Journal of Pioneering Medical Sciences
Received: April 3, 2025 | Accepted: May 31, 2025 | Published: July 5, 2025
Volume 14, Issue 06, Pages 86-93

DOI https://doi.org/10.47310/jpms2025140613

The Relationship between Pain and Disability among Candidates for Back Surgery: A Cross-Sectional Study in Erbil, 2024-2025

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Abstract **Background:** Back pain is a leading cause of disability globally, often requiring surgical intervention when conservative treatments fail. Therefore, this study investigates the relationship between pain and functional disability among candidates for back surgery in Erbil, Iraq, while exploring associated sociodemographic and clinical factors. **Methods:** This cross-sectional study was conducted at Hawler Teaching Hospital from September 2024 to March 2025. Using purposive sample, four parts of questionnaires. Pain intensity was assessed with the Universal Pain Assessment Tool (UPAT) and functional disability was measured using the Oswestry Disability Index (ODI). The data was analyzed through using SPSS, Version 27. Descriptive statistics, Pearson's correlation and multiple linear regression were used to analyze and relationship between pain and functional disability. Statistical significance was set at $p<0.05$. **Results:** The samples consisted of 103 participants, majority of them (87.4%) complaining with severe pain (Mean±SD score: 8.43±1.87) and 61.2% being completely disabled (Mean±SD score: 35.74±7.72). A moderate positive correlation was found between pain and disability levels ($r = 0.30$, $p<0.001$), A significant positive correlation was observed between pain intensity and functional disability ($r = 0.30$, $p<0.001$). A regression analysis found that disability level was the only strongly significant predictor ($\beta = 0.99$, $p<0.001$) of the outcome (likely pain), with higher disability linked to worse results. **Conclusions:** The study demonstrates a significant positive correlation between pain severity and disability levels in back surgery candidates, with disability being the strongest predictor of pain intensity while demographic and clinical factors showed no significant influence. Healthcare providers should prioritize disability assessment and management alongside traditional pain interventions, while policymakers should develop guidelines that incorporate functional improvement strategies as a primary approach to reduce pain burden in this patient population.

Key Words Low Back Pain, Back Surgery, Pain Intensity, Functional Disability, Laminectomy, Spinal Fusion

INTRODUCTION

Back pain is a leading cause of disability globally, affecting millions of individuals and having a significant impact on their quality of life. Low Back Pain (LBP) afflicted 619 million persons worldwide in 2020 and it is predicted that by 2050, there will be 843 million cases, mostly due to aging and population growth [1]. Back pain can vary widely in its intensity and impact on individuals. It is often classified into acute or chronic back pain, with acute pain lasting less than six weeks and chronic pain persisting for more than three months [2]. It represents one of the most prevalent musculoskeletal conditions globally, affecting approximately 80% of adults at some point during their lifetime [3]. It constitutes a leading cause of disability worldwide, with substantial socioeconomic implications through healthcare expenditure, work absenteeism and reduced productivity [4].

The complex relationship between pain intensity and functional disability represents a critical dimension in understanding back disorders. While intuitive reasoning might suggest a direct correlation between pain severity and disability levels, clinical evidence indicates a more nuanced association influenced by psychological, social and cultural factors [5]. The importance of patient-centered decision-making in lumbar surgery is emphasized in the literature, which also calls on the surgical community to prioritize educated, compassionate decisions to improve the quality of healthcare [6].

Spinal surgery has become one of the most common challenging surgical interventions, used to treat different

disorders, either traumatic or non-traumatic, leading to disability, which negatively affects physical functioning, psychological wellbeing, social and economic participation, family relationships and environmental health [7]. While surgical intervention can be effective for select patients, suboptimal patient selection and poor preoperative risk stratification may lead to unsatisfactory outcomes [8].

Pain and disability are closely related, though not always linearly. In some cases, individuals with lower pain levels may still experience significant disability due to factors like fear of movement, psychological distress or chronic illness [9]. Nurses' roles include patient reassurance as well as educating them about preoperative surgical planning and postoperative care. The patient's physical response to general anesthesia is related to early postoperative complications [10].

Cultural and regional factors further shape the experience and reporting of pain and disability, with evidence suggesting variations in pain perception, expression and impact across different societies and healthcare systems [11]. These cultural dimensions may be particularly relevant in the Kurdistan context, where traditional beliefs, family structures and healthcare-seeking behaviors potentially interact with clinical manifestations and management approaches [12]. A systematic review aimed at identifying preoperative predictors of pain and disability outcomes following spinal surgery for chronic LBP found that better pain outcomes were associated with factors such as younger age, higher education levels and absence of spinal stenosis. However, the quality of evidence for most identified associations was low to very low, indicating a need for further research in this area [13]. Furthermore, the economic implications of LBP-related disability cannot be overlooked. A study assessing healthcare-seeking behavior and out-of-pocket payments in Erbil revealed that musculoskeletal problems were among the most common health conditions, accounting for 13.1% of reported cases. The median total out-of-pocket healthcare expenditure was significantly higher for individuals seeking care from private facilities compared to public ones, highlighting potential financial barriers to accessing adequate treatment for LBP [14,15].

The intricate relationship between pain and disability among candidates for back surgery in Erbil underscores the necessity for comprehensive research to inform clinical practice and policy-making. By elucidating the factors that influence surgical outcomes, healthcare providers can better tailor interventions to meet the specific needs of patients, ultimately improving quality of life and reducing the socioeconomic burden associated with LBP in the region. Therefore, this cross-sectional study aims to investigate the relationship between level of pain and functional disability among candidates for back surgery in Erbil City during 2024-2025.

Research Question

Are there Relationships between the levels of severity pain and functional disability among patient's candidates for back surgery in Hawler teaching hospitals in Erbil and what is the main relation variables factors related to each other?

METHODS

Study Design, Setting, Period and Sampling

This cross-sectional study design was conducted in Erbil, Iraq, specifically in Hawler Teaching Hospital (Neurosurgery departments), this hospital unique public hospital that perform back surgeries in Erbil City. The data of the study was collected from September 1, 2024 to March 6, 2025. The purposive sampling or population are candidates for back surgery in Erbil, identified based on patients from neurosurgery departments, pre-surgical evaluations.

Sample Size

The sample size was determined using a power analysis for Pearson's correlation. Based on Cohen's guidelines, a medium effect size (r = 0.3) was chosen to detect a meaningful relationship between pain and disability, where $Z_{\alpha/2} = 1.96$ for a 95% confidence level, $Z_{\beta} = 0.84$ for 80% power. Substituting these values, the required sample size was estimated to be 91 participants. This ensures adequate power to detect a statistically significant correlation while minimizing the risk of Type II error, the researchers received 103 patients, more than sample size was estimated to increase the power of the study.

Inclusion/Exclusion

The participants for this study were adults aged 18 to 60 years, of any gender, who have undergone post-spine surgery from Thoracic 1 to Sacral1 or were scheduled for elective back surgery. Exclusion criteria included patients with cervical spine surgery, cognitive impairments affecting their ability to understand or provide consent and those undergoing emergency surgeries. Additionally, individuals undergoing a second back surgery or those with significant comorbidities that might have impact participation or study outcomes such as, fractures, injuries or decreased range of motion in the upper or lower limbs that limit mobility, was excluded.

Study Tools and Data Collection

Data for this study were collected using a questionnaire administered before surgery. The questionnaires were structured into four main parts aligned with the research objectives: The first part gathered demographic data, including date of birth, gender, marital status, highest educational qualifications, current employment status, residential area, economic status. The second part was Patients' health history including, Body Mass Index (BMI), smoke cigarettes, consume soft drinks e.g., Pepsi, Cola,… (weekly intake), duration of back problem (year), type of operation, present chronic disease. The third part was Universal Pain Assessment Tool (UPAT), designed to evaluate pain intensity. The fourth part was Oswestry Disability Index Questionnaire (ODI), designed to evaluate functional disability.

Pilot Study

A pilot study was conducted with 18 participants to assess the feasibility of data collection methods and refine the educational program based on participant feedback. This pilot study was carried out from June 2, 2024, to July 13, 2024, to assess the internal consistency and reliability of the questionnaire items before application. The internal consistency of the items was calculated using Cronbach's alpha [16]. resulting in an overall score of 0.82. The questionnaire has been assessed and approved by 23 experts of different specialties from Neurosurgical, Orthopedic and physiotherapy departments, finally they were don some modifications in both the socio-demographic and clinical data sections of the questionnaire.

Measures

Sociodemographic Characteristics: The first part of the questionnaires, which included socio demographic, such as date of birth, gender, marital status, highest educational qualifications, current employment status, residential area, economic status.

Patients' Health History

This part records the second part, which contains patients' health history, including Body Mass Index (BMI), smoking cigarettes, consuming soft drinks (e.g., Pepsi, cola) (weekly intake), duration of back problem (year), type of operation and present chronic disease.

Universal Pain Assessment Tool

The third part was UPAT, designed to evaluate pain intensity before going to operation. It is rooted in "Melzack's McGill Pain Questionnaire (1970-1975)" [17] and has been updated by Wisdom Library in 2024 [18]. The scale, ranging from "0 to 10", categorizes pain as follows: "0 (No pain), 1-2 (Mild pain), 3-6 (Moderate pain) and 7-10 (Severe pain)".

Oswestry Disability Index Questionnaire

The fourth part was ODI Questionnaire, designed to evaluate functional disability, known as the "gold standard" for assessing "low back pain-related functional disability" created by Fairbank, (1980) [19], this index evaluates patients' functional limitations. Each of the "10 questions" is scored from "0 to 5", with total scores ranging from "0 to 50", categorized as: "0-4 (No disability), 5-14 (Mild disability), 15-24 (Moderate disability), 25-34 (Severe disability) and 35-50 (Completely disabled)". Assessed internal consistency of the ODI during the pilot study, showed a Cronbach's alpha of 0.82 [16], indicating very good reliability.

Ethical Approval and Inform Consent

All applicable institutional and governmental regulations concerning the ethical use of human volunteers was followed during the course of this research which includes: the approval of the Hawler teaching hospital, General Director of Erbil Health and ethical committee of College of Nursing (Registration No. 2435, August 22, 2024). Informed consent was obtained from all participants before enrollment, ensuring they understand the study's purpose, procedures, risks and benefits. Confidentiality of patient data was maintained throughout the study. All the patients who participated in this study, participated voluntarily and anonymously, they had the right to refuse and drop out before returning the anonymous forms.

Statistical Analysis

The data was analyzed through using of descriptive inferential statistic by using IBM SPSS Version 27 (IBM SPSS Statistics, Armonk, NY). The frequencies, percentages for qualitative variables. Quantitative variables were presented with mean and standard deviations. The relationships between pain intensity and functional disability, were assessed using Pearson's correlation coefficient. The adjusted association between these variables and other confounding factors was evaluated using multiple linear regression analysis, statistical significance was set at $p<0.05$.

RESULTS

Demographic, Clinical Characteristics, pain and Disability Assessment

A total of 103 patients who were candidates for back surgery participated in the study, with a mean age of 45.63±10.46 years. The age distribution showed that 35.9% (n = 37) were aged 41-50 years and 35.0% (n = 36) were aged 51-60 years. The majority of participants were female (73.8%, n = 76), while males accounted for 26.2% (n = 27). Regarding marital status, 89.3% (n = 92) were married, 5.8% (n = 6) were single and 4.9% (n = 5) were widowed. Educational backgrounds varied, with 47.6% (n = 49) being illiterate and 22.3% (n = 23) having completed basic school education. In terms of employment, 67.0% (n = 69) were housewives and 17.5% (n = 18) were workers.

Most participants resided in urban areas (61.2%, n = 63), followed by suburban areas (26.2%, n = 27) and rural areas (12.6%, n = 13). Economic status was reported as sufficient by 73.8% (n = 76) of participants, while 26.2% (n = 27) reported insufficient economic status. Body Mass Index (BMI) analysis revealed that 33.0% (n = 34) were overweight, 31.1% (n = 32) had class I obesity and 2.9% (n = 3) had class III obesity, with a mean BMI of 30.51±5.05. Regarding lifestyle factors, 21.4% (n = 22) reported smoking, while 78.6% (n = 81) did not smoke. Soft drink consumption was reported by 50.5% (n = 52) of participants. The duration of back problems ranged widely, with 50.5% (n = 52) experiencing issues for 1-4 years and 15.5% (n = 16) for 9-12 years, resulting in a mean duration of 5.76±4.69 years. Laminectomy with spinal disc fusion was the most common planned surgical procedure (46.6%, n = 48). Chronic diseases were present in 28.2% (n = 29) of participants, with hypertension being the most prevalent condition (17.5%, n = 18). Pain assessment showed that the majority of participants (87.4%, n = 90) reported severe pain, with a mean pain score of 8.43±1.87. Disability levels were high, with 61.2% (n = 63) classified as completely disabled and 30.1% (n = 31) as severely disabled, resulting in a mean disability score of 35.74±7.72. Detailed demographic and clinical characteristics are presented in Table 1.

Table 1: Demographic and Clinical Characteristics of Participants

No.	Variables	Characteristics n = 103	F	%
1	Age (year)	21-30	9	8.7
		31-40	21	20.4
		41-50	37	35.9
		51-60	36	35.0
		Mean±SD	45.63±10.46	
2	Gender	Male	27	26.2
		Female	76	73.8
3	Marital Status	Single	6	5.8
		Married	92	89.3
		Widowed	5	4.9
4	Highest Educational Qualifications	Illiterate	49	47.6
		Read and write	20	19.4
		Basic School Graduate	23	22.3
		High School Graduate	7	6.8
		Institute, University Graduate	4	3.9
5	Current Employment Status	Police	5	4.9
		House Wife	69	67.0
		Worker	18	17.5
		Student	3	2.9
		Driver	5	4.9
		Employee	3	2.9
6	Residential area	Urban	63	61.2
		Sub Urban	27	26.2
		Rural	13	12.6
7	Economic Status	Insufficient	27	26.2
		Sufficient	76	73.8
8	Body Mass Index (BMI)	≤18.4 (Underweight)	2	1.9
		18.5-24.9 (Normal weight)	13	12.6
		25-29.9 (Overweight)	34	33
		30-34.9 (Obesity class I)	32	31.1
		35- 39.9 (Obesity class II)	19	18.4
		≥40 (Obesity class III)	3	2.9
		Mean±SD	30.51±5.05	
9	Smoke cigarettes	Yes	22	21.4
		No	81	78.6
10	Consume soft drinks (e.g., Pepsi, Cola,...)	Yes	52	50.5
		No	51	49.5
11	Duration of back Problem (year)	1-4	52	50.5
		5-8	23	22.3
		9-12	16	15.5
		13-16	10	9.7
		17-20	2	1.9
		Mean±SD	5.76±4.69	
12	Type of operation	Laminectomy/laminotomy	9	8.7
		Discectomy	11	10.7
		Spinal disc fusion	5	4.9
		Foraminotomy	3	2.9
		Discectomy and Spinal disc fusion	7	6.8
		Discectomy and Foraminotomy	9	8.7
		Laminectomy and Spinal disc fusion	48	46.6
		Laminectomy and Foraminotomy	7	6.8
		Laminectomy and Discectomy	4	3.9
13	Present Chronic disease	No any Chronic disease	74	71.8
		Diabetes Mellitus	7	6.8
		Hypertension	18	17.5
		Diabetes Mellitus and Heart disease	1	1
		Diabetes Mellitus and Hypertension	3	2.9
14	Level of Severity of Pain	No pain	0	0
		Mild pain	2	1.9
		Moderate pain	11	10.7
		Severe pain	90	87.4
		Mean±SD	8.43±1.87	
15	Level of Disability	No disability	0	0
		Mild disability	2	1.9
		Moderate disability	7	6.8
		Severe disability	31	30.1
		Completely disabled	63	61.2
		Mean±SD	35.74±7.72	

F: Frequency, %: Percentage; Pain was scored as “0” considered "No pain", “1-2” considered "Mild pain", “3-6” considered "Moderate pain" and “7-10” considered "Severe pain", Disability Level was scored as No disability (0-4), Mild disability (5-14); Moderate disability (15-24), severe disability (25-34) and completely disabled (35-50)

Table 2: Correlation between level of Pain, and level of Disability of patients (n = 103)

Variables	Pearson Correlation	Pain level	Level of Disability
Pain level	Correlation Coefficient	1.00	0.30**
	Sig. (2-tailed)	-	p<0.001
	N	103	103
level of Disability	Correlation Coefficient	0.30**	1.00
	Sig. (2-tailed)	p<0.001	-
	N	103	103

Significance was set at p<0.001

Table 3: Final Model of Multiple Linear Regression for Assessing the Association Between level of Pain, level of Disability, Demographic and Clinical Characteristics Variables among patients

Variables	Coefficient standardized (B)	Coefficient unstandardized (B)	95% Confidence Interval		p-value*
			Lower	Upper	
Age	0.00	0.14	-0.00	0.01	0.25
Gender	0.03	0.09	-0.06	0.12	0.48
Occupation	-0.01	-0.05	-0.03	0.02	0.69
level of Education	0.02	0.12	-0.02	0.05	0.39
Marital Status	0.01	0.02	-0.09	0.10	0.88
Residential area	-0.02	-0.19	-0.07	0.02	0.28
Economic Status	-0.03	-0.08	-0.09	0.04	0.45
BMI	-0.01	-0.19	-0.01	0.00	0.13
Smoke cigarettes	0.08	0.24	-0.01	0.17	0.07
Consume soft drinks (e.g., Pepsi, Cola,..)	-0.01	-0.03	-0.07	0.06	0.81
Type of operation	0.01	0.13	-0.01	0.02	0.24
Present Chronic disease	-0.04	-0.15	-0.11	0.03	0.21
level of Disability	0.99	0.36	0.31	1.52	p < 0.001

Level of Pain is the dependent variable, Significance was set at p<0.001

Correlation between Level of Pain and Level of Disability of Patients

The study revealed a statistically significant positive correlation between pain levels and disability levels among participants (r = 0.30, p<0.001). This correlation indicates that as pain intensity increases, functional disability also tends to increase, though the relationship is moderate in strength. The significance level (p<0.001) confirms that this association is not attributable to chance. With a Pearson correlation coefficient of 0.30 (below 0.50), the relationship, while statistically meaningful, demonstrates only moderate predictive power. This finding suggests that although pain contributes to disability, other factors likely influence functional disability levels in this patient population. The analysis, conducted with an adequate sample size (N = 103), provides sufficient statistical power to support the reliability of these findings (Table 2).

Correlation between Level of Pain, Level of Disability, Demographic and Clinical Characteristics Variables

The regression analysis examined the relationship between various independent variables and pain level as the dependent variable. The results demonstrated that most independent variables-including age, gender, occupation, education level, marital status, residential area, economic status, BMI, smoking status, soft drink consumption, operation type and chronic disease presence-did not show statistically significant associations with pain level (all p-values >0.05). However, 'level of disability' emerged as a highly significant predictor, with an unstandardized coefficient (B) of 0.359 and a standardized coefficient (B) of 0.918 (p<0.001). This strong positive relationship indicates that increased disability levels significantly predict higher pain levels. The 95% confidence interval for the disability level variable (0.31 to 1.52) further confirms this robust association. While smoking status showed a trend toward significance (p = 0.07), it did not reach the conventional threshold for statistical significance. Overall, the analysis identifies disability as the most influential factor among all variables examined, while demographic, lifestyle and clinical factors demonstrated no significant impact on pain outcomes. Complete regression results are presented in Table 3.

DISCUSSION

The study aimed to identify key predictors of pain and disability in this vulnerable population and to assess the influence of demographic and clinical characteristics on this relationship. The study investigated the link between pain severity and disability levels in Erbil, examining factors like age, gender, BMI, socioeconomic status and chronic diseases. Our results demonstrate a significant positive correlation between pain intensity and functional disability levels among back surgery candidates in Erbil City, with psychological factors and comorbidities emerging as important mediating variables that should be addressed in preoperative assessment and management.

This study was conducted to address chronic back pain's impact on quality of life, functional capacity and surgical intervention, aiming to understand pain severity and disability levels for improved patient care.

The findings reveal that middle-aged individuals are more susceptible to chronic back problems due to degenerative spine changes, highlighting their unique

demographic profile [20,21]. Research indicates that women report chronic pain conditions, including back pain, more frequently, as reflected in the higher proportion of females in our sample [22]. Lower educational attainment is linked to poorer health outcomes, limited access to preventive care and higher prevalence of severe pain and disability among this population [23]. The occupational distribution, primarily involving housewives and workers, offers a unique context that may differ from studies examining other employment sectors [24].

Our study reveals that obesity, a common factor in many studies, can contribute to back pain and potentially impact surgical outcomes. For instance, Hébert *et al.* [25] and Flippin *et al.* [26] reported varying mean BMIs across groups, some exceeding obesity thresholds. Nayyef and Al-Ali [27] found that most healthcare providers in their study were overweight or obese. Previous research has demonstrated that socioeconomic status and BMI can significantly impact pain perception. A study by Sturgeon *et al.* [28] found that lower socioeconomic status leads to higher pain intensity, stress and smoking, highlighting this significant lifestyle factor's impact on health and surgical outcomes. The varied duration of back problems before intervention is common in studies of this nature, reflecting different stages at which patients seek surgical treatment [29]. This is consistent with evidence indicating that chronic back pain often persists for several years, leading to significant disability [3]. The predominance of spinal fusion procedures may indicate a focus on advanced lumbar conditions, distinct from studies primarily on discectomy or laminectomy alone [30]. Surgical patients often experience severe preoperative pain and disability, indicating the significant burden of chronic back pain. Studies like Cook *et al.* [31] demonstrated a correlation between disability status and higher pain intensity.

Our findings highlight the link between pain and disability, particularly in chronic conditions, emphasizing the significant impact of higher pain intensity on mobility and quality of life [32]. The relationship between body mechanics and pain reduction may not always be direct, with other factors mediating this connection, as suggested by Abd Elwahhab *et al.* [33]. Lee *et al.* [34] study revealed that chronic pain patients with higher catastrophizing levels and lower social support reported greater disability, regardless of pain intensity. Additionally, Barbanti-Brodano *et al.* [35] suggest that the Oswestry Disability Index (ODI) is a crucial outcome measure for patients undergoing spinal surgery, supporting our observed association.

Our results demonstrate that disability level significantly predicts pain in patients, aligning with previous research indicating a strong association between higher disability levels and increased pain levels. For instance, Smith *et al.* [20] found that disability significantly contributes to chronic pain, as it often leads to reduced physical activity and increased psychological distress, both of which exacerbate pain perception. Ahmed *et al.* [36] utilized both the Pain Analogue Scale and the Oswestry Low Back Pain Disability Scale to assess patients. While Barbanti-Brodano *et al.* [35] identified the Oswestry Disability Index (ODI) as a key outcome measure for patients undergoing spinal surgery. However, our model found no significant association between demographic variables such as age, gender, occupation, education, marital status and residential area with pain levels, contradicting some previous studies. Holbert *et al.* [37] found that social determinants of health, such as residential area and economic status, significantly influence postoperative outcomes like length of stay and discharge disposition.

The non-significant outcomes regarding smoking may be due to low smoking prevalence in our sample or other factors like disability overshadowing the impact of lifestyle choices on pain. Cook *et al.* [31] explicitly examined differences in outcomes, including Oswestry Disability Index (ODI), back pain and leg pain, across employed, unemployed and disabled individuals. While obesity is often linked to chronic pain due to increased mechanical stress on joints and systemic inflammation, our study found no significant association between BMI and pain [38], possibly due to sample characteristics or other variables, contrasting with Nakajima *et al.* [39] findings of tandem pain and disability changes.

The study's limitations include its focus on a single public hospital in Erbil City, resulting in a predominantly female and urban sample, which may limit the generalizability of the findings to other demographic groups, such as males or rural populations. The relatively small sample size may lack the statistical power to detect smaller but potentially meaningful associations between certain variables and outcomes of interest. Additionally, the strong emphasis on disability as a predictor may overshadow the potential cumulative impact of other variables that did not reach statistical significance but could still play important roles in pain management and overall health.

CONCLUSIONS

The study found a strong correlation between pain and disability, with higher pain levels indicating greater disability. Disability was the most significant predictor of pain severity among participants. The study underscores the interconnected nature of pain and disability in patients awaiting back surgery. Based on the study's findings, healthcare providers should prioritize comprehensive pain and disability assessments for back surgery candidates, with a focus on multidisciplinary interventions that address both physical and functional aspects of chronic pain. Policymakers should allocate resources to develop targeted rehabilitation programs and support systems for this high-need population, particularly given the strong link between disability and pain severity. Future research should investigate the underlying mechanisms connecting pain and disability in this population, explore the effectiveness of early intervention strategies to prevent progression to severe disability and examine how socioeconomic factors influence outcomes. Additionally, longitudinal studies are needed to

assess how pain and disability levels change post-surgery and which preoperative factors best predict surgical outcomes.

Acknowledgement

The authors would like to extend their gratitude to the participants and the staff at Hawler Teaching Hospital for their cooperation and support during the data collection process, especially for Neurosurgery department. Special thanks are also extended to the experts who reviewed and validated the study tools.

Conflicts of Interest

The authors report no conflicts of interest.

Ethical Statement

Ethical approval was obtained from the Hawler Teaching Hospital, the General Director of Erbil Health and ethical code was obtained from Ethical Committee of the College of Nursing, Hawler Medical University, Erbil, Iraq (Registration No. 2435, August 22, 2024).

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