



Associations of multisite pain with mental ill health among women in North India

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Abstract

Physical triggers of multisite body pain (MSP) have typically been the focus of treatment regimens for MSP in low- and middle-income countries (LMICs). We explored the non-physical dimension of MSP, particularly the presence of mental ill health and other possible risk factors. We conducted a case-control study among 140 female participants in North India in early 2019. We used structured interviews to assess pain and validated mental health questionnaires to determine presence of depression and psychological distress. Statistical analyses of MSP, mental health, and demographic data found strong associations between MSP and depression and psychological distress. Marital status (women who had been widowed, separated, or unmarried) was the only demographic factor found to have a significant association with the experience of MSP. We conclude that non-physical factors such as mental health need to be considered by treating practitioners and included within national treatment guidelines in LMICs such as India.

Key words: pain, mental health, women, India, widowhood, multisite musculoskeletal pain, depression, psychological distress disorder

Points of interest

- Multisite pain has long-term impacts but is poorly understood, particularly in LMICs.
- Treatments for multisite pain typically address physical symptoms, whereas non-physical aspects of its aetiology may be important.
- Our study notes a significant association between women reporting multisite pain and marital status (i.e., singleness in some form).

- In high-income settings, studies have indicated associations between mental health conditions and musculoskeletal pain.
- Among women in North India, we confirm the positive association between mental ill health—namely depression and psychological distress—and multisite pain.
- We note that potentially dangerous treatment regimes, such as long-term use of non-steroidal anti-inflammatory medications, are often used when the aetiology is poorly understood.

Introduction

Multisite pain (MSP) is a prevalent condition with far-reaching impacts. A global study estimated that six to 34 percent of the populations in 17 countries suffered from the condition.¹ MSP was predictive of disability, especially when occurring around the neck, back, and upper limbs.^{2,3} For low-and middle-income countries (LMICs), the incidence of MSP is rapidly growing: as of 2015, neck and back pain climbed from the top twelfth in 1990 to the fourth cause of disabilities in LMICs.⁴ In India, where this study was conducted, MSP is often described as “whole body pain” by patients.

Despite its serious long-term health impact, MSP is often inadequately treated or managed, especially in LMICs, partly due to the lack of clear aetiology and partly because causes of the MSP often have been understood in the light of physical triggers such as ergonomics or occupational stressors, heredity, or physical injuries.^{5,6} Notwithstanding the frequent acceptance of this biophysical approach, studies have shown that many cases of multisite body pain cannot be wholly attributed to damage to tissues or other specific physical causes.⁷

The growing understanding of the intricate relationship between mind and body has seen more studies devoted to the non-physical dimension of MSP. Mental disorders, for instance, are among some of the common ailments that involve physical pain. Studies have found that people with musculoskeletal pain likely have concomitant mental health problems.^{1, 8-11} The association between pain and mental disorders may be due to the shared risk factors, which include female gender, older age, low socioeconomic status (SES), and adverse life events.^{8,10,12} Globally,

women were found to have more years lived with disability due in part to higher prevalence of major depressive disorder in addition to higher prevalence of anaemia, migraines, and Alzheimer’s disease.¹³

The impact of MSP and depression in LMICs requires further study. Although the psychological dimension of MSP and chronic pain has attracted growing attention among public health and medical researchers, most of the studies are conducted in high-income countries like Germany, Norway, France, and the UK.^{9,11,14,15} Very few studies have focused on those in LMICs who experience multisite body pain and none specifically on women. To address this, we examined (1) the association between MSP and mental health among women in rural North India and (2) the possible risk factors of MSP.

Ethics approval was obtained from the Community Health Global Network (CHGN) Uttarakhand Cluster on 23 November 2018.

Methods

Study design and setting

We conducted a case-control study between February and July 2019 in Tehri Garhwal District in Uttarakhand, North India. A total of 140 participants were recruited into the study, of which 70 were cases and 70 controls. The participants were selected through a screening survey undertaken in community health clinics.

Cases and controls

We defined MSP, the disease of interest, as currently experiencing physical pain in more than three sites. Given that older age is a well-recognised risk factor, we matched each case with a similarly aged control. We arbitrarily used seven years each side of the case age, but our analysis

showed minimal difference between the ages of the cases and controls. For every case we recruited, the very next female patient without MSP and aged within seven years was recruited as a control. Cases and controls were recruited at the same clinics in the study district. All female patients aged 18 years or above were eligible to be enrolled in the study.

Data collection, variables of interests, and definitions

Through a structured interview, our trained researchers/interviewers identified cases by asking questions about the number of sites they were currently experiencing pain. We collected demographic and socio-economic data with a short questionnaire which contained questions regarding participants' age, education, marital status, family size, parity (number of children), household income, occupation, decision-maker in the household, and type of housing.

We collected data on mental health using the Patients' Health 9 Questionnaire (PHQ-9) and the Self-Reported Questionnaire 20 (SRQ-20), both of which have been validated and widely used for determining the presence of depression and psychological distress, respectively.¹⁶ Validated English and Hindi versions of both screening tools were administered by our researchers as Hindi was widely accepted and understood in this area.

Depression status was determined by the total score of the PHQ-9 in which the questions touch on participants' level of interest in doing things, feeling down or depressed, difficulty sleeping, energy levels, eating habits, self-perception, ability to concentrate, speed of functioning, and thoughts of suicide. Responses range from "0" (not at all) to "3" (nearly every day).

Using the SRQ-20, we assessed patients for presence or absence of psychological distress. This 20-question instrument asks respondents about symptoms and problems likely to be present in those with psychological distress. The response was binary (yes/no), and all 20 items were scored as "0" or "1." The score of "1" indicates that the symptom was present during the past month while

a score of "0" indicates that the symptom was absent.

Participant consent

Participants were briefed verbally about the study objectives based on a plain language statement that was also provided to the participants. We obtained written consent from all participants via a consent form translated into Hindi, which most women in this area could sufficiently comprehend. The contents of the plain language statement and the consent form were read aloud and explained prior to seeking written consent, or verbal consent if they were unable to sign their name (this was then recorded by the researcher).

Statistical analysis

We presented all categorical and binary data as percentages of the total number of participants and/or of the number of participants in their respective group. Age, annual income, average daily hours of household work, family size, PHQ-9 total score, and SRQ-20 total score were presented in mean and standard deviations or median and interquartile range in case of skewed distributions.

We analysed the data as unmatched case-control data as this would be more appropriate given the sample size and the minimal matching in our study. We transformed the two exposure numerical variables into binary variables for tests of association between MBSP and depression and psychological distress. For diagnosis of depression, we followed (17)'s physicians' guidelines, which suggested the following cut-points based on PHQ-9 total scores:

- Minimal depression (0 to 4),
- Mild depression (5 to 9),
- Moderate depression (10 to 14),
- Moderately severe depression (15 to 19),
- Severe depression (20 to 27).

Given the narrow range of total scores and the absence of patients with severe depression in our sample, we combined minimal, mild, and moderate depression as one category, which gives a binary outcome of min/mild/moderate depression vs. moderately severe depression. For psycho-

logical distress, respondents were classified either as “normal” (total SRQ-20 score ≤ 12) or with “psychological distress” (total SRQ-20 score > 12).

We tested the associations between whole body pain and mental health variables (depression and psychological distress), as well as socio-economic variables using the Chi-square test. We also examined the link between depression and selected socio-economic risk factors such as total number of children, hours of housework, and annual income. Strengths of association were measured in odds ratio using EpiTab for case-control studies. All statistical analyses were conducted using Stata v.14.¹⁸ Tests were two-sided with statistical significance at 0.05.

Results

We recruited 140 female participants between February and July 2019 in Tehri Garhwal

District in Uttarakhand, North India. All 140 respondents gave consent to the survey (100 percent response rate) of which 70 (cases) had MSP and 70 did not have the condition.

Socio-demographic profile of all respondents

Table 1 summarises the characteristics of major demographics and mental health conditions of all respondents. The average age of all participants was 39.3 years, ranging from 23 years to 62 years. The median age was 40 years in the case and 38 years in the controls. Approximately 73 percent (n=102) of the respondents were either housewives or farmers. Nearly 70 percent of all participants had no more than five years of education, of which half had no schooling at all. On average, these women worked for more than seven hours daily on household chores. All but two of them lived in owned houses, as opposed to rented.

Table 1. Demographic features of all participants (n=140)

Variable	Categories	Count	%
Education	Never been to school	48	34.29
	1–5 years	48	34.29
	6–9 years	21	15.00
	10–12 years	15	10.71
	College	8	5.71
Marital status	Married	123	87.86
	Separated	3	2.14
	Widowed	13	9.29
	Unmarried	1	0.71
Type of Family	Joint	46	32.86
	Nuclear	94	67.14
Number of boys	Nil	12	8.63
	1 to 2	97	69.78
	3 to 4	26	18.71
	5 to 7	4	2.88
Number of girls	Nil	30	21.58
	1 to 2	75	53.96
	3 to 4	30	21.58
	5 to 6	4	2.88
Type of Housing	Pucc (permanent)	114	81.43
	Kuccha (temporary)	26	18.57
Occupation	Wage worker	32	23.02
	Shop owner	5	3.60
	Farmer	49	35.25
	Housewife	53	38.13
Housing	Own house	138	98.57
	Rented house	2	1.43

Table 1. Demographic features of all participants (n=140) (cont'd)

Variable	Mean	SD	Min	Max
Age	39.32	8.70	23	62
Annual Income (IRP)	76,581.63	57,224.09	10,000	360,000
Average daily hours of household work	7.24	2.42	2	13
Number of family members	6.43	2.76	1	17
PHQ9 [†] (based on total score)	8.2	4.77	0	18
SRQ20 [‡] (based on total score)	9.78	3.59	1	20

Note. [†] Patient Health 9 Questions for measuring depression

[‡] Self-Reported 20 Questions for identifying psychological distress

Whole body pain and mental disorders

Table 1 shows that both the average PHQ-9 and SRQ-20 scores of all respondents were below the parameters for moderately severe depression (total PHQ-9 score <20) and psychological distress (total SRQ-20 score <12). However, in individuals

with the disease of interest (MSP), average SRQ-20 score was 54 percent higher (mean=11.9; SD=2.7) than in those without MSP (mean=7.7; SD=3.2). Similarly, participants with MSP scored more than double on average PHQ-9 (mean=11.4; SD=3.8) when compared with their non-MSP counterparts (mean=5; SD=3.2).

Table 2. Distributions of exposure variables by MSP status

Exposure variable	Category	Case (n=70) Count (%)	Control (n=70) Count (%)	Row total
PHQ	Moderately severe [†]	17 (24.29%)	1 (1.43%)	18
	Min/mild/moderate [‡]	53 (75.71%)	69 (98.57%)	122
SQR20	psychological distress [§]	33 (47.14%)	5 (7.14%)	38
	Normal [¶]	37 (52.86%)	65 (92.86%)	102

Note. [†] Moderately severe: PHQ total >14

[‡] Min/mild/moderate: PHQ total ≤ 14

[§] psychological distress: SRQ total >12

[¶] Normal: SRQ total ≤ 12

Moderately severe depression was 17 times more prevalent in those with MSP (Table 2). Similarly, nearly seven times as many individuals with MSP also had psychological distress when compared with non-MSP subjects. The proportions of both exposures (depression and psychological distress) were significantly different according to pain status (depression: $p < 0.001$; psychological distress: $p < 0.0001$).

We detected an association between MSP and depression. The odds of having moderately severe depression were 22 times higher in those with MSP than in those without (95 percent CI 3.21 to 937.8, $p < 0.001$). Likewise, we observed a link

between MSP and psychological distress. The odds of having psychological distress in patients with MSP were 12 times higher than those in the control group (95 percent CI 3.9 to 40.6, $p < 0.0001$).

Other possible risk factors

Of all socio-economic and demographic variables, marital status was the only factor found to be associated with MSP (Table 3). The odds of being widowed, separated, or unmarried were about four times higher (95 percent CI: 1.07; 16.6, $p = 0.02$) in those with MSP than in those without.

Table 3. Associations between main socio-economic factors and MSP status

Variable	Categories	Case	Control	Row total	Odds ratio (95% CI)	p-value
Education	Never been to school	23 (47.92%)	25 (52.08%)	48	0.88 (0.41; 1.88)	0.72
	Grade 1 to college	47 (51.09%)	45 (48.91%)	92		
Marital status	Widowed, separated, or single	13 (76.47%)	4 (23.53%)	17	3.76 (1.07; 16.59)	0.02
	Married	57 (46.34%)	66 (53.66%)	123		
Type of Family	Nuclear	52 (55.32%)	42 (44.68%)	94	1.93 (0.89; 4.22)	0.07
	Joint	18 (39.13%)	28 (60.87%)	46		
Number of girls	3 or more	17 (50%)	17 (50%)	34	1.02 (0.44; 2.38)	0.96
	0 - 2	52 (49.52%)	53 (50.48%)	105		
No. of children	No children	4 (66.67%)	2 (33.33%)	6	2.09 (0.29; 23.75)	0.39
	1 or more	65 (48.87%)	68 (51.13%)	133		
Type of House	Temporary-Kuccha	15 (57.69%)	11 (42.31%)	26	1.46 (0.57; 3.84)	0.38
	Permanent - Pucca	55 (48.25%)	59 (51.75%)	114		
Occupation	Housewife	27 (50.94%)	26 (49.06%)	53	1.09 (0.52; 2.28)	0.81
	Other occupations	42 (48.84%)	44 (51.16%)	86		
Decision maker	Self	17 (58.26%)	12 (41.38%)	29	1.59	0.27
	Others	49 (47.12%)	55 (52.88%)	104		
Hours of household work	7 hours or more	36 (52.94%)	32 (47.06%)	68	1.59 (0.68; 3.75)	0.25
	2-6 hours	17 (41.46%)	24 (58.54%)	41		
Annual income	40,000 IRP or less	13 (48.15%)	14 (51.85%)	27	1.2 (0.45; 3.2)	0.69
	More than 40,000 IRP	31 (43.66%)	40 (56.34%)	71		
House ownership	Rented	1 (50%)	1 (50%)	2	1 (0.01; 79.62)	1
	Owned	69 (50%)	69 (50%)	138		

Discussion

The present study demonstrates an association between MSP and depression among female patients in a small village clinic in rural North India. Those who had MSP had higher odds of having moderately severe depression than those without. Similarly, the odds of psychological distress were significantly higher in those with MSP than in those without pain. When exploring

possible socio-economic risk factors that might be associated, we found that marital status was related to MSP. Women who were not married, divorced, or widowed, had higher odds of having moderately severe depression than those who were married. The same finding was true for psychological distress.

MSP-mental disorder associations

Our study findings affirm the hypothesis that MSP is associated with depression and psychological distress. The odds of having moderately severe depression were 22 times higher in those with MSP than in those without. Although different in magnitude, our study results in rural North India are consistent with studies done in other contexts that confirm a link between MSP and mental disorders^{1,8-11} In a population-based study involving 17 countries worldwide, Gureje and colleagues (2008) found a strong association between psychological disorders and MSP across cultures. The odds of having a mood disorder and anxiety in those with MSP were almost four times than in those without. Coggon and colleagues also demonstrated a moderate to strong association between mental health status and multisite musculoskeletal pain.⁸

Most of the cited studies took place in urban areas among various occupation groups mostly in European countries. The present study is unique in exploring these associations in rural clinics in North India. However, in the other studies the screening tools for main exposures (depression and psychological distress) and definition of disease outcome (MSP) are not the same across these studies, which limits the comparison of odds ratios.

Despite the association between MSP and mental disturbances, a causal relationship cannot be established based on the case-control methodology. Whether MSP is a risk factor for or an outcome of mental health issues in women is worthy of further investigation. Kroenke and colleagues (19) demonstrated a bi-directional causal relationship in which the severity of chronic widespread pain was predictable of the severity of mental diseases, and vice versa.¹⁹ Some longitudinal studies, however, indicated that low mood led to the subsequent development of pain while also predicting the severity and persistence of pain.²⁰⁻²³ Specifically, it has been suggested that the number of pain sites increased progressively with the severity of mental health disorders.⁸ The limited sample size prevented us from exploring a dose-response relationship, and we treated MSP as a binary variable.

None of the women experiencing MSP were found to be severely depressed, although 24 percent of them had moderately severe depression. This was not surprising since those with very severe or pronounced symptoms of mental disturbances might either be seeking help elsewhere or be too unwell to consult a practitioner. What is concerning is that MSP patients may not be aware of their mild to moderately severe mental health disease, thereby missing out on timely and appropriate intervention. In fact, less severe depression may go unnoticed over a long period due to poor mental health literacy in India.²⁴ In our sample, all but one of the women with MSP had at least minimal, mild, or moderate symptoms of depression. Even if patients with MSP are aware of their mental distress, stigmatisation of mental illness often results in a reluctance to seek medical treatment.²⁵

The role of socio-demographic factors

While MSP was strongly associated with depression and psychological distress, our study found that only marital status, among all socio-economic risk factors, was related to the MSP status. Women with MSP had much higher odds of having any form of singleness, i.e., not married, widowed, or divorced. Ascertainment of a causal path between singleness and MSP could not be established due to the inherent limitation of case-control studies. Mixed results have been published in recent literature. A small study conducted in an urban area of Karnataka, North India, found that those who were married had much higher odds of suffering from chronic pain than the unmarried study subjects (OR 34.9, CI 2.71 to 102.3, $p=0.006$).²⁶ However, our finding was consistent with that of a 14-year, prospective study in Norway: singleness due to separation or divorce was associated with higher number of pain sites.¹⁰ Important questions such as whether and why the association between singleness and MSP is more pronounced in some cultural contexts also merit further exploration.

Although MSP was associated with marital status in the present study, it was not found to be linked with any other socio-economic factors. Many studies affirmed the relations between MSP

and occupation, education and number of dependent children or parity.^{10,21,27,28} One possible explanation of our different findings is the sample size of the present study, which had insufficient power to detect associations with all demographic variables. The odds of MSP were higher in most risk groups; however, these associations were not statistically significant. Moreover, these differences may be due to the fundamental differences in terms of study and contextual settings, case definitions, and target populations.

Further research and policy recommendations

Presently, the exact pathway MSP is connected to mental health is still unclear. Some experts suggest a somatisation presenting as MSP as an explanation. That is, patients complaining of somatic pain could be suffering from psychiatric issues (often termed psychosomatic pain), particularly in cultural contexts where mental disease is stigmatised.²¹ In a study of patients with major depressive episodes, Chowdhury and colleagues (2001) reported that 48 percent said physical pain and other somatic symptoms were the most troubling problems, not the psychological complaints. It is important for patients and physicians to both be aware of the possible connection between pain and mental health. Failure to identify the psychological dimension of pain in some patients may hamper the effectiveness of pain alleviation and exacerbate mental health problems. More concerning, in a context where medication overuse and polypharmacy are common, failing to recognise psychosomatic pain can lead to unnecessary, and often dangerous, treatments ranging from prolonged use of potent anti-inflammatories to unnecessary procedures and injections.²⁹⁻³¹

Alternatively, a confirmation of association between mental health and MSP in our study should not necessarily imply that patients who show both symptoms must be demonstrating psychosomatic pain syndromes. Screening on somatising tendency using validated measures such as the Brief Symptom Inventory (BSI) would be beneficial to our understanding of the complex relationship between mental health and MSP.³²

More importantly, to fully grasp the aetiology of MSP, we need well-designed longitudinal studies in rural India where medical resources are scarce and mental health disorders and MSP are prevalent.

Our study has several limitations. The presence of wide confidence intervals suggests that a sample size was insufficient to detect all statistically significant demographic associations between risk factors for depression and MSP. Although generalisability of the study is limited by participants being from community health clinics (rather than randomly selected), our findings are highly consistent with other studies in other geographic areas. A common concern of a self-reporting mental health survey is the possibility of over- or under-reporting of mental disturbances, especially when the research objectives were known to the participants. While imprecision of estimation seems inevitable, this is unlikely to be differential according to the status of MSP. More importantly, in a society where mental diseases are stigmatised or at least seen as undesirable, over-reporting of mental health problems is unlikely.^{24,33} Furthermore, we applied two screening tools for mental health in our survey, and both depression (measured by PHQ-9) and psychological distress (measured by SRQ-20) were strongly associated with MSP.

Conclusion

This study among women in rural India is highly supportive of the association between MSP and depression and psychological distress, which is highly consistent with other studies. Where MSP is reported, depression is highly likely and should be evaluated by the treating practitioner. Indian guidelines for managing MSP should outline this association in order to limit unnecessary treatments or mismanagement of these women.

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