

BMJ Open Prevalence and factors associated with joint pain in Nepal: findings from a countrywide cross-sectional STEPS survey

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ABSTRACT

Objective This study aims to determine the prevalence of joint pain and its association with demographic, socioeconomic and behavioural factors in Nepal.

Design The study was a national cross-sectional population-based study.

Setting We used the most recent nationally representative population-based cross-sectional health survey, The WHO STEPwise approach to surveillance (STEPS) survey, 2019 from all seven provinces of Nepal including both urban and rural areas.

Participants The participants were men and women aged 15–69 years, who were usual residents of the households for at least 6 months and have stayed the night before the survey.

Primary and secondary outcome measures Primary outcome in this study was prevalence of joint pain. The secondary outcome measure was factors associated with joint pain in Nepal. Joint pain in our study was based on any self-reported symptoms of joint pain, stiffness and swelling lasting for more than 1 month in the past 12 months. Data were weighted to generate national estimates.

Results The prevalence of self-reported joint pain in Nepal was 17% (95% CI 14.3% to 20.2%) with higher prevalence for older adults, females, ever married, none/less than primary education, smoker, lowest wealth quintile, homemaker, those with sufficient physical activity and those living in the Karnali province of Nepal. In multivariable analysis self-reported joint pain was found to be associated with advanced age (adjusted OR (AOR)=2.36; 95% CI 1.56 to 3.55), sex (AOR=1.47; 95% CI 1.19 to 1.82) and sufficient physical activity (AOR=0.40; 95% CI 0.25 to 0.65).

Conclusions The results showed a high prevalence of joint pain in Nepal. Considering the process of ageing and rapid growth in non-communicable disease, this study warrants the need for health policies directed to prevention, treatment and rehabilitation for people affected by chronic musculoskeletal conditions addressing related disabilities and loss of work in Nepal.

INTRODUCTION

Worldwide, musculoskeletal disorders especially joint and back pain represent the

Strengths and limitations of this study

- To our knowledge, this is the first nationwide population-based study of joint pain in Nepal.
- We used a robust sampling technique that is, multi-stage stratified cluster.
- Due to the cross-sectional nature of the study, establishing a casual relationship between the risk factors and the prevalence of the condition was not possible.
- Diagnosis of joint pain was based on the self-reported questionnaire.

leading contributor to disability¹ and its burden is growing because of the ageing and increasing world population. A recent analysis of Global Burden of Disease data showed that around 1.71 billion people globally have musculoskeletal conditions. Musculoskeletal condition is widely recognised as the leading cause of disability in developed countries.² However, disability related to joint and back pain is projected to markedly increase in low-income and middle-income countries where resources are scarce, quality of care is generally low and people are becoming more sedentary.³

Arthritis is now recognised as one of the most common causes of joint pain.⁴ Patients routinely seek medical attention for joint pain, and it is one of the leading causes of activity limitation and absenteeism at work and poses a heavy economic burden on individuals, and society.^{5 6} Joint pain is a significant public health concern that differentially burdens vulnerable populations, such as the elderly, children and ethnic/racial minorities, due to disparities in treatment and resources.⁷ In a country like Nepal, most of the poor people are engaged in physically demanding jobs. People not being able to perform physical work due to back pain may

put many additional people into poverty. However, it is also highlighted that 80% of people with chronic pain in Nepal continue to work to fulfil the demand for money.⁸ The epidemiology of chronic joint pain and its relationship with sociodemographic and behavioural factors have been reported by numerous studies from various geographical regions and countries.⁹ The literature indicates a set of factors associated with joint pain, such as sociodemographics factors (age, income, sex and education), lifestyles (smoking and low physical activity (PA) or vigorous physical work) and metabolic risk factors (obesity and other comorbid chronic conditions)^{10–12}

Despite their epidemiological, clinical and health economic importance, current data on the prevalence and determinants of musculoskeletal complaints in low/middle-income countries like Nepal are limited. Available information is also based on a hospital setting which doesn't provide the real situation of joint pain. To date, country-specific joint pain prevalence across parameters of socioeconomic and behavioural factors have not been systematically evaluated in a large, nationally representative sample of the population from Nepal. Hence, this study aims to determine the prevalence of joint pain and its association with sociodemographic factors and underlying the behavioural factors.

METHODS

Study design

We used the most recent nationally representative population-based cross-sectional health survey¹³ STEPS survey, 2019 from all seven provinces of Nepal including both urban and rural areas. The survey was conducted using the standardised WHO non-communicable disease (NCD) STEPwise approach to surveillance (STEPS) instrument V.3.2,¹⁴ by incorporating all of the core questions with some selected country-specific modules to assess the joint and back pain in consultation with WHO regional office for South-east Asia. The questionnaire was translated into Nepali and validated by translation and back translation. The field enumerators underwent a 4-day intensive training before deployment. The STEPS field work was carried out between 9 February 2019 and 8 May 2019. Participants were involved in the study for 2 days. Data collection techniques included a face-to-face interview for demographic information and behavioural measurement (STEP 1), physical measurements (STEP 2) and biochemical measurements (blood and urine) collection (STEP 3). The survey data were collected by an android tablets on the spot and transferred and stored in ONA data base server.

Sampling and sampling techniques

This population-based national representative sample was drawn through multistage cluster sampling using the Central Bureau of Statistics data. A total of 25 households were sampled from each of the clusters. Household data were collected from adults aged 15–69 years

by a trained enumerators. Sample size calculation was based on the sample calculator used in the WHO STEPS approach. The sample size was adjusted for design effect for complex sample design set at 2, prevalence of 0.5 for most indicators as the conservative estimate, 0.05 margin of error, 95% CI and a non-response rate of 15%. With these adjustments, the final sample was 6475. Assuming a response rate of 86.7% in STEP 1, total sample size was adjusted for 5593. From each of the selected household, one person between the ages of 15 and 69 was sampled randomly from all the eligible adults in a household using the android tablet. Further details about the study methodology can be found on the STEPS Survey 2019.¹³

Outcomes

Primary outcome in this study was prevalence of joint pain. The secondary outcome measures were factors associated with joint pain in Nepal. Joint pain in our study was based on any self-reported symptoms of joint pain, stiffness and swelling lasting for more than 1 month in the past 12 months. Participants were defined as having joint pain if they had either rheumatoid arthritis or osteoarthritis. Participants who reported having joint pain/stiffness/swelling lasting for more than 1 month and not associated with any injury along with morning stiffness or stiffness after a long rest lasting less than 30 min that goes away after exercise of the joint are categorised as having probable arthritis; while participants who reported having morning stiffness or stiffness after a long rest lasting more than 30 min and that does not go away after exercise of the joint were categorised having probable rheumatoid arthritis.

Covariates

The following covariates were investigated for association with joint pain. The demographic variables were stratified by sex (male, female) age group (15–29, 30–44, 45–69). The socioeconomic variables included marital status (never married, currently married, ever married); (education-none/less than primary, primary, secondary, more than secondary) wealth quintile (lowest, second, middle, fourth, highest); occupation (employed, student, homemaker, unemployed, others) place of residence (urban, rural), province (province 1, province 2, Bagmati province, Gandaki province, Lumbini province, Karnali province, Sudurpaschim province). Health and lifestyle variable were smoking (yes or no), alcohol consumption (yes or no), PA was assessed using the WHO recommended Global Physical Activity Questionnaire (GPAQ) V.2.0, calculating the Metabolic Equivalent of Task (MET) value in minutes per week for work, recreational and transport domains. Sufficient PA was defined as any combination of PAs that exceeds 600 METs per week or (more than 150 min per week). Insufficient PA (IPA) was defined according to WHO recommendation (less than 600 METs per week) or (less than 150 min per week). Body mass index (BMI) in kg/m² was classified into following categories: underweight (<18.5 kg/m²),

normal weight (18.5–24.9 kg/m²), overweight (25–29.9 kg/m²) and obesity (≥30 kg/m²). In the final analysis, we merged ‘underweight’ and ‘normal’ as well as overweight and obese together as the number of individuals for these categories was too small to constitute a standalone BMI group. Provincial distribution has not been included in logistic regression analysis.

Data collection tools and techniques

Data management and analysis

Data were collected electronically using personal digital assistants (PDAs) programmed with WHO e-STEPS software. The data from the field was downloaded from the PDA which was then exported on Microsoft excel for cleaning and cross-checked the inconsistencies. Data analysis was performed using STATA V.15.0 (StataCorp) and Epi Info V.3.4 with appropriate methods for the complex sample design of the survey. Descriptive analyses were reported for a categorical variable, with relative frequencies of the prevalence of joint pain and respective 95% CI and p value.

Associations between dependent and independent variables were tested using χ^2 . Bivariate analysis was conducted to analyse the unconditional association between each explanatory variable and joint pain status. Multicollinearity, the variance inflation factor was assessed for all the independent variables found to be statistically significant from the bivariate analysis. All explanatory variables in the bivariate analysis were inserted in the multivariate binary logistic regression model to see the independent effect of each variable on occurrence of joint pain. For those variables that were not included in the final model, only the unadjusted OR are presented. Finally, we present both unadjusted and adjusted ORs with 95% CIs.

Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

RESULTS

The overall prevalence and descriptive statistics of joint pain in our study population are summarised in [table 1](#). The overall prevalence of joint pain in Nepal was 17.0% (95% CI 14.2% to 20.2%). The age-specific prevalence is found increasing with age and found highest 29.4% (95% CI 24.9% to 34.3%) in the age group of 45–69 years and lowest 9.5% (95% CI 6.7% to 13.4%) among 15–29 years aged participants. Prevalence was highest at 20.1% (95% CI 16.7% to 23.9%) in females compared with males 13.6 (95% CI 11.0 to 16.7). The prevalence of joint pain among participants who were none/less than primary educated was 25.6 (95% CI 21.3 to 30.4). Among participants with secondary education, were 10.8 (95% CI 8.1 to 14.4). The prevalence of joint pain varied considerably also by province, ranged from 12.3% (95% CI 7.5% to 19.5%) in Bagmati province to 25.9% (95% CI 19.9%

Table 1 Descriptive characteristics of participants with joint pain

Numbers and proportions of joint pain across all covariates		
Characteristics	Joint pain	
	Total	Pain% (95% CI)
Age (n=5593)		
15–29	1466	9.5 (6.7 to 13.4)
30–44	2039	17.4 (14.1 to 21.2)
45–69	2088	29.4 (24.9 to 34.3)
Sex (n=5593)		
Women	3595	20.1 (16.7 to 23.9)
Men	1998	13.6 (11.0 to 16.7)
Educational attainment (n=5592)*		
None/less than primary	2792	25.6 (21.3 to 30.4)
Primary	1051	12.4 (9.0 to 16.7)
Secondary	1088	10.8 (8.1 to 14.4)
More than secondary	661	11 (7.4 to 16.1)
Place of residence (n=5593)		
Metropolitan/submetropolitan	705	9.9 (4.9 to 18.8)
Municipality	2755	16.3 (12.9 to 20.4)
Rural municipality	2133	19.8 (14.8 to 25.9)
Province (n=5593)		
Province 1	804	15.9 (10.2 to 24.0)
Province 2	803	12.5 (7.0 to 21.4)
Bagmati province	759	12.3 (7.5 to 19.5)
Gandaki province	793	16.6 (11.4 to 23.4)
Lumbini province	797	18.8 (11.8 to 28.7)
Karnali province	808	25.9 (19.9 to 33.1)
Sudoorpaschim	829	25.6 (19.0 to 33.5)
Wealth quintile (n=5593)		
Lowest	1653	23.3 (18.9 to 28.5)
Second	1062	20.8 (15.8 to 26.9)
Middle	949	15.3 (11.6 to 19.9)
Fourth	878	15.3 (11.5 to 20.0)
Highest	1051	10.4 (6.8 to 15.6)
Occupation (n=5587)*		
Employed	1707	16.3 (12.4 to 21.1)
Student	402	6.3 (3.7 to 10.6)
Homemaker	3142	20.8 (17.4 to 24.6)
Unemployed	273	18.8 (12.5 to 27.3)
Others	63	16 (7.6 to 30.6)
Marital status (n=5592)*		
Never married	538	7.3 (4.8 to 11.0)
Currently married	4752	18.9 (15.7 to 22.5)
Ever married	302	33.7 (26.1 to 42.2)
Physical activity (n=5493)*		
Sufficient (more than 150 min per week)	5090	17.8 (14.9 to 21.1)
Insufficient (Less than 150 min per week)	403	7 (4.3 to 11.2)

Continued

**Table 1** Continued**Numbers and proportions of joint pain across all covariates**

Characteristics	Joint pain	
	Total	Pain% (95% CI)
Smoking (n=5593)		
No	4528	16.7 (13.8 to 20.1)
Yes	1065	18.4 (14.7 to 22.8)
Alcohol consumption (n=5593)		
No	4441	16.6 (13.7 to 20.0)
Yes	1152	18.6 (13.9 to 24.5)
Body mass index (n=5499)*		
Normal or underweight	4009	16.8 (13.8 to 20.3)
Overweight	1490	17.9 (14.4 to 21.9)
Total	5593	17.0 (14.3 to 20.2)

*Missing value.

to 33.1%) in Karnali province. By wealth quintiles, prevalence ranged from 10.4% (95% CI 6.8% to 15.6%) in the highest wealth quintiles to 23.3% (95% CI 18.9% to 28.5%) in low quintile. In terms of occupation, the prevalence was highest at 20.8% (95% CI 17.4% to 24.6%) among homemakers and lowest among students 6.3% (95% CI 3.7% to 10.6%). Regarding their marital status, proportion was highest (33.7% (95% CI 26.1% to 42.2%)) among ever married and lowest among never married 7.3% (95% CI 4.8% to 11.0%).

In our study, the prevalence was more than double 17.8% (95% CI 14.9% to 21.1%) among participants who engaged in sufficient PA compared with IPA 7.0% (95% CI 4.3% to 11.2%). In addition, we found a higher prevalence 18.4% (95% CI 14.7% to 22.8%) among current smokers compared with non-smokers 16.7% (95% CI 13.8% to 20.1%). Similarly, those individuals classified as overweight had slightly higher prevalence, that is, 17.9% (95% CI 14.4% to 21.9%) compared with underweight 16.8% (95% CI 13.8% to 20.3%)

A summary of bivariate and multivariable analyses is presented in [table 2](#). A bivariate analysis was conducted to assess the association between joint pain and risk factors. In bivariate analysis, the variables age, sex, education, province, wealth quintile, occupation, marital status and PAs were significantly ($p \leq 0.05$) associated with joint pain. However, higher age, being a female, belonging to the highest wealth quintile and only primary education, IPA, were the only predictors which remained significantly associated with joint pain on multiple logistic regressions.

The results of our study show that participants aged 45–69 years (OR=2.36; 95% CI 1.56 to 3.55) and participants aged 30–44 years (OR=1.45; 95% CI 0.99 to 0.12) were more likely to have joint pain when compared with participants aged 15–29 years. Similarly, female participants (OR=1.47; 95% CI 1.19 to 1.82) were more likely to have joint pain compared with male participants. Furthermore, being in the highest wealth quintile (OR=0.60; 95%

CI 0.37 to 0.98), having primary schooling (OR=0.72; 95% CI 0.52 to 0.98), completing sufficient PA (OR=0.40; 95% CI 0.25 to 0.65) were protective against joint pain.

DISCUSSION

This study reports population-based prevalence of self-reported joint pain and associated factors in Nepal, aggregating rheumatic diseases and osteoarthritis, using data from the country's major nationally representative population based STEPS survey. The prevalence of joint pain in Nepal can be considered high, given that they are reported by about one in five adults. The overall prevalence of joint pain in our study (17.0%) is equal to or lower than the prevalence presented in several other studies.^{15–19} Study design, methodologies applied, definitions and presentation of results may explain most of the differences.

This study highlights that joint pain is associated with older age, sex, education, province, wealth quintile, occupation, marital status and PAs. After adjusting for age, gender, wealth quintile, education, PA remained the correlates for joint pain in this population.

In this study, as in the literature cited, women had 1.47 times greater prevalence of joint pain than men. This finding may be explained, at least in part, by women being more inclined to report health problems in population surveys, sex-segregation of women into sedentary, repetitive and routine work, and the persisting gender imbalance in domestic work as well as being more frequent users of health services.^{20–21} In agreement with other studies a strong and increasing association was observed between age and joint pain.^{22–24} Given longer life expectancy, the relation between age and increasing prevalence of NCD and functional disability demands more attention from health policy-makers with a view to adjusting management of these conditions in the population.

Both wealth quintile and education show a protective effect on joint pain. Wealth indices were a better discriminator than the educational attainment for joint pain in our sample. This finding is new to Nepal as there are no supporting findings from Nepal. But few studies from outside Nepal show educational achievement has been reported to have better rheumatoid arthritis outcome concerning pain and function.^{25–26}

Well-planned PA has a protective effect on the joints; this is confirmed by the numerous scientific studies.^{27–29} PA and exercise are increasingly being promoted and offered in various healthcare setting, and for a variety of chronic musculoskeletal conditions. However, our multivariable model of this study confirmed the relationship between joint pain and sufficient PA. This seems contrary to the common notion that a sufficient PA may decrease the risk of chronic joint pain; this contrasting finding may be due to the fact that, we used the self-report measurement based on GPAQ rather direct measurement via observation or other methods for example, multimodal exercise based approach, which may have resulted bias

Table 2 Factors associated with joint pain

Characteristics	Bivariate analysis		Multivariable analysis	
	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Age				
15–29	1			
30–44	2 (1.39 to 2.86)	***	1.45 (0.99 to 2.12)	*
45–69	3.94(2.73 to 5.70)	***	2.36 (1.56 to 3.55)	***
Sex				
Men	1			
Women	1.60 (1.32 to 1.92)	***	1.47 (1.19 to 1.82)	***
Educational attainment				
None/less than primary	1			
Primary	0.41 (0.29 to 0.57)	***	0.72 (0.52 to 0.98)	*
Secondary	0.35 (0.26 to 0.48)	***	0.76 (0.56 to 1.02)	0.068
More than secondary	0.36(0.22 to 0.58)	***	0.88 (0.53 to 1.44)	0.601
Place of residence				
Metropolitan	1			
Submetropolitan Municipality	0.45 (0.20 to 1.02)	*		
Rural municipality	0.79 (0.51 to 1.23)	0.296		
Province				
Sudoorpaschim	1			
Province 1	0.55 (0.29 to 1.04)	0.067		
Province 2	0.42 (0.20 to 0.88)	*		
Bagmati province	0.41 (0.21 to 0.79)	**		
Gandaki province	0.58 (0.32 to 1.03)	0.062		
Lumbini province	0.68 (0.35 to 1.31)	0.246		
Karnali province	1.02 (0.61 to 1.70)	0.943		
Place of residence				
Urban	1			
Rural	0.51 (0.23 to 1.11)	0.090	1.57 (0.80 to 3.11)	0.192
Wealth quintile				
Lowest	1			
Second	0.86 (0.62 to 1.20)	0.385	1.02 (0.80 to 1.30)	0.879
Middle	0.59 (0.42 to 0.84)	**	0.78 (0.59 to 1.03)	0.084
Fourth	0.59 (0.39 to 0.90)	**	0.84 (0.59 to 1.20)	0.334
Highest	0.38 (0.22 to 0.65)	***	0.60 (0.37 to 0.98)	*
Occupation				
Employed	1			
Student	0.35 (0.19 to 0.64)	***	0.59 (0.27 to 1.32)	0.198
Homemaker	1.35 (1.03 to 1.76)	*	0.85(0.64 to 1.13)	0.260
Unemployed	1.19 (0.73 to 1.95)	0.483	1.05 (0.73 to 1.52)	0.785
Others	0.98 (0.40 to 2.40)	0.963	0.85 (0.39 to 1.89)	0.696
Marital status				
Unmarried	1			
Currently married	2.95 (1.94 to 4.46)	***	1.13 (0.72 to 1.76)	0.601
Single	6.43 (3.81 to 10.83)	***	1.27 (0.77 to 2.10)	0.347
Body mass index				
Normal or underweight	1			

Continued



Table 2 Continued

Characteristics	Bivariate analysis		Multivariable analysis	
	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Overweight	0.93 (0.72 to 1.19)	0.562	1.02 (0.83 to 1.25)	0.847
Alcohol consumption				
Yes	1			
No	0.87 (0.60 to 1.25)	0.451	1.09 (0.80 to 1.48)	0.604
Physical activity				
Sufficient (more than 150 min per week)	1			
Insufficient (less than 150 min per week)	0.34 (0.20 to 0.59)	***	0.40 (0.25 to 0.65)	***
Smoking				
Yes	1			
No	0.89 (0.68 to 1.16)	0.392	0.89 (0.71 to 1.13)	0.337

*p<0.05; **p<0.01; ***p<0.001.

in the association between PA and joint pain, an objective measure—preferable for assessing the PA level in the population.

Our findings suggest that there is no relationship between smoking (current or previous) and joint pain. Previous research examining the association between joint pain and smoking behaviour has been inconsistent: some studies found a positive association^{30–32} and others suggest no association.³³

Alcohol consumption has many effects on bone, and increased alcohol consumption has been shown to be associated with higher bone density.³⁴ Therefore, it can be expected that increased alcohol consumption may be associated with increased joint pain among participants. However, there was no correlation between alcohol consumption and the presence of joint pain in our study.

Overall, the literature suggests an association between BMI and joint pain,^{35 36} but the strength of the relationship varies by study and also aetiology and type however we did not find any association between BMI with joint pain in our survey.

Our study has several strengths and limitations. The main strengths include, large sample size, coverage of urban and rural residence; all three ecological belts of the country—the mountains, hills and terai, and all provinces of Nepal making it nationally representative data and generalisable among Nepalese population. However, a questionnaire administered by an enumerators was the primary screening tool used and the diagnosis for joint pain was based on the answers to the symptomatic self-reported questions by participants. Another potential limitation of this study include lack of standardised measuring tool for the joint pain and possibility of recall bias with a 1-year time period.

CONCLUSION

About one in five Nepali population suffer from joint pain. Ageing, female gender, belonging to a highest

wealth quintile are the important associated factors for joint pain. Similarly, people having insufficient PA (Less than 150 min per week) have a low risk of developing joint pain. This population based nationally representative survey warrants health system's greater attention for addressing the challenges of pain and disabilities associated with joint pain. Further prospective studies are needed to estimate the impact of this group of conditions particularly addressing related disabilities and loss of works. We believe the results of our study can support for policy and planning for joint pain management in Nepal.

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Contributors AP, BB and MD were responsible for the concept and design, analysis and interpretation of data and writing the manuscript. PG, SK, SB and SS participated in the acquisition, analysis and interpretation of data, and critical revision of the manuscript. All authors wrote the article, edited and approved the final draft of the manuscript.

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Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval The data used in this study were obtained from a cross-sectional nationwide population-based survey. Ethical approval was taken from Ethical Review Board of Nepal Health Research Council prior to conduct the NCD STEPS survey 2019. The participants were informed about the purpose of the research study and were asked to give their written consent to participate in the study. Regarding the under 18 years participants, both assent and consent was sought from the guardian/parents. The participants were also guaranteed confidentiality of their information and were notified that participation would be voluntary.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available in a public, open access repository. Data are available on reasonable request. STEPS tools, data and reports are publicly available at WHO data repositories and can be accessed freely at <https://nada.searo.who.int/index.php/catalog/76>. The data used in the study are also available from this platform.

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