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Measuring the extent of pain by using over-the-counter medications and its consequences towards pharmacy students: A cross-sectional survey

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ABSTRACT

Pain management is important for many individuals who suffer from constant or periodic pain, especially for students. However, Self-medication and Over-the-counter medication due to its accessibility to most of the patients have become the first choice of many students around the world to manage their pain during their study period. However, lack of knowledge among the students may result in unpleasant consequences which may affect the student's performance. Worldwide many investigations occurred to assess the students' approach to deal with the pain using several available strategies. This study research was done to examine the extent of pain by using over-the-counter medication (OTC) among College of Pharmacy students at Umm Al-Qura University. To investigate the student pain management strategies, a cross-sectional questionnaire has been constructed and distributed to students. The results showed 97% of female students tend to use OTC to deal with the pain. Among these students, 19% were suffering from chronic pain and they have been using NSAIDs and acetaminophen to control their pain. Furthermore, pain management is vital for the student to improve their performance and retain their education outcomes with the best results.

Keywords: Pain, Pain management, OTC medication, Over- the- Counter medicines, self-medication, Pharmacy students

1. INTRODUCTION

Pain was defined by IASP as "an unpleasant sensory and emotional experience related to or explained in terms of existing or potential tissue damage". Pain has a wide range of severity, quality, and duration, as well as a

variety of pathophysiologic processes (Raja et al., 2020). The method through which a harmful input in the body is interpreted as painful by the brain is complicated and not entirely understood. The process's intricacy stems from the nervous system's plasticity, which allows it to adjust its function under varied settings rather than being a 'hard wired' system (Loeser & Melzack, 1999).

Acute pain, chronic pain, neuropathic pain, nociceptive pain, and radicular pain are the five most prevalent forms of pain. Chronic pain lasts for a longer period. It might be either continuous or intermittent. Headache for instant classified as chronic pain if they last for months or years - even if the discomfort is not constantly present (Neuhäuser et al., 2010; Perrot et al., 2019). Long term pain is frequently caused by a medical disease such as rheumatic or bone disorders. Acute pain is a discomfort that lasts for a little period (from minutes to around 90 days and up to 184 days). Sudden pain is often associated with an injury to soft tissue or a short sickness, and it usually goes away after the damage or illness cures. Sudden pain from accident can progress to chronic pain if the damage does not heal properly or if the pain signals fail (Schmidt, 2021; Bennadi, 2013).

Radicular pain is a form of pain that occurs when the spinal nerve becomes crushed or irritated. It travels through the spine and spinal nerve roots from the back and hip to the leg(s). Radicular discomfort patients may suffer tingling, numbness, and muscular weakness. Radiculopathy refers to pain that can start from behind the back and into the feet. The pain is frequently referred to as sciatica since it is caused by an injury to the sciatic nerve. This sort of pain is frequently constant and can be felt inside in the leg. Activities as walk, sit, and other activities might aggravate the sciatica. The common prevalent type of radicular pain is sciatica (Blenkinsopp & Bradley, 1996; Mahzari et al., 2019).

Nociceptive pain is a form of pain induced by tissue injury. People frequently describe it as a sensitive, painful, or throb like pain. It is frequently caused by an outside injury. One may experience nociceptive pain if he/she whacks their elbow, stub their toe, twist their ankles, or tumble and scrape up their knees. This kind of pain is commonly felt in the joints, muscles, skin, tendons, and bones, and it might be acute or persistent (Ibrahim et al., 2014; Albasheer et al., 2016). Nerve damage or other components of the nervous system causes neuropathic pain. It is frequently characterized as shooting, stabbing, or searing pain, or as pins and needles. It can also impair touch sensitivity and make it harder to experience hot or cold sensations.

Neuropathic pain is a kind of persistent pain that is widespread. It might be for some period or severe enough to make completing daily duties difficult. Because pain can impair normal movement, it can also create mobility difficulties (Marchettini et al., 2006; Finnerup et al., 2007; Yoon & Oh, 2018). Analgesic medication is used to prevent physical pain and they are the largest group used over-the--the-counter (OTC). Their risk/benefit ratio is favorable when used correctly. While using any type of analgesia (opioids, acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs) start at low dose and stop at the lowest effective dose for all but mostly in the elderly and patients with kidney diseases to ensure patient safety.

Adjuvants thereby could be used such as antidepressants, muscle relaxants, and antiepileptic drugs (AEDs) (White, 2017; Katz et al., 2015; Sentürk et al., 2002). Acetaminophen wrought to reduce pain with no anti-inflammatory effect. The mechanism of action involves inhibition of PG synthesis in the central nervous system (CNS), which results in reducing pain impulse generation (Naylor et al., 2010; Forero et al., 2016). However, for some populations like children, elderly, pregnancy, breastfeeding, and patients who have chronic diseases like high blood pressure and diabetes, the using of OTC medication are not necessarily safe and effective to them, as it might bring some unpleasant side effects and complications. There are some of OTC medications that have serious side effects, drug-drug or drug-food interactions, and contraindications or precautions. However, in Saudi Arabia, the rate of self-medication was reported to be around 81.4% of the population having used medication without proper medical advice (Khan et al., 2018; Nandita et al., 2021; Alghamdi et al., 2020).

A study conducted at King Abdul-Aziz University in Jeddah, reported that alarming rates of analgesic self-medication among students from medical colleges. The study recommended further studies to assess students' knowledge and skill in this regard (Malebari et al., 2020). Another study was done at Jizan University revealed that self-medication was common among medical students. However, there are no studies conducted in Umm Alqura University, therefore, this study aims to investigate the extent of pain by using over-the-counter medications and its consequences towards pharmacy students at Umm Al-Qura University in Makkah, Saudi Arabia.

2. MATERIALS AND METHODS

This cross-sectional study was done using Google form-based questionnaire targeting college of Pharmacy students at Umm Al-Qura University. The study data was collected during the academic year 2021-2022 as the study sample was obtained from the responses of fourth year students (n = 80), fifth year students (n = 121), and sixth year students (n = 101). Participants were informed about their rights and the privacy of the information will be collected for this study before their participation in the survey. However, the participation was not obligatory, and the identity of all participants was hidden and not revealed during all stages of

this study. Students who did not attend the class on the questionnaire day were excluded from the study. Umm Al-Qura University Institutional Review Board assessed the ethics and approved of the study (HAPO-02-K-012-2021-10-786).

The questionnaire constructed for this study was adapted from a previous study done by Breivik et al., (2006). The survey consisted of 24 questions divided into four sections. The first section (five items) asked how often students suffered from pain, and how intense the pain was, and how the pain was tolerated and located. Participants who did not have any pain or did not remember their pain was considered in the no group pain. Students who suffered from pain were asked about the duration of pain, was it sudden, acute, or for a long time. The second section (seven items) investigated how students manage their pain and what are the OTCS they used and the efficacy of this medication. The third part included 7 questions assessing the outcomes of pain management processes.

The collected data were applied into a Microsoft Excel (2018) spreadsheet according to a codebook for analysis. Students were grouped into one of three groups based on pain intensity level (acute pain, chronic pain, or no pain) for analysis. Data were compared using independent t-tests for continuous variables (pain intensity, level of pain tolerated, pain level using pain management strategies, and number of emergency department (ED) visits) and either a chi-square test or Fisher's exact test (if the expected value of any one of the cells was below five) for categorical variables. Every analysis was performed using SPSS (IBM SPSS, v23, Armonk, NY, USA).

3. RESULTS

A total of 302 female pharmacy students participated with a response of 100%. The Responses divided pain intensity into three main groups as acute, chronic, and no pain (Table 1). Table 1 showed students having acute pain (79.4%) than chronic pain (14.5%), however, 5.9% of students denied any pain. Most participants were aged from 18 to 25 (82%). There were not any significant differences in basic characteristics (age and years in program) between the acute, chronic, and no pain groups ($p > 0.05$). Back pain was the most experienced pain by the students (acute, 51%; chronic, 33%), followed by headache (acute, 33%; chronic, 12%) and abdomen (acute, 11%; chronic 10%). There were no significant differences between the acute and chronic pain groups on the location of pain. Pain intensity was significantly greater in the chronic pain group (mean = 4.7, SD = 1.6) than in the acute pain group (mean = 4.1, SD = 1.0; $p = 0.023$), the level of pain tolerated was not significantly different between the chronic pain group (mean = 5.3, SD = 1.6) and acute pain group (mean = 5.2, SD = 1.8; $p = 0.444$) as shown in Figure 1.

Table 1 Demographic characteristics results of respondents (n=302)

	Acute	Chronic	No Pain	*p* Value
Total Number (*n* = 302)	240 (79.4%)	44 (14.5%)	18 (5.9%)	
Age	*n* (%)			
18–25	197 (82%)	32 (72%)	15 (83%)	0.766
26 and above	43 (18%)	11 (28%)	3 (17%)	
Year in program *n* (%)				
Fourth year	78 (32.5%)	10 (22.7%)	11 (61%)	0.367
Fifth year	77 (32%)	25 (56.8%)	5 (27.7%)	
Sixth year	85 (35.4%)	9 (20.4%)	2 (11%)	
Intensity of Pain mean (SD) [1]	4.1 (1.0)	4.7 (1.6)	-	0.023 [2]
Tolerability of pain mean (SD) [1]	5.3 (1.8)	5.2 (1.6)	-	0.444

[1]The scale from 0 (no pain) to 10 (worst pain); [*]$p < 0.05$

Female pharmacy students used different ways to reduce or manage their pain which shown in Table 2, Figure 2 and 3. Almost 97% of them used medications and the rest were using a combination of medical and nonmedical ways such as exercise, hot or cold baths. Pain was especially difficult for the female students in the form of chronic pain as they used an average of 7.2 (SD = 3.9) pain management strategies, while students with acute pain used an average of 4.5 (SD = 1.7) pain management strategies. Among the chronic group, with the most common method for managing pain, 36.6% of students identified NSAID use, 4.5% acetaminophen, and 4.5% were using the rest of the treatment strategies. For the acute group, 61.2% were using NSAIDs, 9% used acetaminophen, and 3.3% using rest of the strategies.

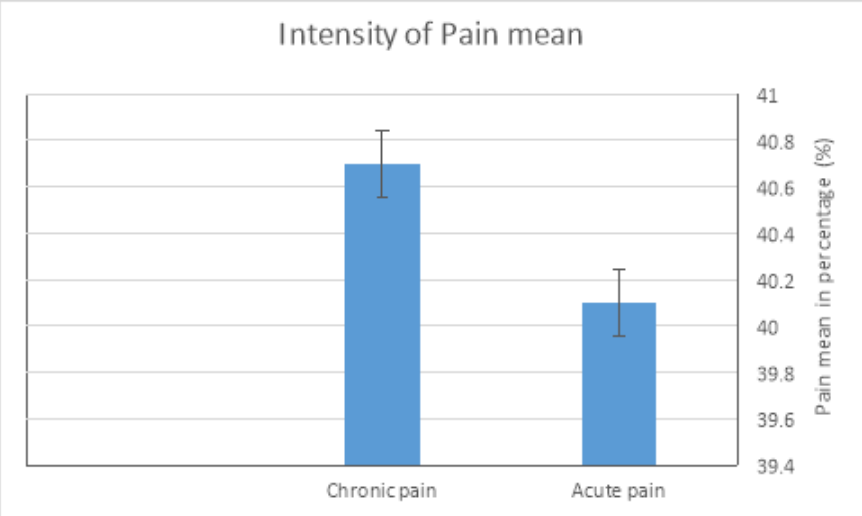

Figure 1 Intensity of pain mean between acute and chronic pain. (N=302, P<0.05)

Table 2 Medical and nonmedical strategies used by student pharmacists for the self-management of pain.

	Acute *n* (%)	Chronic *n* (%)	*p* Value
Total Number	240 (81)	44 (19)	
NSAIDs	147 (61.2%)	16 (36.6%)	0.001 *
Muscle relaxants	7 (3%)	2 (4.5%)	0.480
Physical therapy	6 (2%)	9 (20.4%)	0.324
Steroid injections	4 (1.6%)	2 (4.5%)	0.241
Acetaminophen	22 (9%)	2 (4.5%)	0.002*
Aspirin	5 (2%)	2 (4.5%)	0.533
Herbal/dietary supplements	4 (1.6%)	2 (4.5%)	0.244
Rest	8(3.3%)	2 (4.5%)	0.470
Relaxation/stress reduction	5 (2%)	3 (6.8%)	0.210
Hot/cold packs	5 (2%)	1 (2.2%)	0.040
Hot baths/showers	4 (1.6%)	1 (2.2%)	0.140
Massage	4 (1.6%)	1 (2.2%)	0.130
Avoid specific activities	3 (1.25%)	1 (2.2%)	0.220

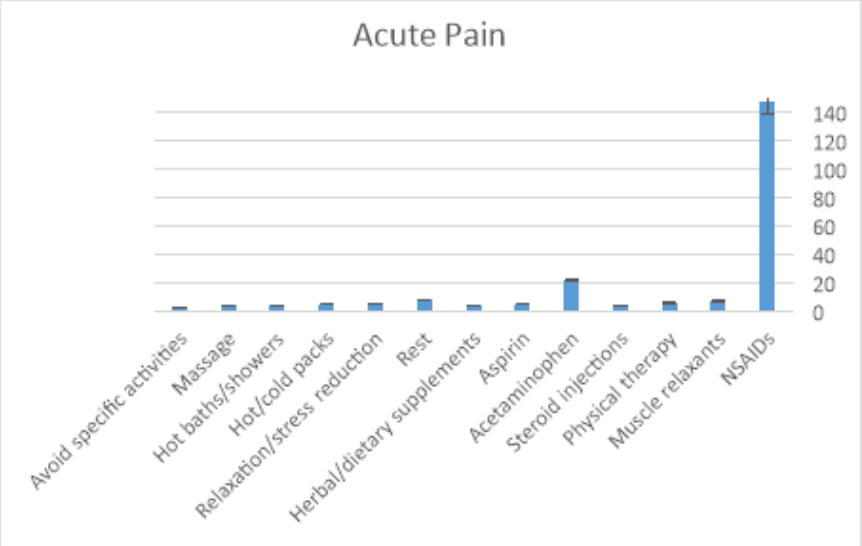

Figure 2 Medical and nonmedical strategies used by student pharmacists for the self-management of pain, Acute pain.

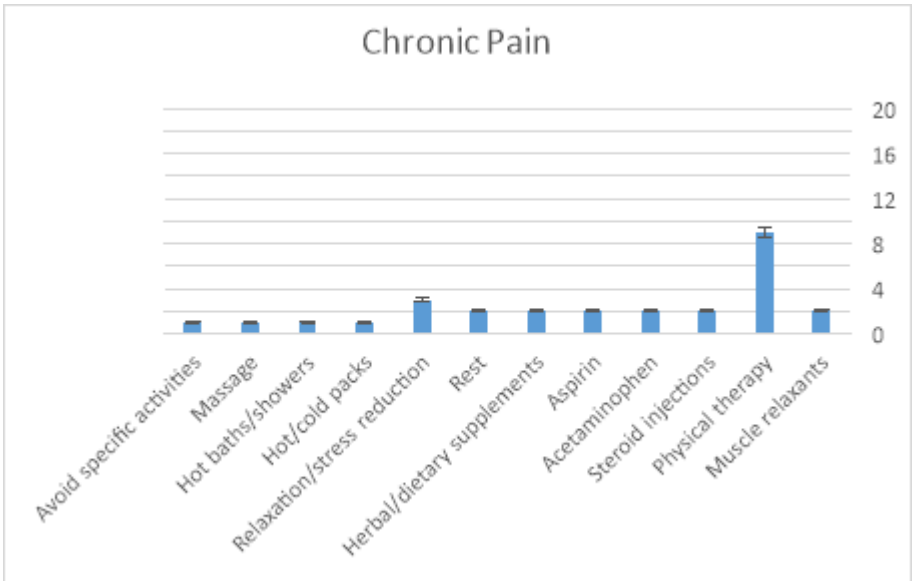

Figure 3 Medical and nonmedical strategies used by student pharmacists for the self-management of pain. Chronic Pain

Table 3 demonstrated the outcomes that were reported by the female students using pain management strategies. More than half of the students (83.7%) were unsatisfied with their pain management strategies. Around 17% of the students experienced side effects, and 26.6% reported poor or fair health status. The mean level of pain when using pain management strategies was similar between the acute pain group (2.0, SD 1.0) and the chronic pain group (3.1, SD 2.3). Around more than half of the students reported that to some extent, their pain prevented them from activities, leisure, and attending college. There were significantly more students with chronic pain towards daily activity than acute pain ($p = 0.004$) as shown in Figure 4. Moreover, students with chronic pain (mean = 0.5, SD = 0.1) also reported a significantly greater number of visits to the ED in the past five years due to pain compared to participants with acute pain (mean = 0.1, SD = 0.5; $p = 0.002$).

Table 3 Student pharmacists reported outcomes of pain self-management strategies.

	Acute	Chronic	*p* Value
Total Number (*n* = 173)	240 (81)	44 (19)	
Satisfaction with current pain management strategies *n* (%)			
Not/Somewhat/Moderately	141 (58.7%)	11 (25%)	0.324
Satisfied	111 (4.5%)	10 (22.7%)	
Very	12 (5%)	23 (9.5%)	
Side effects experienced with current pain management *n* (%)			
Yes	20 (8.3%)	4 (9%)	0.411
No	220 (91.6%)	35 (79.5%)	
Overall health status *n* (%)			
Poor/Fair	31 (13%)	6 (13.6%)	0.056
Good/Excellent	209 (87%)	38 (86.3%)	
Effect of pain on ability to perform daily activities *n* (%)			
Somewhat or less	122 (50.8%)	33 (57%)	0.004*
Quite a bit/very much	118 (49.1%)	11 (43%)	
Effect of pain on ability to participate in *different* activities *n* (%)			
Somewhat or less	230 (96%)	33 (57%)	0.325
Quite a bit/very much	10 (4%)	11 (43%)	
Effect of pain on ability to study *n* (%)			
Somewhat or less	233 (97%)	31 (55%)	0.163
Quite a bit/very much	7 (3%)	13 (45%)	

Effect of pain on ability to attend college *n* (%)			
Somewhat or less	211 (87%)	30 (54%)	0.226
Quite a bit/very much	29(13%)	14 (46%)	
Effect of pain on relationships with other people *n* (%)			
Somewhat or less	202 (84%)	32 (56%)	0.693
Quite a bit/very much	38 (16%)	12 (46%)	
Level of pain when pain strategies employed mean (SD) [2]	2.0	3.1	0.441
Emergency department visits in last 5 years due to pain mean (SD)	0.1	0.5	0.002 *

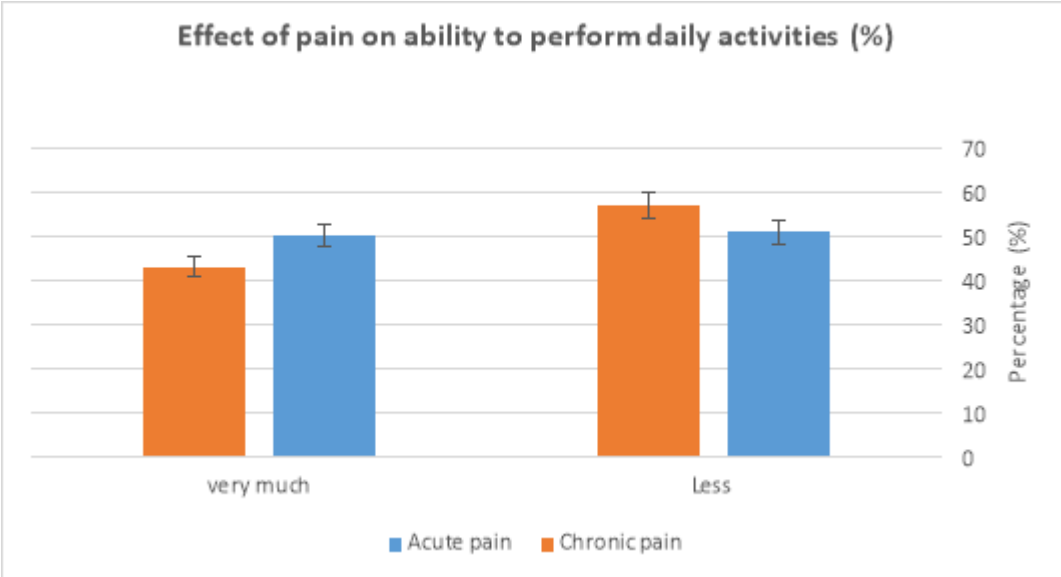

Figure 4 Effect off pain on the ability to perform daily activities (N=302, P<0.05).

4. DISCUSSION

The main aim of this research was to investigate and measure the extent of pain by using over-the-counter medications and its consequences towards female pharmacy students at Umm Al-Qura University in Makkah, Saudi Arabia. Our results showed that 19% of the students suffered from chronic pain in the past six years during their undergraduate studies that resulted in problems with their college attendance and ability to perform some activities. Our study also showed that more than half of the students used different ways to relief their pain, medical and nonmedical or both, which resulted in large stress during their study time. Moreover, in both groups the main medication was used by the students to relief pain was NSAID.

Our study findings were similar to previous studies which measured the extent of pain among students. A study done in the UK stated that around 14% of the students suffered from chronic pain (Breivik et al., 2006; Mallen et al., 2005). A study in the USA reported that about 19% of the pharmacy students complained of chronic pain for about five years. Moreover, like our study, all these students suffered from chronic pain, this had an effect towards their work, reported that 13% of the participants who suffered from chronic pain had a bad impact towards their work (Stewrat et al., 2003). Our findings are important to enhance the educational process and to encourage universities to assess the prevalence of pain among students to help to improve the study environment which will reflect positively on the student's performance.

Our results reported that the most common site for pain was backache; this was different than other studies that reported headache as the comment site of pain in students (Axon et al., 2017; Hirsh et al., 2014). Back pain can be due to stress and setting for a long period of time for studying and attending classes. Students in our study used different strategies to relief or decrease their pain; they did not seek medical attention unless it was very unbearable. The most common type of OTC they used were NSAIDS and acetaminophen. These results were parallel to other studies (Blyth et al., 2005; Takai et al., 2015). In our study, we found that some of the students use non- medical ways such as herbal, meditation and hot or cold packs to relieve their pain. This has an impact on student knowledge and awareness about other strategies that might be used rather than medication only. University and

college personnel must have a vital role in educating their students towards the use of different strategies to relieve their pain without harming themselves for the long-term period.

Our study had some limitations as the survey did not go through the causes of pain and when and how it started in detail. In the future, detailed assessment might be quite helpful to assess the source of pain and to give some advice to students when to seek medical attention. Another limitation is that this study did not assess the exact amount of OTC was taken and the treatment duration, which may help the students to manage their pain successfully.

5. CONCLUSION

Our study showed that female pharmacy students suffered from chronic pain in the past six years during their undergraduate studies at the university. The pain affected their academic performance and participating in extracurricular activities. NSAIDs and Acetaminophen were the most common OTC medications used. Future recommendation is to educate junior students to increase their knowledge about pain management and to choose the suitable OTC medication and does not impede their academic performance.

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Author Contribution

All Authors contributed equally to study conception, supervision, project administration, literature review and writing/ manuscript preparation: writing the initial draft, data collection, formal analysis and data presentation, data collection and revision.

Ethical Approval

The study was approved by the Medical Ethical Committee of Umm Al-Qura University with number (HAPO-02-K-012-2021-10-786).

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This study has not received any external funding.

Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

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

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