillers, safety of long duration, and interactions with programs, years of study and genders is presented in Table 5. The utilization pattern among various programs, years of study and genders was not found to be significant (p value= 0.614, 0.825, 0.202, respectively). The knowledge of students in different programs and years of study did not differ significantly (p value= 0.144, 0.920, respectively), however; a significant variation in the knowledge between genders was observed (p value= 0.006). The association between the students' knowledge about interactions across all programs, years of study and genders was also found to be insignificant (p value= 0.512, 0.655, 0.572, respectively).

Similarly, the pain management strategy was compared among programs, years of study, and genders (See Table 6). No significant change between the strategies was found in all programs (p value= 0.074), years of study (p value= 0.183) and genders (p value= 0.076).

4. DISCUSSION

Self-medication with painkillers is a common practice among healthcare and non-healthcare students. In fact, analgesics are the most commonly used OTC medications among students [9,15,16]. The main advantage of self-medication is the easy access to medications, time saving and less consultation charges. In order to be beneficial and cause minimum harm, however; it should be practiced rationally.

While there were several studies conducted in the UAE that evaluated self-medication pattern among students, this study focused mainly on self-medication with painkillers. More than half of the respondent have used painkillers without any consultation. Compared to another study that was conducted in GMU in 2014, the percentage of students who used painkillers was higher in this study in 2018 [15]. The prevalence of analgesic use in GMU was lower in comparison to other universities in Saudi Arabia and Bahrain [9,16]. In the neighboring countries such as Iran, the prevalence of analgesic use among students was higher than the same in this study [11]. This is probably because of culture, tradition and higher number of available pharmacies. For example, some people from certain cultures do not tolerate pain of any severity and take painkillers instantly. Also, certain painkillers are traditionally known for specific indications in

neighboring cultures (e.g. Paracetamol for headache, etc).

Approximately half of the students who used painkillers preferred paracetamol, followed by ibuprofen and aspirin. Similar results were obtained from studies conducted in other universities in the UK, ¹² Pakistan [17], Saudi Arabia [18], Egypt [19], Mozambique [20] and Nigeria [21]. The common use of paracetamol could be explained by the variety of brands and dosage forms, its availability in all pharmacies and almost all retailers, and its economic value [22]. Also, the diversity of brand names in which paracetamol is available could have contributed to the percentage of students who choose their painkillers based on certain brand names; which is not as low compared to the higher percentages of other factors affecting the choice of analgesics.

Headache and fever were the most common symptoms for which the students used painkillers, as reported in university students in Poland [23]. Most of the respondents who have used painkillers took them monthly, once a day for a duration of one day only. Fortunately, two thirds of the students took painkillers with food, therefore avoiding the risk of Gastrointestinal - related problems. The study in Nigeria, found that less than half of the participants used painkillers with food [23]. Instructions mentioned in patient information leaflet were followed by half of the respondents, whereas in a Polish university, the students hardly read the package insert [23].

This study revealed that the two major factors affecting choice of painkillers among respondents were specific painkillers known for a specific indication, and family and friends' recommendations. In a university in the UK, students chose painkillers according to whatever is available or if a specific painkiller was known for a specific indication [12]. In the present study, half of the students practiced self-medication whenever they experienced pain, and the other half either consulted a pharmacist or a physician. In comparison, university students in Pakistan mainly relied physicians for recommendations and information about medications [17].

Eighty three percent of students were aware that painkillers should not be used for a long period of time, and the adverse effects mostly known by students were found to be nausea, drowsiness and vomiting. Similar findings were reported in a

Table 5. Association of educational programs, years of study and genders with the utilization pattern and knowledge about painkillers

Parameter			Yes	No	Chi square value	p value
Utilization	Program	MBBS	76	51	7.223	0.614
		Pharm.D	28	15		
		DMD	49	37		
		BPT	16	12		
		BBMS	17	11		
		MLS	6	10		
		MIS	5	7		
		AST	5	5		
		BSN	5	1		
		ADPCS	12	10		
	Year of study	1	69	46	1.510	0.825
		2	60	48		
		3	60	49		
		4	13	7		
5		17	10			
Gender	Female	139	92	1.631	0.202	
	Male	77	67			
Safety of long duration	Program	MBBS	16	109	13.422	0.144
		Pharm.D	4	39		
		DMD	16	68		
		BPT	3	25		
		BBMS	7	21		
		MLS	3	13		
		MIS	5	7		
		AST	3	7		
		BSN	1	5		
		ADPCS	2	20		
	Year of study	1	17	95	0.931	0.920
		2	19	88		
		3	19	90		
		4	3	17		
5		3	24			
Gender	Female	28	203	7.590	0.006	
	Male	33	111			
Interactions	Program	MBBS	50	75	17.158	0.512
		Pharm.D	25	18		
		DMD	28	57		
		BPT	12	16		
		BBMS	9	19		
		MLS	2	14		
		MIS	3	9		
		AST	4	6		
		BSN	3	3		
		ADPCS	10	12		
	Year of study	1	46	66	5.929	0.655
		2	40	66		
		3	37	72		
		4	10	10		
5		13	14			
Gender	Female	93	137	1.116	0.572	
	Male	53	91			

Table 6. Association of educational programs, years of study and genders with pain management strategies

Parameter			Self-medication	Pharmacist's help	Physician's help	Chi square value	p value
Pain management strategy	Program	MBBS	73	23	28	38.250	0.074
		Pharm.D	31	12	0		
		DMD	41	25	17		
		BPT	15	7	6		
		BBMS	15	7	6		
		MLS	9	6	1		
		MIS	9	2	1		
		AST	3	1	6		
		BSN	6	0	0		
		ADPCS	14	3	5		
Year of study	Year of study	1	58	24	30	16.184	0.183
		2	67	22	18		
		3	61	27	19		
		4	12	6	2		
		5	19	7	1		
Gender	Gender	Female	142	52	37	6.868	0.076
		Male	75	34	33		

study conducted in Poland among students [23]. On the other hand, another study about the use pattern and knowledge of painkillers done in Nigeria found that the most commonly known adverse effect was heartburn [21]. Contraindications to painkillers that were the most known by students were pregnancy, liver disease and bleeding. The fact that most of them consider pregnancy as a contraindication could be because of a knowledge gap, as almost all the students who participated in this study were unmarried and not exposed to pregnant women. In this study, more than half of the students were not aware of painkillers' interactions with other medications. A study in Saudi Arabia contradicts our findings, where more than half of the students knew about interactions of analgesics [18].

The study had a few limitations. The calculated sample size of the study was 400. However, only 379 students were enrolled because of their unavailability at the study setting at the time. Also, less students from College of Nursing were involved because of their different class schedule. The number of females in our study was higher compared to males. Furthermore, the study was conducted during mid-semester examinations, which might had influenced the students' responses.

Based on the study findings, we recommend conducting workshops and other educational programs and activities for students regarding

the rationale self-medication with analgesics. If further studies addressing this topic would be done, we recommend choosing a larger sample size and focusing on the self-medication aspect to get more information about the utilization pattern and knowledge about painkillers.

5. CONCLUSIONS

In this study, it was found that more than half of the students in our university use painkillers without professional consultation. However, the utilization pattern was rational as most of them used painkillers on a monthly basis and took them appropriately, not exceeding 10 days and with food. Paracetamol was the most commonly used analgesic mainly for headache and fever. Most of the students were familiar with the gastrointestinal-related adverse effects of painkillers and safe duration of their use. Furthermore, a notable number of students were not aware of interactions of painkillers with other medications.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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