Original Research

Exploring Pain Distribution: Unveiling Lower Back Pain as the Prominent Player

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ABSTRACT

Background: Pain is a significant health issue affecting millions worldwide, with lower back pain particularly prevalent. A comprehensive understanding of pain distribution across body regions is essential for effective management, yet clinical studies in this area remain limited.

Aim(s) (including purpose setting): This study aimed to explore pain prevalence and etiological factors of pain according to body region among patients at Bandung Pain Rehab Center by analyzing pain distribution across different anatomical regions along with its intensity, quality, clinical outcomes, and comorbidities.

Material and methods: A descriptive study was conducted at Bandung Pain Rehab Center from January 2019 to December 2022, analyzing 5103 subjects from 5139 medical records. Demographic and clinical characteristics were evaluated using univariate analysis, identifying chronic pain subgroups based on intensity, quality, outcomes, and comorbidities.

Result: The study included 5103 patients, with a higher prevalence of pain in females (59.8%) compared to males (40.2%). Lower back pain was the most frequently reported (58.2%), followed by neck pain (24.4%) and shoulder pain (17.4%). Chronic pain was noted in 76.1% of patients, with most experiencing symptoms for over six months. Comorbidities, such as diabetes and hypertension, were present in 38.4%, significantly affecting pain severity and distribution.

Conclusions: Lower back pain emerges as the most prevalent condition, highlighting the need for focused interventions. The association between chronic pain and comorbidities underscores the importance of comprehensive pain management strategies that address the patient's overall health; these findings can guide clinicians in developing more effective treatment for improved outcomes in pain management.

Keywords: *Body region, Epidemiological, Low back pain, Pain, Point prevalence*

INTRODUCTION

According to the International Association for the Study of Pain (IASP), pain is an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage. Pain, although often seen as a negative sensation, serves a vital protective function when an injury occurs in the body. It triggers the body's natural defense mechanisms to prevent further damage. However, when pain becomes pathological, it can change into a complex and pervasive condition that affects individuals across all age groups, and significantly impact their quality of life. Pathological pain often does not serve a biological purpose, instead, it can become debilitating, limiting physical functioning and contributing to emotional distress. [1,2]

It was estimated that at least 1 in 10 individuals suffers from chronic pain, with a global prevalence number of at least 10%.[3] Chronic pain affects many aspects of life, not only physical discomfort, but is also often associated with emotional consequences such as anxiety, depression, and decreased quality of life. Additionally, chronic pain is also associated with economic burden, with increased healthcare expenses and a reduction in productivity which results in decreased income. It affects both individuals and society[4] and represents a significant burden affecting over 30% of the global population. It is one of the leading causes of disability worldwide and among the top reasons people seek medical care. Chronic pain results in medical costs and lost productivity estimated at between $560 billion and $635 billion annually in the United States. This burden also extends to social and psychological effects, as chronic pain is associated with higher rates of depression, anxiety, substance abuse, divorce, and even suicide.[5]

Pain can occur in many different forms and can affect any part of the body from superficial parts such as skin,

musculoskeletal, nervous structures, and deeper tissues. An understanding of the variability in the location and nature of pain emphasizes the importance of the prevalence of pain based on the body region for optimizing patient care, developing effective treatment strategies, and allocating healthcare resources appropriately.[3] A conventional pain prevalence study has typically targeted specific conditions or patient groups, neglecting the crucial aspect of assessing pain based on body regions. However, recognizing and understanding the distribution of pain across different anatomical areas is essential for tailoring treatment approaches and implementing targeted interventions. Identifying the specific body regions most frequently impacted by pain enables healthcare providers to enhance diagnostic accuracy, improve treatment outcomes, and address the unique needs of individuals experiencing pain in those particular areas.[6]

This study aims to explore pain prevalence and etiological factors of pain according to body region among patients at Bandung Pain Rehab Center. This will be undertaken by analyzing pain distribution across different anatomical regions along with its intensity, quality, clinical outcomes, and comorbidities. The results will enrich pain prevalence literature, guiding more precise clinical decisions, treatment planning, and promoting preventive strategies. This research has the potential to reduce reported pain experiences, initially at Bandung Pain and Rehab Center and extending to a broader national scale.

MATERIAL AND METHODS

This study was conducted at Bandung Pain Rehab Center from January 2019 to December 2022. The Ethics Committee of the Faculty of Medicine, Padjadjaran University, Bandung gave approval for this research (number 732/UN6.KEP/EC/2022).

The inclusion criteria for this study are all patients who are present and treated in Bandung Pain Rehab Center during the mentioned period and have complete electronic medical records. The data collected from each medical record include age, gender, site of pain, past medical history, history of familial disease, previous surgery, and/or physical trauma as seen in Table 1. Patients are excluded from this study if the previous variables are not complete. Sites of pain were recorded based on the patient's report during history taking. Pain anatomical locations were classified into 36 categories as seen in Table 2. We explore the intensity of pain using visual analog score (VAS). Pain ratings of 1–3, 4–6, and 7–10 out of 10 were categorized into low, medium, and high pain categories, respectively. We analyzed the demographic and clinical characteristics of the patients by using univariate analysis. This includes age, gender, site of pain, and past medical history.

RESULT

We had a total of 5139 medical records evaluated, and 36 were excluded for having incomplete data. A total of 5103 subjects were included in this study.

Table 1. Demographic background of participants

Variables	Total (n)	Frequency (%)
Gender		
Male	1953	38.27
Female	3150	61.73
Age (years)		
<18 (Children)	34	0.66
18-35 (Younger adults)	612	11.99
36-64 (Middle adults)	3025	59.27
≥65 (Older adults)	1432	28.06

Past medical history		
Hypertension	1354	26.53
Diabetes	713	13.97
Gastritis	2253	44.15
Hyperuricemia	837	16.40
Heart disease	336	6.58
Kidney failure	80	1.56
Liver failure	74	1.45
Cancer	139	2.72
Hypercholesterolemia	1038	20.34
Stroke	133	2.60
Autoimmune disorder	273	5.34
History of physical trauma	421	8.25
History of surgery	347	6.80
Family history of disease		
Hypertension	132	2.58
Diabetes	155	3.03
Gastritis	13	0.25
Hyperuricemia	5	0.09
Heart disease	52	1.01
Kidney failure	6	0.11
Liver failure	8	0.15
Cancer	32	0.62
Hypercholesterolemia	20	0.39
Stroke	24	0.47
Autoimmune disorder	21	0.41
Pain intensity		
VAS 1-3	1.680	33
VAS 4-6	1722	34
VAS 7-10	1701	33

Table 2. Distribution and prevalence of pain

Variables	**Total (n)**	**Frequency (%)**
Lower back	1697	33.25
Left lateral lumbar area	127	7.5
Lumbar immediate paraspinal area	1300	76.6
Right lateral lumbar area	128	7.5
Left gluteal area	71	4.2
Right gluteal area	71	4.2
Knee	759	14.87
Shoulder	432	10.48
Upper back	321	6.29
Feet	265	5.19
Neck	255	4.99
Hands	183	3.58
Fingers	124	2.42
Arms	121	2.37
Thigh	96	1.88
Wrist	84	1.64
Spine	82	1.60
Sole	79	1.54
Head	64	1.25
Whole body	54	1.05
Trunk	53	1.03
Calf	53	1.03
Elbow	48	0.94
Heel	47	0.92
Abdomen	31	0.60
Jaw	31	0.60
Chest	26	0.50
Lower extremity	23	0.45

Gum	21	0.41
Ankle	18	0.35
Crotch	12	0.23
Face	10	0.19
Nose	3	0.05
Lips	3	0.05
Cheek	3	0.05
Tongue	2	0.03

Within this population, 61.73% (3150) were identified as female, while 38.27% (1953) were classified as male. Regarding age distribution, individuals younger than 18 years accounted for 0.6% (34) of the included subjects, younger adults (18-35 years old) constituted 11% (612) of the subjects, middle adults (36-64 years old) comprised 59% (3025) of the subjects, and the remaining 28% (1432) were aged older adults, ages 65 years or older. The mean age of participants in this study is 55.31 years with a standard deviation of ±15.55 years.

Four hundred twenty-one patients had a history of physical trauma, while 347 patients had an operation history. Around 44% of the patients had a history of gastritis, 26% had a history of hypertension, and 20% had a history of hypercholesterolemia (Table 1). Familial history of diabetes was found in 155 patients, while familial history of hypertension was found in 132 patients (Table 1).

We observed a consistent pain intensity (low, medium, and high) in each category (Table 1). Regarding pain location, lower back pain is reported by 1697 patients with the most common location of point prevalent low back pain being the immediate paraspinal area, with 1300 (76.6% of those with point prevalent pain)

reporting pain in that area (Table 2). The second most common location is the knee, reported by 759 patients, followed by the shoulder, reported by 532 patients (Table 2).

Discussion

This study aimed to investigate the prevalence and distribution of pain based on the body region among patients presenting to a pain clinic. The data, drawn from 5139 medical records, were evaluated, and 5103 subjects were included in the study. The study population consisted of a slight female predominance with 61.73% females compared to 38.27% males, with the majority of individuals falling into the age group of 36-64 years (59%). Females generally report feeling more pain compared to males due to a complex interplay of biological, hormonal, and neurological factors. Estrogen, a key hormone in women, has been shown to influence pain perception, particularly during certain phases of the menstrual cycle. For instance, conditions like fibromyalgia and temporomandibular joint (TMJ) pain have been linked to fluctuations in estrogen levels, with pain intensity often increasing during the luteal phase when estrogen and progesterone levels peak. Additionally, rapid changes in estrogen, as seen in postmenopausal women, have been associated with heightened pain sensitivity. Research also indicates that females and males may process pain through different neural pathways. Microglia, a type of immune cell in the brain, play a central role in pain processing in male, which could contribute to differences in pain experience. Furthermore, testosterone, which has been found to have analgesic properties, is lower in female.[7]

According to data from the 2019 National Health Interview Survey, in the United States, chronic pain affected 20.4% of adults, of all those affected, age played a critical role, with adults aged 65 and over showing the highest prevalence of chronic

pain (30.8%), followed by the middle-aged group, 45–64, which showed a significantly high prevalence (25.8%), 30–44 age group (14.6%), and 18–29 age group (8.5%).[8] In this study, in a clinical setting, we found middle adults groups (36-64 years old) to be the most (59%). This can be caused by intense activities and productivity along with increased awareness to search for pain management, particularly in pain clinics in the middle-aged group. Meanwhile, in the older adult (>65 years old) group, their pain prevalence may not be detected due to lower awareness to search for pain treatment, causing the difference of pain prevalence from other study.

Chronic pain is a significant health burden in developing countries, affecting a considerable portion of the population. Chronic pain can be defined using a 3-month threshold, or 6-month threshold. Based on a study, the prevalence of chronic pain in developing countries was reported as 27.42% for a 3-month threshold and reported as 40.50% for a 6-month threshold,[9] while in the UK, the prevalence of chronic pain was around 50% of adults in the UK.[10] In this study, 76.1% of the patients had chronic pain in clinical setting.

There are few studies which have reported on the geographic distribution of low back pain, with most reporting pain between the ribs and buttocks. Thiese et al. found a high proportion of patients (278 of 828, 33.6%) with paraspinal pain (Table 2). However, in a clinical setting, patients frequently present with gluteal pain. Additionally, some believe that radiating pain, including into the gluteal areas, signifies mild radiculopathy. However, the frequencies of sciatica suggest gluteal pain may be merely referred pain.[11] Existing clinical anecdotes, the only available information in the literature, typically depict patients with focused lower back pain, and only a few report widespread, diffuse low back pain. These distinctions are based on researchers' clinical experience and were

chosen to explore potential variations in pain location. While there are numerous reports on widespread musculoskeletal pain in various body regions, the differentiation between focal point low back pain and more extensive low back pain has not been documented. The widespread pain areas, where many participants report pain in three, four, or all five areas, challenge the conventional notion of low back pain manifesting at a specific point. It remains unclear whether there are any relationships between specific low back pain locations and causal or prognostic factors.

When examining the past medical history of the participants, it was found that a significant number of patients had comorbid conditions. Gastritis was the most prevalent comorbid condition, affecting 44% of the patients, followed by hypertension (26.53%) and hypercholesterolemia (20.34%) (Table 1). Pain management in gastritis patients requires caution due to the potential gastric side effects of medications.[12] Common analgesics like non-steroidal anti-inflammatory drugs (NSAIDs) and opioids can worsen gastric symptoms, leading to bleeding, ulcers, and impaired motility. Individualized strategies balancing effective analgesia and gastric protection are crucial. Close monitoring, alternative analgesics, and gastroprotective agents help optimize pain relief while safeguarding gastric health.[13] Prudent consideration should be given to the careful selection of the optimal agent, administering the lowest effective dose for the appropriate duration, within this specific population.[14,15]

Hypertension was the second most common comorbidity, affecting 26.53% of patients. The prevalence of hypertension in this study is quite similar to the findings from a study conducted by Giummara et al., which found 23.9%, almost one in four patients.[15] The finding of this study is also consistent with the study conducted by Li et al., which shows that pain is more prevalent

in older adults with hypertension.[16] Another study conducted by Bruehl et al. suggests that chronic pain may be associated with an increased risk of hypertension.[17] The high prevalence of hypertension found in this study needs to be taken into account when prescribing pain medications. It has been previously found that NSAIDs therapy can cause adverse cardiovascular events, such as myocardial ischemia and stroke. This specifically applies to non-selective NSAIDs and cyclooxygenase (COX)-2 selective NSAIDs.[14] It is likely related to their impact on inhibition of cyclooxygenase (COX)-2, which is associated with reduced prostaglandin I2 (PGI2 or prostacyclin) production by the vascular endothelium with little or no inhibition of potentially prothrombotic platelet thromboxane A2 production.[18] A careful approach in choosing the appropriate agent with the lowest effective dose within the right duration should be taken in this population.

The findings related to hypercholesterolemia affecting 20.34% of patients are also noteworthy. The prevalent findings of hypercholesterolemia are consistent with the findings of Tilley et al. that indicate a relationship exists between an individual's lipid profile and tendon health.[19] This highlights the importance of considering these comorbidities in pain management strategies, as they can influence treatment choices and outcomes. For instance, individuals with hypertension may require a careful selection of pain medications to avoid adverse effects on blood pressure control. Furthermore, addressing hypercholesterolemia through lifestyle modifications or pharmacological interventions may not only improve overall health outcomes but also contribute to better pain management. This integrative approach emphasizes the need for holistic care, where comorbid conditions are managed alongside pain to optimize patient outcomes.

Hyperuricemia, present in 19.37% of

the study population, is another comorbidity of significant concern.[20] Hyperuricemia is closely linked to painful conditions like gout and kidney stones, highlighting the importance of effectively addressing this metabolic disorder.[21] Effective hyperuricemia management is pivotal for pain prevention and control in the general population. By controlling uric acid levels through lifestyle modifications and pharmacological interventions, individuals can reduce painful flares and related complications.[22] Population-based interventions and interdisciplinary collaboration further contribute to improved public health outcomes.

In this study, we found 421 (8.2%) patients had a history of physical trauma, while 347 (6.7%) patients had a surgical history. This number can possibly be attributable to chronic post-surgical pain. The operation history percentage in this study is lower than the studies done by Rosenberger et al. and Hoofwijk et al., which is 20-30% and 15.3%, respectively, at 6-12 months.[23,24] Given the prevalence of trauma-related pain in this study, it emphasizes the importance of evaluating post-surgical pain as a distinct entity. This condition may require specialized interventions and management strategies. Healthcare providers should be vigilant in assessing and addressing chronic post-surgical pain to optimize patient recovery and quality of life.

One of the key findings from this study was that the lower back is the most prevalent site of pain, where the prevalence accounts for 33.25% of the total, with 1697 patients. This result is consistent with previous studies that showed lower back pain to be the most prevalent site of pain in the body.[25] The percentage found in this study is similar to the findings of Fatoye et al., who studied the real-world incidence and prevalence of low back pain.[26] Lower back pain, is often related to sedentary lifestyles, poor posture, physically

demanding occupations or degenerative conditions. The correlation between sedentary behavior and lower back pain is the effect of limited physical movement, combined with prolonged periods of poor posture, can strain the musculoskeletal system, leading to discomfort and chronic pain. It is further exacerbated by additional factors such as smoking and excess weight, which are common among individuals with sedentary habits. These findings underscore the importance of reducing sedentary lifestyles and encouraging regular physical activity to optimize quality of life.[27]

The knee is the second most prevalent site of pain in this study, which accounts for 14.87% of the total. This number is consistent with the findings of Cui et al., who reported that the global prevalence of knee pain is 16.0%.[6] Interestingly, while the global prevalence of knee pain has been estimated at 16%, it is comparatively lower when compared with the result of a study conducted by Chia et al., which showed that 21.1% of the population in Malaysia is pretty similar to the Indonesian population.[28] The percentage is also lower when compared with the result of a study conducted by Ginnerup-Nielsen et al. in Denmark that showed a prevalence of 21.4%.[29] The number is, however, significantly lower when compared with the study conducted by Kim et al. in Korea, which showed a prevalence of 46.2%.[30] This could reflect regional differences in lifestyle, healthcare access, or genetic predispositions to musculoskeletal conditions.

Shoulder pain, reported by 10.48% of the study population, was the third most common site of pain in this study. The 10.48% prevalence of shoulder pain in this study is lower than the global prevalence of shoulder pain, which is estimated to be around 16%.[3] This number is also lower than previously reported by Sarakbi et al., which showed a number of 15.9%.[31] The relatively lower prevalence of shoulder pain

in this study compared to global estimates suggests the need for further investigation into the factors contributing to regional variations in pain prevalence. For instance, certain occupations may predispose individuals to specific types of musculoskeletal pain, this is particularly important in regions where for example physical labor or repetitive shoulder movements are common. Clinicians should remain attentive to shoulder pain complaints and conduct thorough assessments to identify underlying causes. Timely diagnosis and appropriate management of shoulder pain can help alleviate patients' symptoms and improve their overall quality of life.

A preventive and promotive approach to pain is an alternative option that can be implemented in pain management.[32] However, the evidence of this approach is limited. Evidence for preventing low back pain is lacking compared to treatment trials. Most widely promoted interventions lack a solid evidence base. Exercise combined with education shows moderate effectiveness, while education alone and certain interventions may not be effective.[33,34] More research is needed to establish effective preventive measures. Assessing the relative importance of low back pain location and associated factors could be feasible, and exploring potential links between multiple etiological factors, pain in different back locations, and psychosocial factors is an avenue for future research.

This study was based on a large cohort from the database of our pain clinic with a long period of data collection. This resulted as a substantial sample size of 5103 patients, providing a robust data set from a real clinical setting. However, this study also has several limitations. Firstly, data were extracted from medical records, potentially lacking accuracy and completeness. Secondly, being a single-center study in one pain clinic may limit the

findings' generalizability to other populations or healthcare settings. Additionally, including patients referred to a specialized pain center could introduce bias, given their likely more severe and complex pain conditions. Future research should consider prospective studies with larger sample sizes and multi-center collaborations to enhance the generalizability and reliability of the findings.

This study provides valuable insights into the prevalence and distribution of pain among patients. These findings emphasize the high burden of chronic pain, particularly in the lower back, knees, and shoulders. We also highlight the importance of addressing comorbid conditions such as gastritis, hypertension, hypercholesterolemia, and hyperuricemia in the context of pain management. The high prevalence of pain in specific regions calls for focused healthcare initiatives, including public health campaigns to raise awareness about prevention and early intervention for musculoskeletal disorders.

CONCLUSION

The study highlights that lower back pain is the most prevalent condition, affecting 33.25% of the total population studied (1,697 patients), followed by knee pain (14.87%, 759 patients) and shoulder pain (10.48%, 532 patients). These findings underscore the significant burden of chronic pain, particularly in these regions, and emphasize the need for targeted interventions to address these high-prevalence areas. Furthermore, the study underscores the role of comorbidities such as gastritis (44.15%), hypertension (26.53%), and hypercholesterolemia (20.34%) in influencing pain severity and distribution. Addressing these conditions alongside pain management is crucial for improving patient outcomes. Despite these insights, evidence on preventive measures for conditions like low back pain remains

limited, highlighting the need for further research to establish effective prevention and management strategies.

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