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ORIGINAL ARTICLE

A Cross-Sectional Study on Pain Prevalence, Management and Interference among University Students in a Malaysian Public University

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ABSTRACT

Introduction: Pain is common among university students, and if left unmanaged, it can greatly hinder productivity, academic, mood, and social life. Identifying the prevalence of pain and evaluating the effectiveness of pain management methods among university students are crucial steps in assessing the need for a pain management program. This study aims to assess pain prevalence among university students, analyse the pain management methods, and evaluate the impact of pain on different aspects of students' lives. **Methods:** This cross-sectional study was conducted through an online questionnaire consisting of five sections and involved a convenience sampling of 380 Universiti Malaya students. The statistical tests used were descriptive and inferential analysis (i.e. chi-squared test, Kruskal-Wallis test). **Results:** The overall pain prevalence in the last 30 days was 82.1%, with 1.3% of the cases being chronic pain lasting more than three months. Females are more likely to experience pain ($p < 0.001$). Headache, musculoskeletal pain and period pain were the most commonly experienced pain by the students. About 72% of the participants who reported pain used pharmacological methods, and about 88% used non-pharmacological methods. However, 23.1% of the pain sufferers did not take any action to address their pain. Mood and daily functioning were the aspects of life that are most affected when in pain. **Conclusion:** The high prevalence of pain and the presence of unmanaged pain among a proportion of the students suggest that the introduction of a pain management program would be highly advantageous for university students.

KEYWORDS: acute pain, chronic pain, pain management, pain interference, university students

INTRODUCTION

Pain represents a significant global health concern affecting individuals of all ages, including university students. It can be categorised into acute and chronic forms. Acute pain refers to sudden-onset discomfort expected to subside within a short timeframe, usually up to seven days [1,2]. However, e xtensions of this period, not exceeding three months from the pain's initiation or injury, are common [2]. Chronic pain persists beyond the resolution of the underlying injury or disease and is often considered a distinct ailment rather than a symptom. Chronic pain is characterised by its persistence or recurrence for a minimum duration of three months [3].

Recent findings reveal that chronic pain affects a notable proportion of young adults, with up to one in five individuals under 30 experiencing this condition [4]. The potential progression of mismanaged acute pain into chronic pain further magnifies its adverse effects, prolonging suffering and repercussions [5]. Insufficiently managed acute or chronic pain can profoundly impact a student's physical and mental well-being, academic performance, and overall quality of life [6]. Research consistently highlights the challenges faced by students dealing with pain, including reduced concentration (72%), compromised performance (46%), decreased motivation (66%), and lower-class attendance (26%) [7]. University students often self-

medicate using over-the-counter remedies due to cost-effectiveness and time-saving benefits [8]. In Saudi Arabia, a study revealed that 98%s (n = 365) of students practised self-medication. Meanwhile, in the Klang Valley, Malaysia, self-medication prevalence among adults was 63.5% (n = 356) [9]. Notably, a significant portion obtained medications without consulting pharmacists (68.6%), relying on leftover supplies (44%) or acquiring them from family and friends (16%). However, self-medication raises concerns, including delayed diagnoses, improper dosing, drug interactions and overuse, potentially exacerbating underlying health issues [6].

An analysis of three surveys of pain in 14 countries across Europe, the Americas, Australia, and Asia revealed that 65% delayed pain treatment, often avoiding medication [10]. In Malaysia, a study on undergraduates revealed that neglecting symptoms was the most common response to minor ailments [11]. This leaves university students susceptible to adverse effects from inadequate pain management. Within Malaysia's academic landscape, pain prevalence studies showed musculoskeletal pain (MSP) in 45.7% of medical students [12], 25.5% lower back pain (LBP) among health science students [13], and 54.0% LBP among medical students [14]. Therefore, MSPs and LBPs are notably prevalent among Malaysian university students.

To the best of our knowledge, the field of pain management investigation in Malaysia remains lacking, leaving a considerable gap in our knowledge regarding the wide array of pain conditions and the strategies employed for their management. In light of these gaps, this cross-sectional study investigated the prevalence of acute and chronic pain among Universiti Malaya students. Moreover, it aimed to uncover the pain management strategies employed by the students and their perceived effectiveness, while also evaluating the extent to which pain disrupts the students' daily lives. In addition, the study aimed to explore how different durations of pain and different pain management behaviours may influence the level of pain interference with the students' lives.

MATERIALS AND METHODS

Study Design and Settings

A cross-sectional study was conducted through an anonymous online questionnaire using an online platform. The study was conducted from March 2023 to May 2023 at Universiti Malaya (UM), Kuala Lumpur, Malaysia. The human research ethics was approved by the University of Malaya Research Ethics Committee (UMREC).
(Reference number: UM.TNC2/UMREC_2307).

Subjects

The study included UM students in Session 2022/2023 who are able to read and understand English. The respondents consisted of foundation studies, undergraduate and postgraduate students from various faculties and study programs. A subset of respondents was excluded due to discrepancies in their survey responses. Specifically, participants who selected certain pain management method(s), but in the subsequent question provided effectiveness ratings for other non-selected method(s) were excluded. The sample size was calculated using the Sample Size Calculator by Raosoft, Inc. (2004) [15]. The following is the formula used to calculate the sample size:

Unlimited population: $n = \frac{z^2 \times p(1-p)}{\varepsilon^2}$

Finite population: $n' = \frac{n}{1 + \frac{z^2 x\, p(1-p)}{\varepsilon^2 N}}$

Where,
z is the z-score
p is the population proportion
ε is the margin of error
N is the population size

The population size which took into account the number of foundation studies, undergraduate and postgraduate students was obtained from Universiti Malaya's Academic Administration and Services Department (AASD). With a margin of error of 5%, confidence interval of 95%, z-score of 1.96, response distribution of 50% and a population size of 29,058, the calculated sample size was 380 participants.

Vol 10(1) (2025) 14-28 | jchs-medicine.uitm.edu.my | eISSN 0127-984X
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Study Tool

The structured online questionnaire was constructed in English and was adapted from previous similar studies [6,16]. The questionnaire consisted of five sections. The first section consisted of five demographic-based questions which included gender, age, ethnicity, level of study and faculty. In Section B (Pain Prevalence), respondents were asked about pain in the past 30 days. If experienced, they proceeded to select pain type and duration. Participants without pain were directed accordingly. In Section C (Pain Intensity), respondents rated pain (0-10) in eight body areas using the Universal Pain Assessment Tool (UPAT) [17]. Section D (Pain Management and Their Perceived Effectiveness) involved indicating immediate treatment, waiting, or no action while rating pharmacological and non-pharmacological methods' effectiveness (0-5). Section E (Pain Interference) required rating pain's impact on 10 aspects of life (0-5), including daily functioning, academic performance, mood, relationships, and more. The scale ranged from 0 (indicating no interference) to 5 (denoting completely interferes).

Validity and Reliability

The questionnaire was reviewed by a panel of experts to ensure the validity of the questionnaire. The panel of experts consisted of three lecturers with clinical backgrounds (i.e. clinical pharmacy and clinical pharmacology) and a community pharmacist. This is followed by a pilot study consisting of 30 students to ensure the comprehensibility of the questions. The questionnaire was amended according to the feedback obtained from the panel of experts and participants. The results from the pilot study were excluded from the main study. The Cronbach's alpha of the pain intensity scale and pain interference scale are 0.81 and 0.92 respectively. Therefore, the scales used have high internal consistency.

Data Collection

The sampling method used in the study was convenience sampling. The data was collected using an online questionnaire by a mixed mode, i.e., face-to-face and online modes. Face-to-face data collection was done by approaching UM students on campus (i.e., in cafeterias, libraries, bus stops and student lounge areas of faculties in UM). Students who agreed to participate in the study were asked to scan a QR code to access the online questionnaire. For the online mode, the questionnaire link was distributed via emails and social media platforms (i.e., Telegram, WhatsApp, Facebook). The first page of the questionnaire elaborated on the purpose of the research, confidentiality and e-consent form. The link to the Participant Information Sheet was also attached to the introductory page. Consent was obtained when the participants clicked "I agree". The participants took less than five minutes to complete the questionnaire.

Data Analysis

The data were analysed in the IBM Statistical Package for the Social Sciences (SPSS) Software Version 29.0 (IBM Corporation, Armonk, New York, U.S.). The demographic characteristics were reported as percentages and frequencies. Continuous data were expressed as mean ± standard deviation (SD) or median (Interquartile range, IQR) if the data were not normality distributed. The normality of data was determined by the Kolmogorov–Smirnov test. The pain intensities in different body areas, the perceived effectiveness of the pain management methods as well as the levels of pain interference were not normally distributed. The significance level was set to less than 0.05. Independent t-test was used to assess the difference in continuous variables (i.e., age) between the pain group and no pain group. Chi-squared ($\chi 2$) test or Fisher's exact test (when the frequency of respondents was less than five for any category) was performed respectively to determine the association between categorical groups, such as gender and ethnicity. Kruskal-Wallis tests were performed to compare the perceived effectiveness level across different types of pharmacological pain management methods. Kruskal-Wallis test was also performed to identify whether different groups of pain durations and pain management behaviours have different effects on the levels of pain interferences. This is followed by Dunn's post-hoc test with Bonferroni's corrections for significant Kruskal-Wallis test results.

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RESULTS

A total of 380 UM students were recruited in this study. Table 1 shows the demographic characteristics of the participants. The mean age of the participants was 21.7 ± 1.77 years. The majority of the participants were female (69.5%), Malay (70.8%) and undergraduate students (96.6%) from various fields of study. The mean age of students with pain (21.8 ± 1.85) was significantly higher than those without pain (21.3 ± 1.29) (p = 0.038). Females (76.3%) were more likely to have pain compared to males (23.7%) (p < 0.001). There is a statistically significant association (p = 0.03) between the field of study and the presence of pain, whereby students from the health and medical sciences field (36.5%) were more likely to experience pain compared to those from other fields: Engineering, science and technology (27.9%), Arts, humanities and social sciences (24%), Business and economics (6.4%), Built environment (4.5%) and Others (0.6%).

Table 1 Demographics of the respondents and their pain characteristics

Demographic	Total (n = 380) (n, %)	Pain group (n = 312) (n, %)	No pain group (n = 68) (n, %)	p
Age (mean ± SD)	21.7 ± 1.77	21.8 ± 1.85	21.3 ± 1.29	0.038[a]
Gender				
Male	116, (30.5)	74, (23.7)	42, (61.8)	< 0.001[b]
Female	264, (69.5)	238, (76.3)	26, (38.2)	
Nationality				
Malaysian	375, (98.7)	308, (98.7)	67, (98.5)	1.000[c]
Non-Malaysian	5, (1.3)	4, (1.3)	1, (1.5)	
Ethnicity*				
Malay	269, (71.7)	229, (74.4)	40, (59.7)	0.501[b]
Chinese	79, (21.1)	58, (18.8)	21, (31.3)	
Indian	19, (5.1)	14, (4.5)	5, (7.5)	
Others**	8, (2.1)	7, (2.3)	1, (1.5)	
Level of study				
Foundation	3, (0.8)	3, (1.0)	0, (0)	0.348[c]
Undergraduate	367, (96.6)	299, (95.8)	68, (100)	
Postgraduate	10, (2.6)	10, (3.2)	0, (0)	
Field of Study				
Health and medical sciences	127, (33.4)	114, (36.5)	13, (19.1)	0.030[c]
Engineering, science and technology	117, (30.8)	87, (27.9)	30, (44.1)	
Business and economics	25, (6.6)	20, (6.4)	5, (7.4)	
Built environment	15, (3.9)	14, (4.5)	1, (1.5)	
Arts, humanities and social sciences	94, (24.7)	75, (24.0)	19, (27.9)	
Others	2, (0.5)	2, (0.6)	0, (0)	

[a] Independent t-test, [b] Pearson's Chi-squared Test, [c] Fisher's Exact Test
*Applicable to Malaysian students
**Includes Iban, Kadazandusun, Kelabit and Melanau
SD = standard deviation.

Vol 10(1) (2025) 14-28 | jchs-medicine.uitm.edu.my | eISSN 0127-984X
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Pain Characteristics of the Participants

Table 2 summarises the pain characteristics of the study sample. The majority (82.1%) of the participants experienced pain in the last 30 days. Among these participants, 98.7% reported acute pain, while 1.3% of them experienced chronic pain i.e., pain lasting beyond three months. In terms of pain duration, more than half of the participants (55.1%) experienced pain for 1 to 7 days. Among those who experienced pain, it was found that 38.8% took immediate action to manage their pain, while 38.1% delayed pain management. Meanwhile, 23.1% of them did not take any action to relieve their pain.

Headache (67.6%), MSP (46.2%), and period pain (36.5%) were the top three pain experienced by the participants (Table 2). In terms of pain intensity, the head was found to be the most frequently reported as a painful body area (78.5%) with the highest median pain intensity level i.e., 3 (IQR = 4). This is followed by the abdomen and stomach area (73.1%) as well as the back and waist area (72.8%) both with median pain intensity of 2 (IQR = 4). These findings indicate that these three body areas have a substantial spread of reported values, with a significant portion of the reported pain intensities falling in the higher ranges compared to other body areas.

Table 2 Pain characteristics of the respondents

Characteristics	n	%		
Pain prevalence				
Experienced pain in the last 30 days	312	82.1		
Did not experience pain in the last 30 days	68	17.9		
Pain Duration				
Less than one day	126	40.4		
1 to 7 days	172	55.1		
8 to 30 days	8	2.6		
1 to 3 months	2	0.6		
More than 3 months	4	1.3		
Pain Management Behaviour				
Immediately treated the pain	121	38.8		
Waited to treat the pain	119	38.1		
Did not take any action	72	23.1		
Pain Experienced				
Headache	211	67.6		
Musculoskeletal pain (MSP)	144	46.2		
Period pain	114	36.5		
Gastric / indigestion pain	96	30.8		
Cuts, wounds or burns	64	20.5		
Migraine	56	17.9		
Dental pain	26	8.3		
Bites or stings	17	5.4		
Nerve pain	10	3.2		
Sore throat	6	1.9		
Surgery-related pain	1	0.3		
Otitis media	1	0.3		
Pain Intensity (0 - 10)	**n**	**%**	**Median**	**IQR**
Head	245	78.5	3.0	4.00
Neck	148	47.4	0.0	2.00

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Shoulder	161	51.6	1.0	3.00
Chest	95	30.4	0.0	1.00
Abdomen and stomach	228	73.1	2.0	4.00
Back and waist area	227	72.8	2.0	4.00
Upper limb	115	36.9	0.0	1.75
Lower limb	172	55.1	1.0	3.00

IQR = interquartile range

Pain Management Methods

Table 3 depicts the reported frequency and perceived effectiveness of different pain management methods. It was found that 71.5% of the participants who experienced pain reported the use of pharmacological management, and 88.8% of the participants used non-pharmacological management. Among the pharmacological management methods, pain relief pills were the most frequently used approach (52.2%), followed by pain-relief creams, gels or ointments (37.8%). Both pain-relief pills and patches had the highest median perceived effectiveness score i.e., 4 (IQR = 1). Kruskal-Wallis test revealed significant variability in the level of perceived effectiveness across different types of pharmacological methods ($p < 0.001$). The box plot of the post-hoc test (Figure 1) illustrated that pain-relief pills were associated with a significantly greater median perceived effectiveness compared to other pharmacological methods.

Table 3 Pain management methods used by respondents and their perceived effectiveness

Pain Management Methods	n (%)	Median Perceived Effectiveness (IQR)
Pharmacological Management		
Use of any pharmacological management	223 (71.5)	-
Pain-relief pills	163 (52.2)	4 (1)
Pain-relief creams, gel or ointments	118 (37.8)	3 (1)
Pain-relief patches	54 (17.3)	4 (1)
Pain-relief spray	15 (4.8)	3 (2)
Non-pharmacological Management		
Use of any non-pharmacological managements	277 (88.8)	-
Rest	259 (83.0)	4 (2)
Massage	117 (37.5)	3 (2)
Physical exercise	57 (18.3)	3 (1)
Breathing techniques	50 (16.0)	3 (1)
Heat application	43 (13.8)	4 (2)
Music therapy	35 (11.2)	4 (2)
Herbal products	34 (10.9)	3 (2)
Cold application	29 (9.3)	3 (2)
Aromatherapy	19 (6.1)	3 (2)
Physiotherapy	5 (1.6)	4 (1)
Homeopathy	4 (1.3)	3.5 (2.5)
Transcutaneous Electrical Nerve Stimulation	1 (0.3)	0 (-)

Vol 10(1) (2025) 14-28 | jchs-medicine.uitm.edu.my | eISSN 0127-984X
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(TENS)		
Counselling-based therapy	1 (0.3)	0 (-)
Religion or faith-based therapy	1 (0.3)	4 (-)
Chiropractic therapy	1 (0.3)	2 (-)
Acupressure	0 (0)	-
Surgery	0 (0)	-

IQR = interquartile range

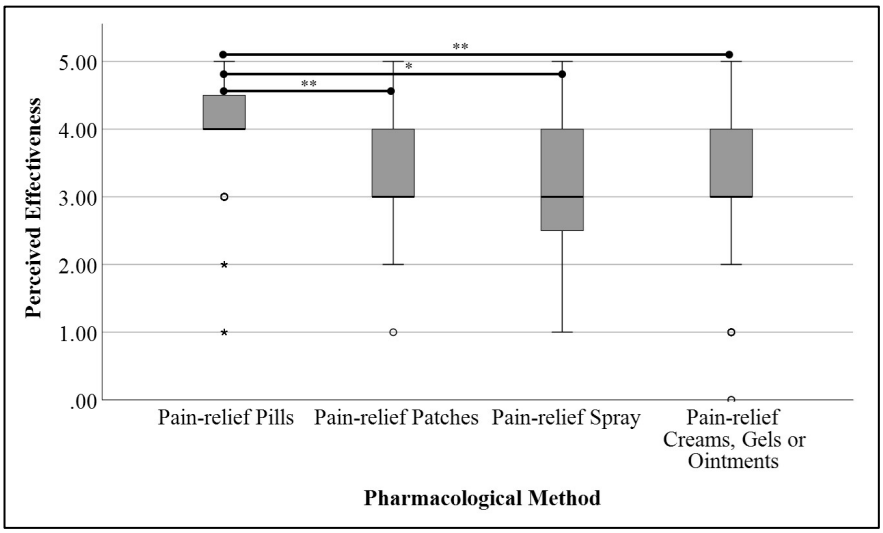

Figure 1 Kruskal-Wallis box plot for identifying differences in perceived effectiveness across pharmacological methods. * = Unadjusted significance value less than 0.05, ** Adjusted Bonferroni significance value less than 0.05

Rest was the most common non-pharmacological management method (83%), followed by massage (37.5%), physical exercise (18.3%) and breathing techniques (16%). Non-pharmacological management methods with the highest median perceived effectiveness score were rest (Median = 4, IQR = 2), heat application (Median = 4, IQR = 2), music therapy (Median = 4, IQR = 2) and physiotherapy (Median = 4, IQR = 1). Kruskal-Wallis test revealed significant variability in the level of perceived effectiveness across different types of non-pharmacological methods ($p < 0.001$). Figure 2 illustrates that rest was associated with a significantly higher median perceived effectiveness compared to other non-pharmacological methods i.e. counselling, TENS, breathing techniques, physical exercise, herbal medicine and massage. Both music therapy (such as meditation audio, binaural beats therapy) and heat application showed greater median perceived effectiveness than herbal medicine.

Pain Interference

As shown in Table 4, mood was reported to be the most interfered aspect of a student's life when the student experienced pain (Median = 3.5, IQR = 2), followed by daily functioning and productivity (Median = 3, IQR = 2).

Pain Interferences by Pain Durations

As shown in Table 4, the aspects of life with the most substantial variabilities in the level of interference across the pain duration groups were walking ability ($H = 25.814$, $p < 0.05$), financial status ($H = 17.713$, $p < 0.05$), sleep ($H = 16.188$, $p < 0.05$), attendance ($H = 13.352$, $p < 0.05$), relationship ($H = 11.619$, $p < 0.05$), social life ($H = 11.272$, $p < 0.05$) and academic performance ($H = 10.506$, $p < 0.05$). This indicates that individuals with different pain durations have significantly different levels of interference particularly in walking ability, financial status, sleep, attendance, relationship, social life and academic performance. The box plots of the Kruskal-Wallis post-hoc test (as shown in Figure 3) demonstrate that a longer duration of pain is generally associated with greater median pain interferences.

Vol 10(1) (2025) 14-28 | jchs-medicine.uitm.edu.my | eISSN 0127-984X
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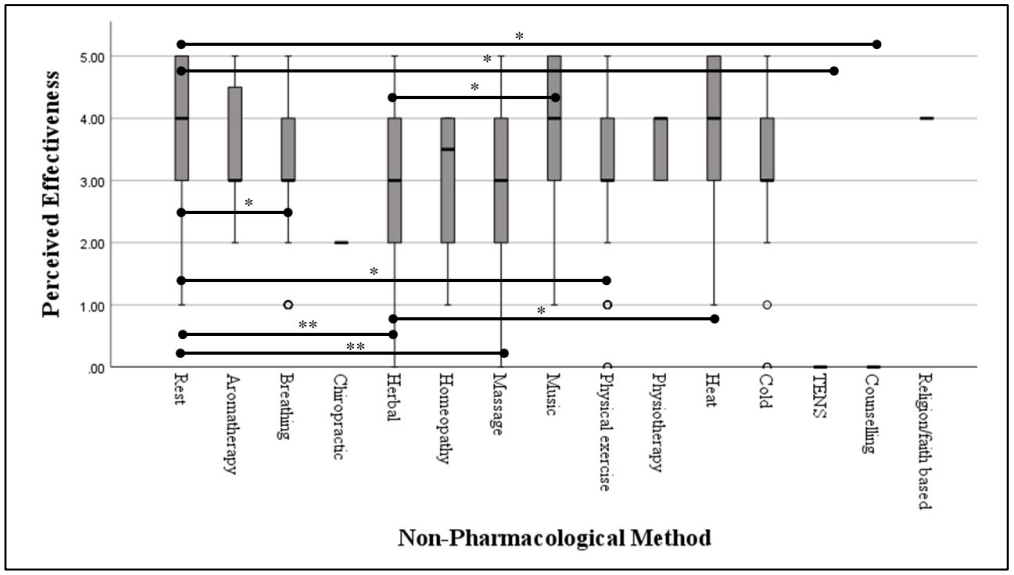

Figure 2 Kruskal-Wallis box plot for identifying differences in perceived effectiveness across non-pharmacological methods. * = Unadjusted significance value less than 0.05, ** Adjusted Bonferroni significance value less than 0.05.

Table 4 Pain interference with various aspects of students' life

Aspects	Pain Interference		Kruskal-Wallis H-value	
	Median (0-5)	IQR	Across Pain Durations	Across Pain Management Behaviours
Daily functioning and productivity	3.0	2.00	6.765	8.176*
Academic performance	2.0	3.00	10.506*	0.780
Attendance	1.0	3.00	13.352*	0.330
Mood	3.5	2.00	3.937	4.136
Sleep	2.0	3.00	16.188*	4.950
Relationship	1.0	3.00	11.619*	5.717
Social life	2.0	3.00	11.272*	5.017
Walking ability	1.0	3.00	25.814*	2.385
Financial status	0.0	1.75	17.713*	0.004
Enjoyment of life	2.0	3.00	8.417	5.368

*P < 0.05 – Null hypothesis is rejected, IQR = interquartile range

Vol 10(1) (2025) 14-28 | jchs-medicine.uitm.edu.my | eISSN 0127-984X
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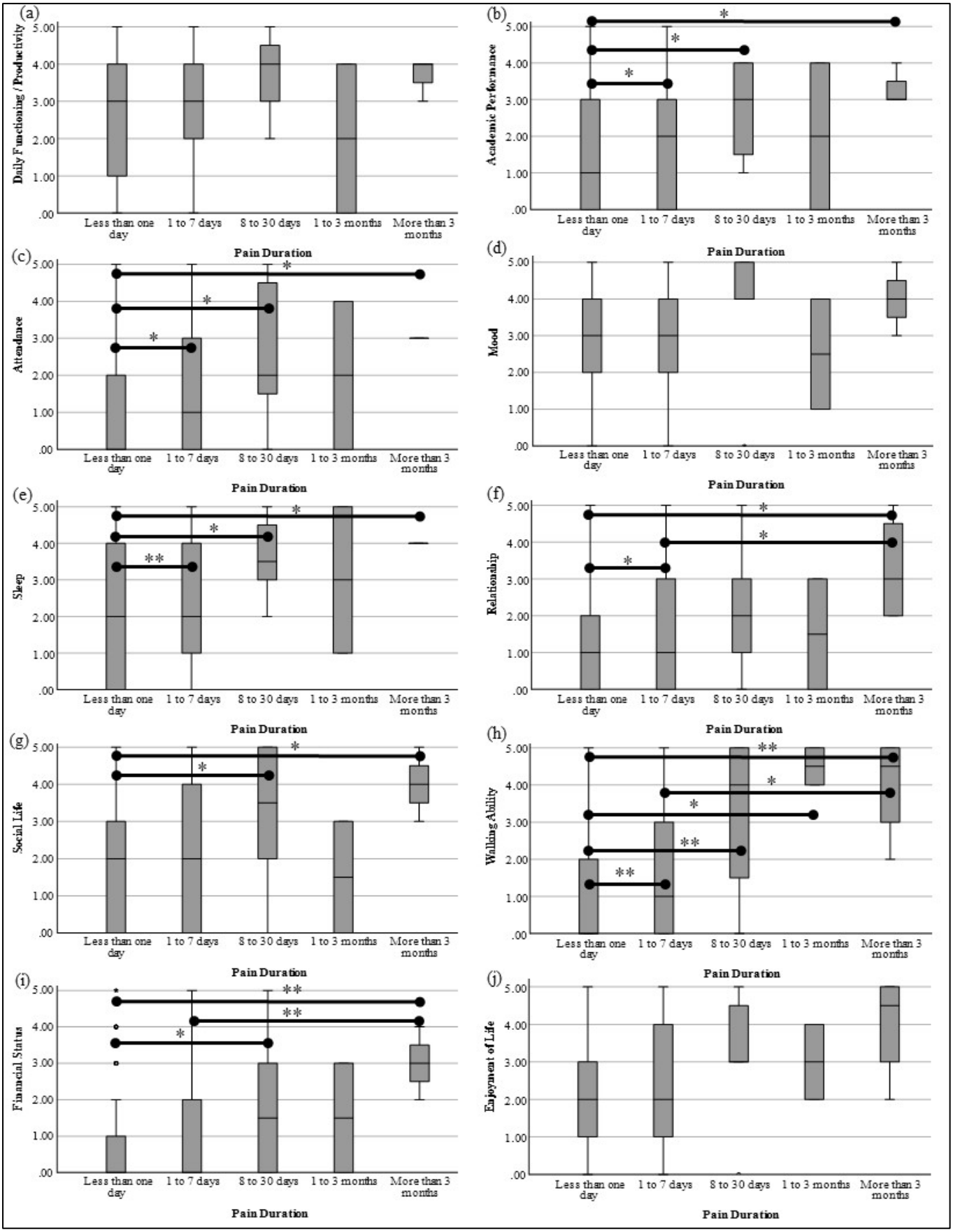

Figure 3 Kruskal-Wallis box plot for identifying differences in pain interference across pain durations. (a) Interference in daily functioning/ productivity (b) Academic performance (c) Attendance (d) Mood (e) Sleep (f) Relationship (g) Social life (h) Walking ability (i) Financial status (j) Enjoyment of life. * = Unadjusted significance value less than 0.05, ** Adjusted Bonferroni significance value less than 0.05.

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Pain Interference by Pain Management Behaviours

As depicted in Table 4, interference in daily functioning and productivity had the highest variability across pain management behaviour groups ($H = 8.176$, $p < 0.05$). The box plots of the Kruskal-Wallis post-hoc test across pain management behaviours are shown in Figure 4. The post-hoc analysis revealed significant pairwise differences between the "I did not take any action - I immediately treated pain" and "I waited before treating – I immediately treated pain" pairs. However, only the comparison between "I did not take any action" and "I immediately treated pain" remained significant after adjusting for multiple comparisons (adjusted Bonferroni significance < 0.05). As shown in Table 5, the mean pain interference was identified for each pain management behaviour group to provide a complementary descriptive understanding of the observed differences. The mean pain interference in daily functioning and productivity for the "I immediately treated pain" group was found to be higher than that of the "I did not take any action" group.

Table 5 Mean pain interference (daily functioning and productivity) of each pain management behaviour

Pain Management Behaviour	Mean Pain Interference (Daily Functioning and Productivity) ± SD
Immediately treated the pain	3.13 ± 1.49
Waited to treat the pain	2.76 ± 1.40
Did not take any action	2.58 ± 1.52

SD = standard deviation

DISCUSSION

This cross-sectional study investigated pain prevalence, pain duration, pain intensity, pain management methods and their perceived effectiveness, as well as the level of pain interference among university students. The results of this study revealed a high prevalence of pain among university students, with approximately 82% of the participants reporting experiencing pain in the last 30 days.

The reason behind the high pain rates among university students can often be linked to their heavy academic workload and the stress it brings. Long hours of studying, use of electronic devices and lack of sleep are among the precipitating factors of headaches and migraines [18,19]. Students are likely to develop MSP from prolonged sitting, especially in poor posture or by sitting on furniture lacking ergonomic features [20]. This may result in musculoskeletal imbalances, strain and stress on the soft tissues, which could become habitual. Consequently, this may lead to chronic or recurring MSP [21]. Moreover, it was found that the use of bags weighing more than 3.2 kg and the use of bags on only one shoulder are linked to the development of MSP in students [20]. Unbalanced bag-carrying styles, such as the use of tote bags and handbags, are associated with musculoskeletal imbalance and moderate or severe shoulder pain in female university students [22].

Previous studies reported that the prevalence of pain among university students ranged from 73.5% to 92.7% and our study showed that the pain prevalence among Malaysian students was congruent with other studies conducted in Japan [23], South Korea [16] and Hong Kong [6]. Moreover, this study discovered that among the participants who reported pain, 1.3% of them reported chronic pain which lasted more than three months. Kodama et al. [23] discovered that the prevalence of chronic pain among healthcare undergraduates in Japan was 5.7%, while Kim et al. [16] found that 7.8% of the participants experienced chronic pain. These disparities in the prevalence of chronic pain may be attributed to the differences in the study methodology. It is important to consider that this study assessed pain experienced in 30 days, while the studies conducted by Kodama et al. [23] and Kim et al. [16] investigated pain experiences over a six-month period. The shorter time frame implemented in this study was a deliberate effort to minimise recall bias. This is because studies involving self-reporting, especially when the events of interest occurred a long time ago, are highly vulnerable to recall bias, hence compromising the accuracy of the results [24,25].

Furthermore, the study discovered that the median pain intensities in different body areas were between 0 to 3 (on a scale of 0 to 10). Meanwhile, the

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mean pain intensities on different body areas (on a scale of 0 to 10) in the study conducted by Kodama et al. [23] were between 3.0 to 5.4 for the female group and between 2.7 to 5.0 for the male group. Tse et al. [6] and Kim et al. [16] discovered that the mean pain intensities on different body sites (on a scale of 0 to 10) were between 2.5 to 5.0 and 3.82 to 5.74, respectively. Therefore, the level of pain intensities in this study was lower when compared to previous similar studies. The discrepancy in terms of pain intensity may be influenced by the study methodology. This is because the studies conducted by Kodama et al. [23], Tse et al. [6] and Kim et al. [16] solely used the Numerical Rating Scale (NRS) to assess pain intensity, while this study provided UPAT to further guide the participants in rating their pain intensity. UPAT has additional features of Wong-Baker facial grimace scale and activity tolerance indicators (e.g., "Pain can be ignored", "Interferes with tasks" and "Bedrest required").

Similar to the findings of Kim et al. [16], the study discovered that females are associated with a higher pain prevalence. Unlike males, most females experience menstruation which is often associated with dysmenorrhea, headaches and migraines. Primary dysmenorrhea is common among females of reproductive age, and a study conducted in Kuala Selangor, Malaysia, found that the prevalence of primary dysmenorrhea is 60.5% [26]. Meanwhile, the study conducted among female university students in UiTM Kota Bharu, Malaysia, revealed a prevalence of 60.4% [27]. Menstrual-related headaches (MRH) are commonly experienced by women due to changes in the oestrogen level during menstruation. Menstrual migraine affects around 20 to 25% of female migraineurs in the general population and accounts for about 22 to 70% of the patients at the headache clinics [28]. Hence, the high prevalence of menstruation-associated pain may have explained why the female students are associated with a higher prevalence of pain in this study.

Moreover, our study discovered a higher prevalence of pain in the health and medical sciences field compared to other fields of study, aligned with the findings of Kim et al. [16]. Likewise, the study conducted by Hasan et al. [29] revealed that 88.5% of medical students, in contrast to 64.9% of non-medical students reported experiencing MSP in the previous 12 months. Meanwhile, Alshangga et al. [12] discovered that MSP was more prevalent among respondents who are in the clinical years compared to those in the pre-clinical years. Therefore, the high prevalence of pain among students in the health and medical sciences field may be attributed to their long hours of training in the hospital wards. In addition, dental students are prone to MSP due to their coursework requiring long hours of static posture, bending and repetitive motions, all of which pose ergonomic hazards.

This study discovered that non-pharmacological pain management is more frequently employed than pharmacological pain management. Rest and massage were the two most used non-pharmacological pain management, similar to the findings of the research done by Kim et al. [16]. The preference for rest and massage as pain management methods suggests that individuals are seeking more non-invasive and holistic approaches to alleviate pain. In addition, non-pharmacological management may be preferred due to the perceived safety of the methods. Hagen et al. [10] and the Global Pain Index (GPI) 2020 study [4] discovered that 21% and 34% of the respondents expressed their concern about being dependent on pharmacological management methods, respectively. Aligned with the findings of Kim et al. [16], our study found that both pain relief pills and rest were perceived as the most effective methods among various pharmacological and non-pharmacological methods, respectively. Interestingly, the study conducted by Nudo et al. [30] revealed that topical pain-relief medications were significantly more effective at reducing pain with fewer reported adverse effects compared to pain relief pills versus placebo, in injured athletes. In addition, the study conducted by Klinge and Sawyer [31] concluded that topical and oral nonsteroidal anti-inflammatory drugs (NSAIDs) exhibit comparable efficacy in managing acute and chronic musculoskeletal pain. Concurring with this, Rannou et al. [32] discovered that topical and oral NSAIDs produce similar efficacy in alleviating knee pain. Meanwhile, the effectiveness of resting as a non-pharmacological management method is contingent upon the nature of the pain. Typically, rest is found to be highly beneficial for conditions associated with

Vol 10(1) (2025) 14-28 | jchs-medicine.uitm.edu.my | eISSN 0127-984X
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repetitive strain and common injuries such as muscle sprains and strains. By resting and reducing activities, these minor injuries typically naturally resolve themselves due to the healing of tissues and reduction in stress [33]. Nevertheless, it is crucial to acknowledge that managing pain is not a one-size-fits-all approach, given the complex nature of pain. Pain can present in diverse forms, such as headaches, musculoskeletal discomfort and neuropathic pain. In addition, when we consider individual factors such as unique physiology and individual health profiles, making direct comparisons of pain management effectiveness may oversimplify the intricate nature of pain.

This study highlighted that 38.8% of respondents took immediate action to treat their pain, a figure in line with the GPI 2020 study which reported a 38% immediate treatment rate [4]. Conversely, 23.1% of students experiencing pain chose not to address it, reflecting trends observed by Tse et al. [6] and Kodama et al. [23] at 29.5% and 27.3%, respectively. The reasons for non-action are multifaceted, with the GPI 2020 underscoring the prevalence of enduring pain as a belief (80% of Malaysians) and cultural views associating pain medication with weakness [4,34]. Notably, university students display a higher tendency to neglect pain management compared to the general population; the GPI 2020 revealed that only 6% of Malaysians and 9% globally chose not to treat their pain [4]. Rathakrishnan and Saimon [35] established links between health-seeking behaviour, perceptions of masculinity, and health literacy. Additionally, Tse et al. [6] found that 86% of students supported the need for improved pain management education. The potential lack of knowledge regarding pain management could be a driving factor behind students' avoidance of addressing their pain. To comprehensively understand the barriers to effective pain management among university students, further research is imperative.

This study revealed that mood and daily functioning were the two most affected aspects of students' lives during pain, aligning with Kim et al's findings [16]. Common emotional responses among pain sufferers included frustration, anger, sadness, and feeling misunderstood [36]. The relationship between mood disorders and acute pain is bidirectional, as prolonged pain duration exacerbates mood dysregulation, while anxiety and depression heighten pain perception [37]. In terms of daily functioning, the GPI 2020 study [4] corroborates these results, highlighting reduced focus and productivity (4 in 5 workers) when in pain. In addition, this study highlights that neglecting pain management is not associated with higher interference in daily functioning or productivity. Surprisingly, the mean pain interference score was lowest among those who did not actively manage their pain. This implies that even without active management, these students experienced relatively minimal disruption in their productivity. This observed trend might be attributed to the lower reported pain intensities in this study compared to previous research. It is plausible that both low pain intensity and low pain interference may have accounted for the students' reluctance to manage their pain. Importantly, it raises the question of whether a more accurate gauge of pain interference could be achieved through the involvement of trained healthcare professionals in future investigations. Their specialised assessment could provide a more holistic understanding of how pain impacts an individual's overall functioning. Interestingly, these results align with Hagen et al.'s findings [10], which indicate that individuals who never treat their pain have a lower overall impact on their lives. This emphasises the role of perceived pain interference in shaping one's motivation for immediate treatment. However, for a deeper understanding of the factors influencing pain management behaviours, further investigation is necessary.

The findings of this study will contribute to the existing literature by shedding light on the extent and magnitude of the issue in the context of university students in Malaysia. From here, the universities can assess whether there is a need for a pain management program among university students. By having an in-depth understanding of the examples of pain experienced by the students, pain management methods used and their perceived effectiveness, the universities can plan for effective and targeted interventions to help the students manage their pain better. Understanding the level of pain interference with the students' life will help the universities develop strategies to minimise pain-related disruptions and ultimately promote the well-being of the students.

Vol 10(1) (2025) 14-28 | jchs-medicine.uitm.edu.my | eISSN 0127-984X
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Amidst its insightful findings, the study does bear certain limitations, notably arising from the recruitment process reliant upon convenience sampling which could introduce selection bias and potentially hinder the broader applicability of the findings. To enhance the study's robustness and applicability, future researchers might consider adopting more rigorous methods like random sampling or incorporating larger and more diverse participant pools. Given the study's reliance on a self-administered questionnaire, there exists a potential for respondents to misinterpret questions. Ambiguity or presumptions on the part of respondents might consequently yield inaccurate responses, potentially compromising the integrity of the data collected. This emphasises the need for careful consideration when interpreting self-reported pain intensities, evaluating the perceived effectiveness of pain management strategies, and assessing how pain impacts different facets of participants' lives. Additionally, it is worth noting that the current study did not distinguish between participants who utilised pharmacological versus non-pharmacological pain management methods, or those who employed a combination of both. As a result, it would be valuable for future investigations to examine whether the integration of pharmacological and non-pharmacological strategies notably enhances the control of pain symptoms.

In future research, it would be valuable to investigate potential factors that could play a role in causing pain, including aspects like physical inactivity, obesity, and the presence of underlying chronic conditions. To explore this further, specific questions about how often individuals engage in exercise on a weekly basis and categorising participants based on their Body Mass Index (BMI) could be included. This approach could provide a more comprehensive understanding of how lifestyle factors might relate to pain experiences and help inform potential interventions or strategies for managing pain effectively.

CONCLUSION

This study discovered that pain is highly prevalent among university students in Malaysia. The prevalence of chronic pain reported in this study is markedly lower than findings from previous studies. Given the high overall pain prevalence and a significant tendency to neglect pain management among students, pain management education and comprehensive support systems by the universities are necessary to ensure the well-being of the university students. Further investigations on the barriers to practising pain management among university students are necessary in order to formulate more targeted pain management interventions.

Conflict of interest

Authors declare none.

Authors' Contribution

NJMJ and KG conceived the ideas and design of the study. NJMJ carried out the data collection, data analysis and drafting of the manuscript. YHY aided in data analysis as well as presentation of results in tables and figures. KG and YHY contributed to the text of the manuscript through revisions and edits. All authors read and approved the final manuscript.

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Vol 10(1) (2025) 14-28 | jchs-medicine.uitm.edu.my | eISSN 0127-984X
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