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ORIGINAL RESEARCH

Prevalence of Thai People with Lumbar Instability and Associated Factors: A Cross-Sectional Study

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Background: Lumbar instability has been extensively reported; however, the risk factors for lumbar instability remain poorly defined, and understanding this condition better would help health professionals and their patients.

Proposal: To determine the prevalence of lumbar instability in Thai people with chronic low back pain (CLBP) and explore the factors associated with lumbar instability in these patients.

Patients and Methods: Using multistage random sampling methods, 1762 participants with CLBP were enrolled in the study from six regions of Thailand. Data were collected using a paper-based questionnaire. Participants were interviewed by physical therapists in the hospital they attended. They were classified as having lumbar instability when they attained ≥7/14 items on the lumbar instability screening tool. Univariate and multivariate regression analysese were used to determine the possible factors associated with lumbar instability.

Results: There were 961 (54.54%) participants with lumbar instability and 801 (45.46%) participants without. The eight factors associated with lumbar instability were: (i) age ≥40 years (AOR: 1.36; 95% CI: 1.09–1.69); (ii) body mass index ≥25 kg/m^2 (AOR: 1.42; 95% CI: 1.16–1.74); (iii) having an underlying disease (AOR: 1.32; 95% CI: 1.06–1.65); (iv) frequent lifting ≥5 kg in occupational habits (AOR: 1.69; 95% CI: 1.36–2.09); (v) prolonged walking ≥4 hours per day (AOR: 1.31; 95% CI: 1.04–1.64); (vi) gardening in leisure time (AOR: 1.37; 95% CI: 1.10–1.71); (vii) other area of pain (AOR: 1.24; 95% CI: 1.01–2.52): and (viii) other area of numbness (AOR: 1.85; 95% CI: 1.50–2.27). When considering only women, prior pregnancy was associated with lumbar instability with OR of 1.76 (95% CI: 1.36–2.22), p-value <0.0001.

Conclusion: When treating patients with CLBP who are suspected to have lumbar instability, healthcare professionals should consider associated factors that might be modifiable targets for interventions to improve outcomes.

Keywords: having an underlying disease, frequent lifting, prolonged walking, other area of pain or numbness, gardening in leisure time

Introduction

Low back pain (LBP) remains the leading global cause of years lived with disability.[1] About 80–90% of chronic low back pain (CLBP; >3 months' duration) is non-specific, complicated, and difficult to treat.[2] Failure to manage pain among chronic pain patients has been shown to lead to higher healthcare costs,[3] including the direct costs of back-related healthcare utilization as well as indirect costs from back-related disability and lost work productivity.[4] A review of research showed that the prognosis of non-specific LBP is greatly influenced by a number of factors such as fear avoidance beliefs, maladaptive pain coping, and comorbid depression.[5]

Many epidemiological studies have identified potential risk factors for LBP, which are used for educating people to prevent and relieve their symptoms.[6–8] A systematic review and meta-analysis concluded that the risk factors of LBP occurred in four categories: an individual characteristic, poor general health, physical stress on the spine, and

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psychological stress.[8] Theoretically, LBP is divided into many sub-categories.[9] Studies have investigated the risk factors for specific LBP subgroups such as disc herniation,[10] spondylolisthesis,[11] and sciatica pain;[8] however, knowledge about the risk factors for lumbar instability is limited.

Lumbar instability is categorized as a subcategory of mechanical LBP, which has been extensively studied by many researchers focusing on diagnosis and treatment.[12–15] Patients with lumbar instability may respond best to specific interventions such as stabilization exercises that focus on deep trunk muscle training[16,17] and may become worse with inappropriate treatment.[18] Some patients with lumbar instability may be referred for surgical treatment because of progression to spondylolisthesis.[12,19] Beside accurate diagnosis and treatment, epidemiologic studies determine factors influencing the occurrence of lumbar instability, help therapists and patients have a better understanding of the risks of lumbar instability and may provide important insights into the prevention and management of this condition.

To our knowledge, two studies have reported the prevalence of lumbar instability and associated factors.[20,21] The first, focused on Thai rice farmers.[20] Using both a questionnaire and clinical tests, the investigators reported a 13% (aged 44±10 years) prevalence of lumbar instability in their participant group. Farmers with more than 30 years of farming experience had a risk of lumbar instability (AOR=2.02, 95% CI=1.03–3.98, p<0.05).[20] Another occupational study, involving minibus drivers, determined lumbar instability using clinical tests[21] and the findings indicated a prevalence of 75.42% (age 54±11 years). Drivers who exercised more than 3 times/week had a lower likelihood of developing lumbar instability than those who did not exercise (OR=0.43, 95% CI=0.197–0.936, p=0.034). To date, knowledge has only come from studies of two occupations; therefore, a broader population study across occupations is warranted.

The current study aimed to evaluate the prevalence of lumbar instability in Thai people with CLBP (>3 months' duration) and explore associated factors in this population. The hypothesis was that physical factors related to occupational habits are associated with lumbar instability. An accurate measure of the distribution of lumbar instability, with estimates on prevalence and its associated factors, is needed to ensure sufficient allocation of healthcare resources to address this growing public health problem.

Materials and Methods

Design and Setting

The present study was cross-sectional in nature, utilizing an interviewer-administered questionnaire. The study protocol for human research was approved by the Human Research Ethics Committee of Khon Kaen University, Thailand, according to the Declaration of Helsinki (HE 642159). The study was prospectively registered at Thai Clinical Trials Registry (TCTR 20210917002).

Sample Size Determination

A sample size calculation was conducted for logistic regression analysis (categorical variable).[22] This formula was first $n = \frac{(Z_{1-\alpha/2}[p(1-p)/B]^{1/2}+Z_{1-\beta}[p_1(1-p_1)+p_2(1-p_2)(1-B)/B]^{1/2})^2}{[(p_1-p_2)^2(1-B)]}$ and $n_m = \frac{n}{(1-\rho_{12}^2)}$. An explanation of the formula follows: n = the sample size in the first formula; n_m = the absolute sample size; $Z_{1-\alpha/2}$ = the statistic corresponding to level of confidence (1.96); p1 = the event rates at proportion of lumbar instability absent; p2 = the event rates at proportion of lumbar instability present; p= the average value of p1 and p2; and B = the proportion of participants with lumbar instability present among all participants–this value was taken from the Puntumetakul et al study.[20] The total sample size required was 1678 participants, anticipating a 5% loss of response rate. The current study therefore required 1762 participants.

Participants

Participants were recruited to the study by multistage random sampling. First, cluster sampling was used to randomly select 59 provinces in 6 regions of Thailand. According to different province numbers in each region, 70% of the number of provinces in each region was selected to get the sample size. Then, simple random sampling was used to select one hospital in each province.

Participants with CLBP (>3 months' duration), with or without referred pain to the lower limbs,[23] aged 20 to 60 years, who attended for physical therapy services at the selected study hospital were enrolled. The exclusion criteria were: unwilling to answer the questionnaire, had spinal surgery, serious spinal pathologies, spondylolisthesis, and degenerative scoliosis of >10°.[15] The current study required 30 participants per hospital. Participants who did not meet any of the exclusion criteria above were asked to participate in the study. They were informed of the purpose of the study, provided written consent, and completed the questionnaire with questions asked by their physical therapist.

Study Instrument and Data Collection

The paper-based questionnaire consisted of 6 sections: (i) personal information (eg, questions regarding sex, age, weight, height, occupation, and underlying disease); (ii) screening for lumbar instability; (iii) posture habits during work (eg, prolonged sitting, frequent lifting, prolonged standing, etc.); (iv) exercise habits (eg, frequency of running, yoga); (v) leisure time activities (eg, smartphone use, gardening); and (vi) other area(s) of pain and numbness (identified using a body chart).

For the second section of the questionnaire (lumbar instability screening), we used a tailored tool that has been used to classify patients with CLBP into a lumbar instability group. The Thai version was created for use by Thai physical therapists.[24] Briefly, the tool comprises 14 items related to how the patient feels and his or her behavior, activity, and positions adopted. The tool score ranges from 0 (not related to having lumbar instability) to 14 (strongly related to having lumbar instability). Patients with CLBP who scored ≥7 on the lumbar instability screening tool were classified as having lumbar instability; those who scored ≤6 were defined as not having lumbar instability.

Prior to data collection, the paper-based questionnaire was checked for content validity to confirm all the items aimed to assess factors associated with lumbar instability. This process was performed by a three-person committee. On the committee were two physical therapy specialists who have more than 20 years of clinical experience each and one orthopedic surgeon with more than 20 years of clinical experience. The paper-based questionnaire obtained an index of item congruence (IOC) from the committee of >0.6 for all six sections of the questionnaire.

Data collection took place between August 2021 and January 2022. The study utilized an interviewer-administered questionnaire conducted by a local physical therapist with at least 1 year of clinical experience and who had a Thai Physical Therapy License. The 59 physical therapists were asked to complete an online practice session before they received the paper-based questionnaire. This process was used to confirm they understood all elements of the questionnaire.

Data Analysis

Data analysis was conducted using STATA 10.0 (Stata-Corp LP, College Station, TX, USA). Descriptive statistics were calculated, and data sequestered into groups of participants with and without lumbar instability, as diagnosed using the lumbar instability screening tool.[15] The results are presented as frequencies (proportions; %) for categorical variables and mean±standard deviation (SD) for continuous variables. Odds ratios (ORs) and 95% confidence intervals (CIs) for lumbar instability risk factors were estimated using simple logistic regression analysis at a significance cut-off of $p<0.2$. The factors that reached $p<0.2$ were entered into multivariate regression analysis. An adjusted p-value of <0.05 was deemed statistically significant, using a dichotomous "presence or absence of lumbar instability" as the dependent variable. The association of pregnancy and lumbar instability was calculated in a separate regression model that included only female participants in the analysis.

Results

Prevalence of Lumbar Instability and Baseline Characteristics of Study Participants

A total of 1762 participants with CLBP were recruited (100% responce rate), consisting of 30 participants per hospital from 58 hospitals and 22 participants from the remaining hospital. Participants' demographic characteristics are described in Table 1; of the 1762 participants, 54.54% had lumbar instability and 45.46% did not. Nearly all participants (97.16%) were employed.

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Table 1 Participant Baseline Characteristics (Value Represents Number Shown as Percentage Unless Otherwise Indicated)

	All CLBP (n=1762)	Lumbar Instability Absent (n=801)	Lumbar Instability Present (n=961)
Gender			
Male	587 (33.31)	260 (32.46)	327 (34.03)
Female	1175 (66.69)	541 (67.54)	634 (65.97)
Age range (years)			
20–29	277 (15.72)	160 (19.98)	117 (12.17)
30–39	417 (23.67)	215 (26.84)	202 (21.02)
40–49	416 (23.61)	201 (25.09)	215 (22.37)
50–60	652 (37.00)	225 (28.09)	427 (44.43)
Weight (kilogram), (mean±SD)	64.46±13.92	63.41±14.28	65.33±13.55
Height (centimeter), (mean±SD)	161.45±8.13	161.79±7.88	161.71±8.33
BMI (kilogram/meter^2)			
<18.50	104 (5.90)	59 (7.37)	45 (4.68)
18.50–24.90	931 (52.83)	456 (56.93)	475 (49.43)
25.00–29.90	529 (30.02)	208 (25.97)	321 (33.40)
≥29.90	195 (11.07)	75 (9.36)	120 (12.49)
Lumbar instability screening score, (mean±SD)	6.86±2.78	4.43±1.42	8.89±1.85
Underlying disease			
Yes	542 (30.76)	196 (24.67)	346 (36.00)
No	1220 (69.24)	605 (75.53)	615 (64.00)
Work activities			
Heavy lifting (kilogram)			
<5 kilograms	993 (56.36)	527 (65.79)	466 (48.49)
≥5 kilograms	769 (43.64)	274 (34.21)	495 (51.51)
Prolonged sitting (hours/working day)			
<4 hours	1106 (62.77)	501 (62.55)	605 (62.96)
≥4 hours	656 (37.23)	300 (37.45)	356 (37.04)
Prolonged standing (hours/working day)			
<4 hours	1241 (70.43)	594 (74.56)	647 (67.33)
≥4 hours	521 (29.57)	207 (25.84)	314 (32.67)
Prolonged walking (hours/working day)			
<4 hours	1224 (69.47)	598 (74.66)	626 (65.14)
≥4 hours	538 (30.53)	203 (25.34)	335 (34.86)
Prolonged driving (hours/working day)			
<2 hours	1624 (92.17)	752 (93.88)	872 (90.74)
≥2 hours	138 (7.83)	49 (6.12)	89 (9.26)
Prolonged running (hours/working day)			
<1.5 hours	1681 (95.40)	762 (95.13)	919 (95.63)
≥1.5 hours	81 (4.60)	39 (4.87)	42 (4.37)
Frequent yoga and stretching			
No	1244 (70.60)	570 (71.16)	674 (70.14)
Yes	518 (29.40)	231 (28.84)	287 (29.86)
Smartphone usage >4 hours/day			
No	946 (53.69)	407 (50.81)	539 (56.09)
Yes	816 (46.31)	394 (49.89)	422 (43.91)
Frequent gardening			
No	1103 (62.60)	567 (70.79)	536 (55.78)
Yes	659 (37.40)	234 (29.21)	425 (44.22)

(*Continued*)

Table 1 (Continued).

	All CLBP (n=1762)	Lumbar Instability Absent (n=801)	Lumbar Instability Present (n=961)
Other area of pain			
No	858 (48.69)	429 (53.56)	429 (44.64)
Yes	904 (51.31)	372 (46.44)	532 (55.36)
Neck pain			
No	698 (39.61)	327 (40.82)	371 (38.61)
Yes	1.064 (60.39)	474 (59.18)	590 (61.39)
Other area of numbness			
No	1035 (58.74)	547 (68.29)	488 (50.78)
Yes	727 (41.26)	254 (31.71)	473 (49.22)

Association Between Lumbar Instability and Potential Risk Factors

The univariate regression analyses results are presented in Table 2. Ten factors reached a p-value of <0.2: age ≥40 years, BMI ≥25.00 (kg/m^2), having an underlying disease, frequent lifting ≥5 kg/working day, prolonged standing ≥4 hours/working day, prolonged walking ≥4 hours/working day, prolonged driving ≥4 hours/working day, frequent gardening, other area of pain, and other area of numbness (Table 2).

The ten factors were selected for the initial model of multivariate logistic regression. The backward stepwise technique was used to eliminate the variables with a set p-value of <0.05. The multivariate regression analysis showed that eight factors were associated with lumbar instability: age ≥40 years, BMI ≥25.00 (km/m^2), having an underlying disease, frequent lifting ≥5 kg, prolonged walking ≥4 hours, gardening in leisure time, other area of pain, and other area

Table 2 Risk Factors of Lumbar Instability Among 1762 Participants with Chronic Low Back Pain

Factors	**Lumbar Instability Present**	
	Crude OR Ratio (95% CI)	**Adjusted OR Ratio (95% CI)**
Gender		
Male	1	–
Female	1.07 (0.88–1.31)	
Age range (years)		
<40	1	1
≥40	**1.80** (1.48–2.18) *	**1.36** (1.09–1.69) †
BMI (kilogram/meter ^{2})		
<25.00	1	1
≥25.00	**1.55** (1.28–1.88) *	**1.42** (1.16–1.74) †
Underlying disease		
No	1	1
Yes	**1.67** (1.36–2.06) *	**1.32** (1.06–1.65) †
Heavy lifting (kilogram)		
<5 kilograms	1	1
≥5 kilograms	**2.04** (1.68–2.48) *	**1.69** (1.36–2.09) †
Prolonged sitting (hours/working day)		
<4 hours	1	–
≥4 hours	0.98 (0.81–1.19)	

(*Continued*)

Table 2 (Continued).

Factors	Lumbar Instability Present	
	Crude OR Ratio (95% CI)	Adjusted OR Ratio (95% CI)
Prolonged standing (hours/working day)		
<4 hours	1	–
≥-4 hours	**1.39** (1.13–1.71) *	
Prolonged walking (hours/working day)		
<-4 hours	1	1
≥-4 hours	**1.58** (1.28–1.94) *	**1.31** (1.04–1.64) †
Prolonged driving (hours/working day)		
<4 hours	1	–
≥4 hours	**1.57** (1.09–2.25) *	
Prolonged running (hours/working day)		
<1.5 hours	1	–
≥1.5 hours	0.89 (0.57–1.40)	
Frequent yoga and stretching		
No	1	–
Yes	1.05 (0.86–1.29)	
Smartphone use >4 hours/day		
No	1	–
Yes	0.81 (0.67–0.98)	
Frequent gardening		
No	1	1
Yes	**1.92** (1.57–2.34) *	**1.37** (1.10–1.71) †
Other area of pain		
No	1	1
Yes	**1.43** (1.18–1.73) *	**1.24** (1.01–2.52) †
Neck pain		
No	1	–
Yes	1.10 (0.91–1.33)	
Other area numbness		
No	1	1
Yes	**2.09** (1.72–2.54) *	**1.85** (1.50–2.27) †

Notes: *p-value <0.20; †p-value <0.05.

of numbness. Females who had children showed associated lumbar instability, with an odds ratio of 1.76 (95% CI = 1.36–2.22), p-value <0.0001.

Discussion

The prevalence of and factors associated with lumbar instability in the general Thai population have not been reported to date. The new and important findings from this study showed that 54.54% of Thai people with CLBP have lumbar instability and eight factors are associated with lumbar instability in various aspects of their activities of daily living.

Prevalence of Lumbar Instability

Previous research has reported the prevalence of lumbar instability based on either a clinical test together with a questionnaire or clinical tests alone (13%, 46%, and 75%, respectively).[20,21,25] Our study demonstrated higher prevalence of lumbar instability than Puntumetakul et al; this may be because their study used different diagnostic criteria for diagnosing patients as having lumbar instability; namely, 2/3 of clinical tests positive and 7/13 positive questionnaire responses. Comparing these results to the current findings using only a questionnaire shows this may be a simpler way to expose lumbar instability than the method used in Puntumetakul et al's study.[20] Further, the current study had a much larger sample size (1762 participants) than Puntumetakul et al (323 participants).[20]

Our study results are more aligned with those of Areeudomwong et al, who reported a 46% prevalence of lumbar instability.[25] Their study used the criteria of requiring a positive 7/13 questionnaire score and 3/6 clinical tests, whereas our study used a cut-off score of a positive 7/14 from the questionnaire to define lumbar instability; however, both studies reveal similar prevalence. This may be because participants in both studies were of similar average age (around 50 years old) and neither focused on a specific occupation.

On the other hand, Boonraksa et al reported a higher prevalence of lumbar instability than was found in the current study. Their study defined lumbar instability as positive with 5/14 clinical tests and was conducted in minibus drivers.[21] There was a higher prevalence of lumbar instability in minibus drivers. We suggest this arose because, during driving, there was an adverse effect on the lumbar structures from prolonged sitting, together with whole-body vibration forces.[26] The current study gathered participants with CLBP from various occupational groups (eg, students, housekeepers, teachers, farmers, hairdressers) across all regions of Thailand. Our study may more closely represent the real prevalence of lumbar instability across the Thai population.

Factors Associated with Lumbar Instability

Risk factors were determined in the current study in order to explain the high prevalence of lumbar instability from prior studies.[21,25] There were eight factors associated with lumbar instability, which are described below.

Participants aged more than 40 years old had an adjusted odds ratio of 1.36 (95% CI=1.09–1.69), with a p-value of 0.007, showing that CLBP patients were likely to have lumbar instability. This was contrary to a previous validity study and clinical prediction rule study that reported being <37 years and <40 years old were associated with lumbar instability, respectively.[27,28] Those two studies may have included young adults with highly flexible lumbar regions, as Fritz et al reported the association of lumbar instability and global joint laxity using Beighton's scale.[27] However, the current study revealed that being beyond 40 years of age was related to lumbar instability, which was in accord with other systematic review findings.[29,30] This suggested older age was a risk factor for LBP.[29,30] The Global LBP Prevalence and Burden Study[1] also reported that LBP prevalence increased with age, and years of life disability peaked between 35 to 49 years of age.[1] Aging is associated with pain, which may restrict social and physical function; consequently, this restriction may result in further deterioration of the musculoskeletal system and further pain. Moreover, years of life disability peaked in the middle-aged population, and thus the working-age population is most greatly affected, covering the ages between 45 and 49 years old.[1]

Our study showed that having an underlying disease was significantly associated with lumbar instability. To date, there have been no studies of this association in patients with lumbar instability, so understanding more about comorbidities can provide vital information for management and treatment of lumbar instability. The current study found that 35.45% of the 961 lumbar instability patients had at least one other chronic condition (eg, heart disease, diabetes, hypertension, hyperlipidemia, asthma), with adjusted odds ratio of 1.33 (95% CI=1.06–1.67), p-value of 0.014. Our results align with earlier studies showing adverse effects of chronic disease on LBP. Ramanathan et al conducted a cross-sectional study and reported that 62% of LBP patients had more than one chronic condition,[31] similar to the data from the 214–15 ANHS[32] and German National Health Survey.[33] A potential reason for this association may be that these diseases share some common risk factors, such as physical inactivity.[31] A critical review of the LBP literature found 23 separate studies that showed positive associations between LBP and the following disorders: headache/migraine, cardiovascular disease, respiratory disorders, neck pain, gynecological disease, asthma, hay fever and other allergies, as well as general poor health.[34] In a more recent systematic review, Taylor et al reported that having a chronic disease reached an odds ratio of 1.7 (95% CI=1.2–2.4) to develop LBP.[7]

Being overweight was associated with lumbar instability, with adjusted odds ratio of 1.29 (95% CI=1.04–1.60), p-value of 0.001. There has been no prior assessed association between BMI and lumbar instability; however, it was not surprising that being overweight was related to having lumbar instability. Prior studies have reported the same positive correlation between BMI (being overweight) and LBP.[35,36] The explanation of this finding may be that increasing the loading on the lumbar spine leads to microtrauma.[37] Over time, this increasing weight builds up chronic pain and can eventually develop into lumbar instability.

Frequent weightlifting of more than 5 kg in occupational habits was associated with the development of lumbar instability, which had an adjusted odds ratio of 1.69 (95% CI=1.36–2.09), p-value of 0.0001. Carrying heavy loads at work was the most frequently observed prognostic risk factor for CLBP.[38] Macfarlane et al showed that lifting and moving weights of more than 11 kg increased the risk of low back pain in a 1-year follow-up.[39] A meta-analysis and systematic review concluded that lifting at least 25 kg was associated with LBP.[6,7] However, the current study showed that the frequent lifting of an object of only 5 kg by patients with CLBP was associated with lumbar instability. However, the current study did not assess lifting technique, which may have different effects on the lumbar spine.[20,39] The current study was not specific in relation to occupations; rather, we focused on tasks, for example the frequency of lifting and the weight of loads during the participant's career, meaning this result can be generalized across different occupations with regard to lifting tasks. The study has confirmed, on a populational basis, that working activities involving even light weights in the CLPB population are associated with an increased risk of lumbar instability.

Having an occupation involving prolonged walking of more than 4 hours during the working day was associated with lumbar instability, with an adjusted odds ratio of 1.31 (95% CI=1.04–1.64), p-value of 0.019. That finding accorded with the finding of Macfarlane et al's study; they reported that walking for more than 2 hours per day increased the risk of low back pain with odds ratio up to 2.9 (95% CI=1.5–5.5) in females and 1.6 (95% CI=0.8–3.3) in males.[39] In a study of prolonged walking with backpack loads to gauge trunk muscle activity and fatigue in children, Hong et al reported that most participants suffered from lower trunk muscle fatigue with heavy loads (15–20% of body weight) and from prolonged walking (10–20 min), which was confirmed by analysis of the electromyography data.[40] Additionally, patients with lumbar instability have decreased segmental muscle strength, which puts a strain on the disc or facet joint, which may then progress to vertebral translation.[15]

The current study highlights that leisure time gardening in patients with CLBP was associated with lumbar instability, with adjusted odds ratio of 1.37 (95% CI=1.10–1.71), p-value of 0.005. An average frequency for gardening in CLBP participants with lumbar instability was twice per week, with non-specified duration. When gardening, patients may perform repeated movements of bending, twisting, and lifting. These activities generate load on the spine that can accelerate the degeneration process.[20] Waddell and Burton reported that physical demands of work such as lifting, bending, and twisting, and manual handling are associated with increased risk of back symptoms, pain aggravation, and injuries,[41] supporting this finding.

Having other areas of pain and numbness was also associated with lumbar instability: pain, adjusted odds ratio of 1.23 (95% CI=1.01–1.52), p-value = 0.036 ; numbness, adjusted odds ratio of 1.85 (95% CI=1.50–2.27), p-value = 0.0001. For more details on this finding, Figure 1 shows percentage of participants presenting with other areas of pain and numbness. Both symptoms were highest at the thigh and calf levels. The current study included participants with CLBP (>3 months) with or without referred pain to the lower limbs;[23] however, other areas of pain and numbness may be not

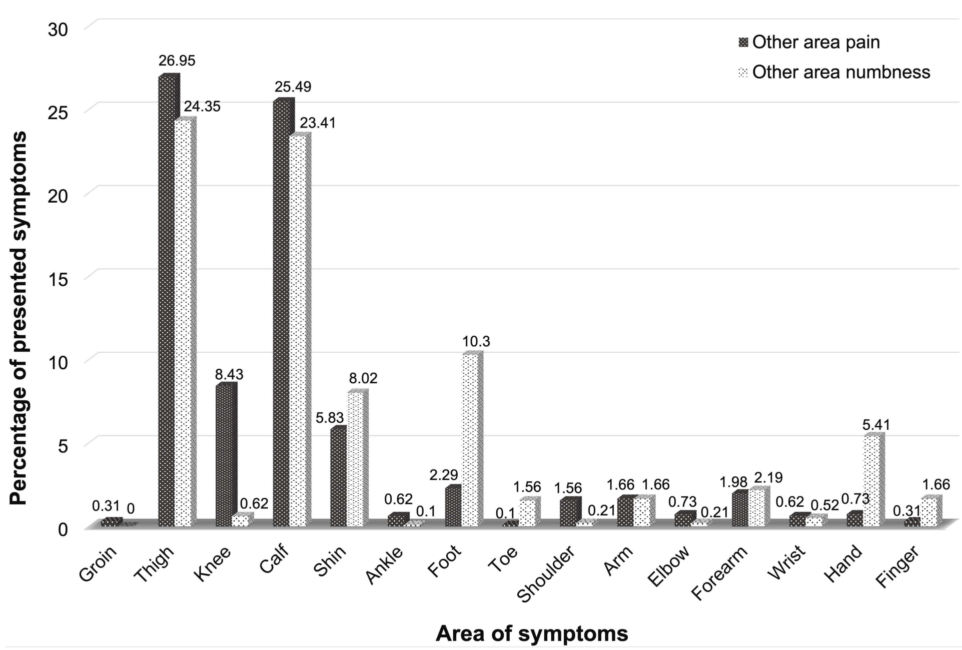

Figure 1 Percentage of other areas of pain and other areas of numbness in participants having lumbar instability.

only due to nerve root involvement but can be present in patients who have lumbar instability. Chatprem et al reported that patients with lumbar instability typically had a higher frequency of pain radiation compared to those without lumbar instability.[15] The findings also confirm evidence that prior LBP is associated with other musculoskeletal conditions.[31]

Pregnancy has been shown to have a significant association with lumbar instability in women; the odds ratio was 1.76 (p-value <0.0001), which is consistent with the findings of several studies that reported similar findings in patients with LBP.[36] Previous pregnancy associated with lumbar instability may be due to weight gained during pregnancy, increasing the abdominal sagittal diameter and the consequent anterior shift of the body's center of gravity. These changes increase stress on the lower back, increasing axial loading of intervertebral discs, leading to decreased height.[42] Postpartum LBP is a temporary disorder with a good prognosis, especially during the first months after childbirth. However, if LBP persists it can lead to lumbar instability.

In summary, all of the reasons above support the associations we found in our study. However, the present study has some limitations. The cross-sectional study design limits the investigation of causality between the risk factors and lumbar instability. Firstly, a prospective study that collects information on "risk factors" before lumbar instability occurs may explain causality between the risk factors and lumbar instability. Secondly, other possible factors, such as psychosocial issues, may also elevate the risk of lumbar instability. These were not assessed in this study, thus further study is needed to investigate these factors in more detail. Thirdly, the current study did not ask the question of other activities that may be associated with prolonged walking (eg, load carrying); further study will clarify if combined activities are identified. Lastly, we did not exclude participants with diabetes mellitus from our analysis, and numbness of participants' extremities may reflect the number of patients with diabetes mellitus.

Conclusion

The current study is the first to assess the prevalence and factors associated with lumbar instability in the Thai population. More than half (54.54%) of Thai participants with CLBP were diagnosed as having lumbar instability using the lumbar instability screening tool. The findings of this study produce important information for exploring associations between various factors and the occurrence of lumbar instability. Giving Thai patients with CLBP education about lumbar instability may help them manage their condition and reduce severity of future lumbar instability symptoms.

Data Sharing Statement

The authors will allow sharing of non-identified participants' data related to our study. The data will be available for anyone who wishes to access it. The data will be accessible immediately following publication until 6 months after publication. Contact should be made via the corresponding author, rungthiprt@gmail.com.

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Disclosure

The authors report no conflicts of interest in this work.

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