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Original Research Article

Prevalence and Predictors of Chronic Musculoskeletal Pain in the Population of Punjab

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ABSTRACT

The information about prevalence and associated risk factors of musculoskeletal pain remains to be examined in the population of Punjab, India, the present cross sectional study examined 493 subjects from tertiary health care hospitals of Punjab to examine the prevalence and predictors of chronic musculoskeletal pain. Musculoskeletal disorders and associated chronic pain was assessed by Nordic Musculoskeletal Questionnaire (NMQ) and Numerical rating Scale (NRS). Depression, cognition and sleep quality was examined using Patients Health Questionnaire-9 (PHQ-9), Mini Mental State Examination (MMSE) and Pittsburgh Sleep Quality Index (PSQI) respectively. The prevalence of mild, moderate and severe pain was observed to be 15.41, 20.69 and 21.10percent in women, which is 1.59 to 1.87folds higher ($P<0.05$) than men.In univariate testing, chronic pain was observed to be strongly associated with BMI >23 kg/m^2,low income group, sedentary life style, low density lipoprotein (LDL) >100 mg/dl, triglycerides (TG) >150 mg/dl, statin use, depression and poor sleep quality ($P< 0.05$). In multivariate logistic regression model, risk factors like sedentary life style, BMI >23kg/m^2, depression and poor sleep quality emerged as independent predictors of chronic musculoskeletal pain. The present study revealed that higher prevalence of pain in musculoskeletal disorders is evident in the population of Punjab, especially in women and majority of these patients remain undiagnosed for significant concomitants.

Keywords: Musculoskeletal disorders; chronic pain; risk factors; predictors; Punjab.

INTRODUCTION

The recurrent or chronic pain as a manifestation of various musculoskeletal disorders is an extremely relevant health concern. It is a common problem prevalent in 30-40 percent of adult population in its global perspective. [1] Several risk factors which cooperate and contribute in the development of musculoskeletal pain vary greatly across humans because of different cultural, psychosocial, physiological, environmental and genetic factors. [2] Despite its formidable impact, pain management and convalescence of the patients are largely insufficient especially in the developing countries. The incongruent subjective sensitivity to pain coupled with co-existing, though unforeseen factors make it highly complex to understand. For instance, patients with musculoskeletal pain have higher chances of getting depression, whereas, depressed subjects with chronic pain have severe symptoms of insomnia or sleep deprivation. [3] Therefore, it is possible that musculoskeletal pain may be inappropriately managed in the primary care

setting because of the unidentified co-existing depression and its other inevitable concomitants such as poor sleep.

The prevalence of musculoskeletal pain among Indian population has not been reported so far, except a study conducted on residents of national capital region, Delhi, [4] nonetheless, few reports have analyzed the prevalence of musculoskeletal disorders in different occupational settings. [5,6] In order to understand the impact of various risk factors, the present study aims to examine the prevalence and predictors of chronic pain in the population of Punjab suffering from musculoskeletal disorders.

MATERIALS AND METHODS

This cross-sectional study involved 493 consenting patients who were suffering from chronic musculoskeletal pain and attended orthopedic outpatient departments (OPDs) and pain clinics of Government Medical Hospital, Patiala, Dayanand Medical College and Hospital (DMCH), Ludhiana, Orthonova Hospital, Jalandhar and Doctor Hardas Hospital and Advanced Research Centre, Amritsar. These hospitals are tertiary health care providers and cater to the referral patients of almost entire region of Punjab. Total 1147 subjects were screened and amongst them, 764 subjects were found eligible after preliminary exclusion criteria. These subjects were tested for musculoskeletal disorders by using Nordic Musculoskeletal Questionnaire (NMQ). Out of these 764 subjects, 114 subjects were excluded because they suffered from trauma, injury or surgical pain, cancer pain, neuropathic pain, phantom limb pain, migraine or headache and congenital analgesia. Subjects having congenital analgesia or suffering from any type of pain other than musculoskeletal and/or if its duration was less than three months were also excluded.157 subjects were excluded because of having neurological or psychiatric disorders other than depression, endocrinal disorders, post stroke pain, grieved with recent bereavement, hormone replacement therapy, calciotropic, corticosteroidal, heparin and anticonvulsant drugs, women with unusual gynecological history, unclear menopause status, irregular cycles or premature menopause before the age of 40 years, subjects having multiple disorders such as, complicated hypertension, cerebrovascular infarcts or angina. The final representative data comprised of 493 patients suffering from pain because of various musculoskeletal disorders (Figure 1). These patients were further categorized according to the severity of pain. All patients gave their written consent prior to participation and the study was approved by ethical committee of the institute.

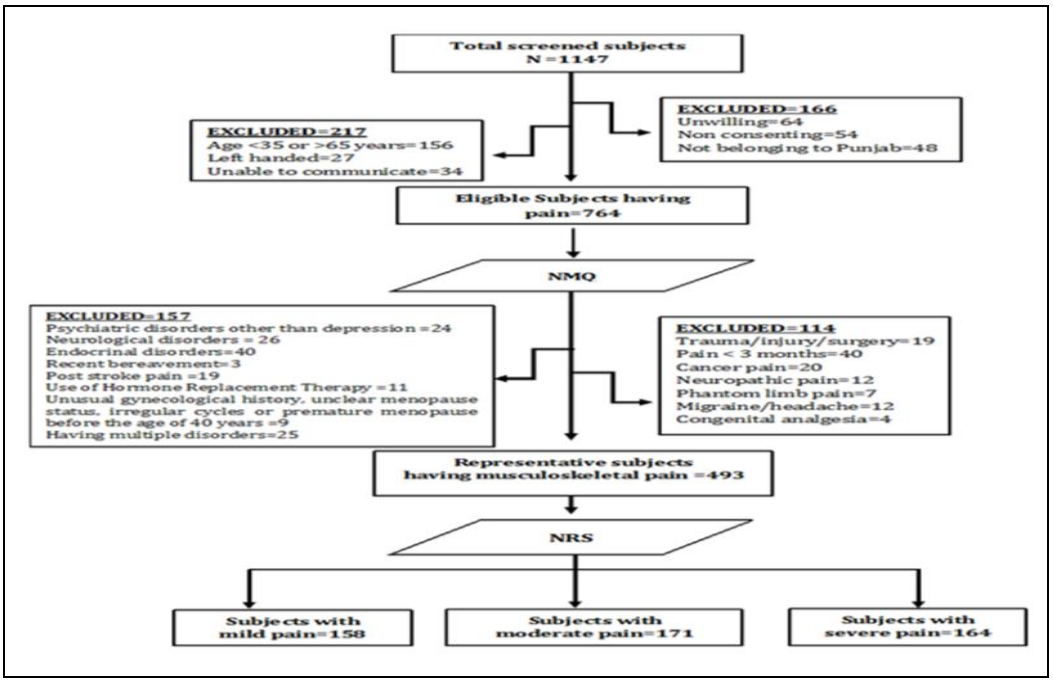
Assessment of musculoskeletal disorders and associated pain

All the subjects having pain were assessed for musculoskeletal disorders by Nordic musculoskeletal questionnaire (NMQ). [7] NMQ contains 40 forced choice questions based on body map indicating nine anatomical regions of the body on which respondents mark the place of localization of the pain. NMQ has additional 25 questions which provide detailed account of other concomitants such as frequency of pain or discomfort, any accident eliciting the pain, duration of the problem and pain in the last seven days etc. Further these subjects were assessed for pain using Numeric rating scale (NRS), an 11 point numeric scale for deducing pain intensity. In comparison to other commonly used pain intensity measuring instruments, NRS has been reported to be the most responsive, [8] easy to use and has higher compliance rate. [9] Patients were categorized on the basis of pain severity into three categories i.e. subjects with mild, moderate and severe pain.

Assessment of depression, cognition and sleep quality

All these subjects were evaluated for co-existing depression, neurocognitive impairment and sleep disturbances. The assessment of depression was done using Patients Health Questionnaire-9 (PHQ-9) which is a self-administered version of the

Primary Care Evaluation of Mental Disorders (Prime-MD). It reflects the Diagnostic and Statistical Manual for Mental Disorders-fourth version (DSM-IV). The assessment of depression by PHQ-9 is in good agreement with other tests administered by health care professionals. [10,11] Its reliability to detect depression has been validated in India. [12] PHQ-9 score ≥10 has been reported to provide 88 per cent sensitivity and specificity for diagnosing depression. [10] Patients were assessed for cognitive impairment by using the standard version of Mini Mental State Examination (MMSE). [13] It comprises 30 point questionnaire which is used to screen arithmetic, language use, and memory and orientation skills. Its validity to detect cognitive decline has been confirmed, whereby MMSE score of ≤ 23 has sensitivity of 81.3 percent and specificity of 60.2 percent. [14] Pattern and quality of sleep in the subjects was evaluated using Pittsburgh Sleep Quality Index (PSQI). It is comprised of nineteen questions generating seven components of sleep such as subjective sleep quality, sleep duration, sleep latency, habitual sleep efficiency, use of sleeping medications, sleep disturbances and daytime dysfunction during the last month. The sum of scores from these components generates global score, which if, <5 or ≥5 indicates good sleep or poor sleep respectively. A global PSQI ≥5 has been confirmed to deliver 89.6 percent sensitivity and 86.5 percent specificity in differentiating poor sleep from good sleep. [15]



Definitions of risk variables

Socioeconomic status of the subjects was calculated according to the updated version of Kuppuswamy and Pareekh scale. [16] Its categorization was done based on per capita per month income in rupees. Accordingly, subjects having per month income of ≤10,000 were considered as low income group, 10,000-50,000 as middle income group and>50,000 as high income group. Physical activity was determined on the basis that whether subjects were doing atleast 30 minutes of aerobic exercise/walk every day and accordingly were considered active otherwise sedentary. Information regarding lipid levels, duration of pain and statin use was noted down from their medical records. Subjects who had not been tested for lipid levels or if tested 3 months prior to the participation in this study, were tested for their complete lipid profiles. Information regarding marital status,

education level, working status, smoking, drinking alcohol was recorded by interviewing them. Height and weight were measured and body mass index (BMI) was calculated according to Quetelet equation (BMI = weight in kilograms/ height in meters squared). According to WHO expert consultation (2004) on BMI of Asian Indians, BMI was categorized as normal weight (≤23kg/m^2), overweight (≥23-29.9kg/m^2) and obese (>30kg/m^2). [17] Systolic and diastolic blood pressure was noted down as a mean of two tests conducted after an interval of 3 minutes in sitting position after 15 minutes of rest.

Statistical Analysis

Data is presented as numbers or Mean±Standard deviation or otherwise indicated. The difference between the groups was examined using chi-square test for categorical variables and student's t-test for continuous variables. A linear regression was applied to investigate the association of risk variables between mild pain versus moderate pain and mild pain versus severe pain (GLM procedure). Those variables which showed linear relationship with the dependent variable (P<0.05) in univariate testing were further included in the multivariate logistic regression analysis (backward stepwise) to identify independent association of the significant variables. The significance was checked at five percent level but for multiple comparisons Bonferroni correction was applied accordingly.

RESULTS

Prevalence of pain

Present study investigated the prevalence of chronic pain in 493 subjects ranging in age from 35 to 65 years (53.09 ± 7.91) having musculoskeletal disorder. Pain prevalence according to the main site of pain was observed to be higher in females than males (Table 1). Point prevalence of mild, moderate and severe pain was observed to be 15.41 percent, 20.69 percent and 21.10 percent in women in comparison to 16.63 percent, 14.0 percent and 12.17 percent respectively in men. Mean BMI of the subjects was 26.83 ± 3.56 with increasing values from mild (25.75 ± 4.39) to moderate (27.47 ± 3.99) and then to severe pain (28.12 ± 3.29). Mean duration of pain was 85.93 ± 38.04 months in the present study. PHQ-9>10 score criteria for the diagnosis of depression revealed that subjects suffering from all the three types of pain i.e. mild, moderate and severe had 12.10 ± 7.40, 14.30 ± 6.52 and 15.80 ± 5.45 mean scores of depression respectively. Subjects who suffered from mild and moderate pain had normal cognition (>23 MMSE scores) however, cognitive impairment was evident in subjects having severe pain (22.46 ±1.8). Poor sleep (PSQI scores ≥5) was prevalent in increasing order from mild (6.3 ±3.2) to moderate (8.7± 4.7) and to severe pain (10.2 ± 5.1) (Table 2).

Association between pain severity and risk variables

Table 1: Prevalence of chronic musculoskeletal pain according to gender

Main site of pain	Men, N (%)	Women, N (%)	Total, N (%)
lower back	59 (11.97)	85 (17.24)	144 (29.21)
Knees	39 (7.91)	50 (10.14)	89 (18.05)
Upper back	22 (4.46)	30 (6.08)	52 (10.54)
Shoulder	20 (4.06)	24 (4.87)	44 (8.93)
Neck	15 (3.04)	12 (2.44)	27 (5.48)
Lower leg	14 (2.84)	18 (3.65)	32 (6.49)
Limbs	13 (2.64)	16 (3.25)	29 (5.89)
Thighs	10 (2.03)	13 (2.64)	23 (4.67)
Forearm	8 (1.62)	9 (1.82)	17 (3.44)
Hips	6 (1.22)	15 (3.04)	21 (4.26)
Ankles	5 (1.01)	10 (2.03)	15 (3.04)
Overall pain	**211 (42.80)**	**282 (57.20)**	**493 (100)**

The association analysis between mild pain versus moderate pain and mild pain versus severe pain (Table 3) revealed that being a woman increased the risk of both moderate (OR 1.59 95%CI 1.03-2.47, P = 0.04) and severe musculoskeletal pain (OR 1.8795%CI 1.20-2.92, P=0.008). Higher BMI values (23-29.9 kg/$m^2$and >30 kg/m^2) emerged as significant risk variables for moderate and severe musculoskeletal pain (P<0.05) in comparison to subjects having lower BMI (<23kg/m^2).Sedentary life style increases the risk of chronic pain from moderate (OR 2.85 95%CI 1.81-4.84, P<0.001) to severe (OR 4.07 95%CI 2.55-

6.47, P<0.001) in comparison to subjects leading active lifestyle. Subjects having low density lipoproteins (LDL)(>100mg/dl) were at higher risk of moderate (OR 1.80 95%CI 1.15-2.82, P=0.01) and severe pain (OR 2.26 95%CI 1.44-3.55, P=0.001). Higher triglyceride (TG) levels (>150mg/dl) also increased the risk of moderate (OR 1.60 95%CI 1.03-2.49, P=0.04) and severe pain (OR 1.93 95%CI 1.24-3.01, P=0.005). Subjects who used statins as lipid lowering drug had approximately 2 and 2.4 times higher chances of suffering from moderate (OR 1.98 95%CI 1.27-3.08, P=0.004) and severe pain (OR 2.33 95%CI 1.49-3.65, P<0.001) respectively. Subjects having both musculoskeletal disorders and depression had higher likelihood of developing moderate (OR 1.69 95% 1.10-2.62, P=0.02) and severe pain (OR 2.18 95%CI 1.39-3.40, P=0.001). Poor sleep was also observed as a significant risk variable for both moderate (OR 1.68 95%CI 1.08-2.60, P=0.03) and severe musculoskeletal pain (OR 2.18 95%CI 1.39-3.40, P=0.001). Other variables such as gender, age, marital status, blood pressure, duration of pain, tobacco smoking, alcohol drinking, education level, working status, total cholesterol, high density lipoprotein, cholesterol and cognition did not influence chronic musculoskeletal pain (P>0.05).

Table 2: Baseline data showing distribution of subjects according to severity of musculoskeletal pain

Variables	Mild Pain (N= 158)	Moderate Pain (N=171)	Severe Pain (N=164)	Total (N=493)
Age (Mean±SD)	49.84±9.44	52.84±8.37	56.43±5.38	53.09±7.91
Gender				
Men: women	82 (16.63) : 76 (15.41)	69 (14.0): 102 (20.69)	60(12.17): 104(21.10)	211 (42.80): 282 (57.20)
Marital Status				
Unmarried: married: widow: divorced/separated	5:131:14:8	8:137:15:11	6:135:13:10	19: 403: 42: 29
Smoking				
Non smokers: smokers: ex-smokers	130:21:7	135:24:12	125:26:13	390: 71: 32
Alchol Drinking				
Non drinkers: drinkers: ex-drinkers	124:27:7	133:32:6	119:36:9	376: 95: 22
Education Level				
Matriculation: Secondary: Graduation and above	103:31:24	111:33:27	109:36:19	325: 98: 70
Socio-Economic Status				
High income: middle income: low income	35:105:18	41:88:42	36:89:39	112: 282:99
Physical Activity				
Active: sedentary	109:49	75:96	106:58	290:203
BMI (Mean±SD)	25.75±4.39	27.47±3.99	28.12±3.29	26.83±3.56
Blood Pressure				
Systolic BP(Mean ±SD)	124.70±20.82	127.75±24.60	128.90±29.18	125.76±34.52
Diastolic BP (Mean ±SD)	86.46±21.62	90.74±25.74	91.86±29.75	89.92±12.22
Duration Of Pain				
Months (Mean±SD)	25.23±36.45	51.29±47.02	172.20±29.75	85.93±38.04
Lipid Profile				
TC (Mean±SD)	199.60±73.20	210.53±59.25	217.03±61.2	207.65±52.03
LDL(Mean ±SD)	141.40±21.82	149.26±37.85	152.52±45.22	146.95±35.10
TG(Mean ±SD)	142.05±44.70	157.10±41.80	184.50±35.20	168.05±35.1
HDL (Mean ±SD)	49.30±18.80	45.92±18.15	43.89±29.98	45.56±5.6
Statin Use				
Non-users: users	102:56	82:89	72:92	256:237
Depression				
PHQ9 score (Mean±SD)	12.10±7.40	14.30±6.52	15.80±5.45	13.50±5.2
Sleep Quality				
PSQI score (Mean±SD)	6.3±3.2	8.7±4.7	10.2±5.1	7.2±4.6
Pain Assessment				
NRS score(Mean ±SD)	3.2±3.8	5.4±4.7	8.4±5.1	5.80±1.2
Cognition				
MMSE score (Mean±SD)	27.2±2.4	23.5±1.9	19.7±2.1	22.46±1.8

TC: Total cholesterol, LDL: Low density lipoprotein, TG: triglycerides, HDL: high density lipoprotein

Independent risk predictors

All those variables which showed significant association in univariate testing were put in backward stepwise logistic regression model to identify independent predictors that conferred risk of chronic

musculoskeletal pain. Insignificant and unclear variables were excluded especially to avoid noise in the data. Colinearity diagnostics in the multiple regression model revealed that variance inflation factor (VIF) between these variables was <3, suggestive of no multicollinearity between predictor variables.

Table 3: Association of risk variables with the severity of chronic musculoskeletal pain

Variables	Mild Pain (N= 158)	Moderate Pain (N=171)	Severe Pain (N=164)	†OR (95% CI), P value	‡OR (95% CI),P value
Gender					
Men	82 (51.90)	69 (40.35)	60 (36.58)	Referent	Referent
Women	76 (48.10)	102 (59.65)	104 (63.42)	1.59 (1.03-2.47), P=0.04	1.87 (1.20-2.92), P=0.008
Age					
35-45 years	56 (35.44)	42 (24.56)	35 (21.34)	Referent	Referent
46-55 years	54 (34.18)	61 (35.67)	62 (37.81)	1.51 (0.88-2.59), P=0.18	1.84 (1.05-3.21), P=0.04
56-65 years	48 (30.38)	68 (39.77)	67 (40.85)	1.89 (1.10-3.26), P=0.03	2.23 (1.27-3.92), P=0.007
Marital Status					
Unmarried	5 (3.16)	8 (4.67)	6 (3.65)	Referent	Referent
Married	131 (82.91)	137 (80.11)	135 (82.32)	0.65 (0.21-2.05), P=0.65	0.86 (0.26-2.88), P=0.95
Widow/widower	14 (8.86)	15 (8.77)	13 (7.92)	0.67 (0.18-2.54), P=0.80	0.77 (0.19-3.16), P=1.00
Divorced /separated	8 (5.07)	11 (6.45)	10 (6.11)	0.86 (0.20-3.63), P=0.87	1.04 (0.23-4.70), P=0.74
BMI (Kg/M^2)					
<23	77 (48.73)	48 (28.07)	42 (25.61)	Referent	Referent
23-29.9	52 (32.91)	57 (33.33)	58 (35.36)	1.76 (1.04-2.96), P=0.04	2.04 (1.20-3.48), P=0.01
>30	29 (18.36)	66 (38.60)	64 (39.03)	3.65 (2.07-6.43), P<0.001	4.05 (2.27-7.21), P<0.001
Blood Pressure: SBP					
≤120mm Hg	93 (58.86)	91 (53.21)	81 (49.39)	Referent	Referent
>120mm Hg	65 (41.14)	80 (46.79)	83 (50.61)	1.26 (0.81-1.95), P=0.36	1.47 (0.94-2.28), P=0.11
DBP					
≤80mm Hg	103 (65.19)	97 (56.72)	90 (54.87)	Referent	Referent
>80mm Hg	55 (34.81)	74 (43.28)	74 (45.13)	1.43 (0.91-2.23), P=0.14	1.54 (0.98-2.41), P=0.08
Duration Of Pain					
≥3 months -3 years	48 (30.38)	35 (20.46)	30 (18.29)	Referent	Referent
4-6 years	41 (25.95)	42 (24.57)	38 (23.17)	1.40 (0.76-2.59), P=0.35	1.48 (0.79-2.80), P=0.29
7-10 years	36 (22.79)	45 (26.32)	46 (28.05)	1.71 (0.92-3.18), P=0.12	2.04 (1.09-3.84), P=0.04
>10 years	33 (20.88)	49 (28.65)	50 (30.49)	2.04 (1.10-3.79), P=0.03	2.42 (1.29-4.57), P=0.009
Smoking					
Non smokers	130 (82.28)	135 (78.95)	125 (76.22)	Referent	Referent
Smokers	21 (13.29)	24 (14.03)	26 (15.85)	1.10 (0.58-2.07), P=0.89	1.29 (0.69-2.41), P=0.52
Ex-smokers	7 (4.43)	12 (7.02)	13 (7.93)	1.65 (0.63-4.32), P=0.43	1.93 (0.75-5.00), P=0.25
Alcohal Drinking					
Non drinkers	124 (78.48)	133 (77.79)	119 (72.57)	Referent	Referent
Drinkers	27 (17.08)	32 (18.71)	36 (21.95)	1.10 (0.63-1.95), P=0.84	1.39 (0.79-2.43), P=0.31
Ex-drinkers	7 (4.44)	6 (3.50)	9 (5.48)	0.80 (0.26-2.44), P=0.91	1.34 (0.48-3.71), P=0.76
Education Level					
Matriculation	103 (65.19)	111 (64.91)	109 (66.46)	Referent	Referent
Secondary	31 (19.62)	33 (19.30)	36 (21.95)	0.99 (0.56-1.73), P=0.92	1.10 (0.63-1.90), P=0.85
Graduate and above	24 (15.19)	27 (15.79)	19 (11.59)	1.04 (0.57-1.92), P=0.98	0.75 (0.39-1.45), P=0.49
Socio-Economic Status					
High income	35 (22.15)	41 (23.98)	36 (21.95)	Referent	Referent
Middle income	105 (66.45)	88 (51.46)	89 (54.27)	0.72 (0.42-1.22), P=0.27	0.82 (0.48-1.42), P=0.58
Low income	18 (11.40)	42 (24.56)	39 (23.78)	1.99 (0.98-4.06), P=0.08	2.11 (1.02-4.36), P=0.06

Continued table no. 3……					
Physical Activity					
Active	109 (68.98)	75 (43.86)	58 (35.36)	Referent	Referent
Sedentary	49 (31.02)	96 (56.14)	106 (64.64)	2.85 (1.81-4.48), P<0.001	4.07 (2.55-6.47), P<0.001
Total Cholesterol					
≤200 mg/dl	98 (62.02)	97 (56.72)	87 (53.05)	Referent	Referent
>200mg/dl	60 (37.98)	74 (43.28)	77 (46.95)	1.25 (0.80-1.94), P=0.39	1.45 (0.93-2.25), P=0.13
Low Density Lipoprotein					
≤100mg/dl	107 (67.72)	92 (53.80)	79 (48.17)	Referent	Referent
>100 mg/dl	51 (32.28)	79 (46.20)	85 (51.83)	1.80 (1.15-2.82), P=0.01	2.26 (1.44-3.55), P=0.001
Triglycerides					
≤150 mg/dl	96 (60.76)	84 (49.12)	73 (44.52)	Referent	Referent
>150 mg/dl	62 (39.24)	87 (50.88)	91 (55.48)	1.60 (1.03-2.49), P=0.04	1.93 (1.24-3.01), P=0.005
High Density Lipoprotein					
≥40 mg/dl	100 (63.29)	102 (59.65)	86 (52.44)	Referent	Referent
<40 mg/dl	58 (36.71)	69 (40.35)	78 (47.56)	1.17 (0.75-1.82), P=0.57	1.56 (1.00-2.44), P=0.06
Statin Use					
Non-users	102 (64.55)	82 (47.95)	72 (43.90)	Referent	Referent
Users	56 (35.45)	89 (52.05)	92 (56.10)	1.98 (1.27-3.08), P=0.004	2.33 (1.49-3.65), P<0.001
Depression					
Non depressed	90 (56.96)	75 (43.85)	62 (37.80)	Referent	Referent
Depressed	68 (43.04)	96 (56.15)	102 (62.20)	1.69 (1.10-2.62), P=0.02	2.18 (1.39-3.40), P=0.001
Sleep Quality					
Good sleep	95 (60.13)	81 (47.37)	68 (41.46)	Referent	Referent
Poor Sleep	63 (39.87)	90 (52.63)	96 (58.54)	1.68 (1.08-2.60), P=0.03	2.13 (1.36-3.32), P=0.001
Cognition					
Normal cognition	106 (67.08)	95 (55.55)	80 (48.78)	Referent	Referent
Impaired cognition	52 (32.92)	76 (44.45)	84 (51.22)	1.63 (1.04-2.55), P=0.04	2.14 (1.36-3.36), P=0.001

Values in parenthesis are percentages. † Mild pain vs. moderate pain, ‡ Mild pain vs. severe pain

Sedentary lifestyle independently predicted 1.54 (95%CI 1.07-2.21, P=0.02) folds increased risk of moderate and 1.88 (95%CI 1.22-2.92, P=0.004) folds increased risk in severe pain. Each unit increase of BMI (>23kg/m^2) added 1.56 (95%CI 1.04-2.35, P=0.032) and 1.76 times (95%CI 1.13-3.03, P=0.04) the risk of moderate and severe pain independently. Depression influenced the risk of both moderate (OR 2.25 95%CI 1.08-4.75, P=0.03) and severe pain (OR 3.96 95%CI 3.05-6.97, P<0.001). Amongst these variables, poor sleep emerged as the strongest independent risk predictor for both moderate (OR 4.57 95%CI 3.87-9.13, P<0.001) and severe pain (OR 8.20 95%CI 5.07-13.28, P<0.001) in the population of Punjab suffering from musculoskeletal disorders (Table 4).

Table 4: Multivariable backward stepwise regression analysis to determine factors independently associated with chronic musculoskeletal pain

Moderate musculoskeletal pain				
Variables	**β±SE**	**OR**	**95%CI**	**P**
Sedentary life style	0.43±0.18	1.54	1.07-2.21	0.020
BMI (>25kg/m^2)	0.45±0.21	1.56	1.04-2.35	0.032
Depression	0.81 ± 0.38	2.25	1.08-4.75	0.030
Poor Sleep	1.55±0.21	4.57	3.87-9.13	<0.001
Severe musculoskeletal pain				
Variables	**β±SE**	**OR**	**95%CI**	**P**
Sedentary life style	0.63±0.22	1.88	1.22-2.92	0.004
BMI (>25kg/m^2)	0.56 ± 0.27	1.76	1.13-3.03	0.040
Depression	1.12 ± 0.29	3.96	3.05-6.97	<0.001
Poor Sleep	2.10±0.25	8.20	5.07-13.28	<0.001

DISCUSSION

There is lack of substantial information for the occurrence and associated risk factors of musculoskeletal disorders and its associated pain in India. First from this region, the present research reported that the prevalence of chronic musculoskeletal pain is 42.80 percent in men and 57.20 percent in women. Other than this, some reports have observed the prevalence of chronic pain to be 50.4

percent in Northwest Scotland, [18] 32.9 percent in USA [19] and in Sweden, it has been observed to be 65.9 percent. [20] Although high variation of chronic musculoskeletal pain is evident in different regions of the world, but from the clinical chapters, it emerges clearly that the women subjects have higher odds of suffering from pain than men. Women in the present study also had higher risk of both moderate and severe pain than men and it is not unexpected as advancing age, coupled with menopausal decrements of bone health exacerbates pain. In India, every third woman is osteoporotic and consequently, osteoporosis related high fracture risk and declining bone mineral density (BMD) at forearm, neck and lumbar spine worsens the propensity of musculoskeletal pain. It has also been substantiated by other population based cross-sectional studies that women have often more musculoskeletal pain problems than men. A meta-analysis comprising 33 studies observed obesity to be a significant risk factor for chronic low back pain. [21] In a longitudinal study, the occurrence of chronic musculoskeletal pain has been examined in 30,000 subjects, which reveals that obese subjects have an approximately 20 percent increased risk of chronic pain in low back and neck shoulder region than their normal counterparts. [22] In the present study, subjects having BMI ≥23-29.5kg/m^2 and >30kg/m^2 are at higher chances of suffering from moderate and severe musculoskeletal pain.

Epidemiological studies have derived inverse relationship between socioeconomic status and musculoskeletal pain. British cohort study has reported that lowest social class had three fold increased risk of chronic widespread pain in comparison to highest social class. [23] Another study has reported that subjects living in less affluent areas have higher chances of widespread pain, physical disability, mental distress and low life satisfaction in comparison to subjects living in affluent areas. [24] In a 15 months follow up study, subjects belonging to moderate and less affluent areas are more likely to have chronic widespread pain. [25] However, after adjusting the psychological factors in multivariate logistic regression, this impact is not evident suggesting that socioeconomic status which in many studies has been based upon home ownership, education level and employment status is not a risk predictor for musculoskeletal pain, unless residual confounding of other risk factors such as depression and sleep quality are not adjusted appropriately. Similar results have been observed in the present study as in logistic regression analysis; its impact was no longer evident, however in univariate testing socioeconomic status was observed to influence pain substantially.

Subjects who have sedentary lifestyle are at 3 and 4 fold higher risk of moderate and severe pain. Sedentary life style has substantial impact on musculoskeletal health and is independently associated with back problems. Moreover, physical inactivity influences bone degradation owing to decreased synovial fluid release. As a result, in acute back pain, orthopaedicians recommend light physical activity rather than complete bed rest. [26] However, a systematic review also suggests that sedentary life style is not associated with low back pain. [27] In the present study, the influence of sedentary life style attenuates substantially when adjusted for the effects of other variables in binary logistic regression analysis. It suggests that sedentary lifestyle is not an intransigent variable but influenced by other co-existing risk variables.

In general population, statin use has been observed to confer adverse effect on musculoskeletal health and pain. In the univariate testing, although statin use was observed to be a risk factor for musculoskeletal pain but it could not retain its predictability in multivariate model. The possible reason is that the anti inflammatory effect of statins especially in arthritis may have counterbalanced the underlying physically active life style, good eating

habits and less stressful lifestyle. Similarly, higher LDL cholesterol (>100mg/dl) and TG levels (>150mg/dl) impact musculoskeletal pain in univariate testing, however these factors do not emerge as independent predictors. In present study 48.07 percent subjects were statin users and 49.08 percent subjects were doing at least 1 hour aerobic exercise daily, both of the conditions were likely to decrease LDL and TG. Moreover, BMI and menopausal status may also participate in reducing the effect of these lipid levels. [28] Alluding to this, it is not unreasonable to surmise that LDL and TG may contribute to musculoskeletal pain but are not independent risk predictors for it.

Sleep deprivation, insomnia or insufficient sleep may coexist with other risk factors or independently influence musculoskeletal pain especially in those subjects who are suffering from low back pain. Other risk factors such as fatigue, cognitive disturbances, mood swings anxiety and depression may influence insomnia associated chronic pain. [29] In the present study, subjects who have poor sleep are at approximately 1.7 to 2.2 folds higher risk of musculoskeletal pain in comparison to subjects having good sleep. The prevalence of depression in the present study is quite high amongst subjects having poor sleep in comparison to good sleep. But in adjusted step wise model, impact of sleep on musculoskeletal pain exacerbates for both moderate to severe pain, which is suggestive that poor sleep is an independent predictor for the risk of musculoskeletal pain.

The effect of pain on depression and *vice versa* is not easy to understand because of their usual co-existence and bidirectional relationship. It has been observed that pain threshold is reduced in subjects having depression whereby somatic preoccupation may be the primary symptom. [30] Almost 50 percent of the depressed patients suffering from depression report some kind of pain in their lifetime. It has also been proposed that chronic pain is a variant of depression. In primary care setting the complex coexistence of pain and depression is largely overlooked and most of the times, depression is considered as an artifact of musculoskeletal pain, which may lead to poor prognosis, misdiagnosis and under treatment of existing pain. In the present study, each unit of depression in subjects having musculoskeletal disorders increases the risk of moderate and severe pain by a factor of 1.69 and 2.18 respectively.

CONCLUSION

In conclusion, present research revealed that higher prevalence of chronic musculoskeletal pain exists in the population of Punjab, which is influenced by sedentary life style, higher BMI, depression and poor sleep irrespective of the other risk variables. The results suggest that in primary care settings for the management of musculoskeletal pain, these significant variables may co-exist and therefore must be identified and treated simultaneously.

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