

Work-Related Musculoskeletal Disorders among Traditional Weavers of Districts of Arunachal Pradesh - A Cross Sectional Study

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Abstract

Background and Objectives: Weaving is the second biggest source of income after agriculture and remains important to India's economy with roughly 4.3 million people involved, of which 61% are from North-East India. Arunachal Pradesh, one of the North-East states has its own unique method of weaving where it demands long sitting without back support for hours that can develop Musculoskeletal Disorders (MSD). Thus, the study aims to estimate the prevalence of Work-Related Musculoskeletal Disorders (WRMD) and severity of disability due to Low Back Pain (LBP) among traditional weavers of Arunachal Pradesh.

Methods: A cross-sectional study was conducted in five districts of Arunachal Pradesh. 210 traditional weavers were randomly selected. Subjects were screened for Work-Related Musculoskeletal Disorders (WRMD) using Nordic Musculoskeletal Questionnaire (NMQ) following which, the weavers that reported Low Back Pain (LBP) were screened for the severity of disability using Modified Oswestry Low Back Pain Disability Questionnaire (M-OSW). Results obtained were statistically analysed using SPSS 25.0.

Results: The result showed highest prevalence of musculoskeletal disorder in lower back, of which 79.2% had trouble in last 12 months, 69.7% was having trouble during last 7 days and 62.9% were prevented from doing normal activities during last 12 months. A total of 36.6% had mild disability, 60.6% moderate disability and 2.8% severe disability due to low back pain.

Conclusion: This study concluded that, prolong work exposure and awkward work postural demand increases the incidence of musculoskeletal disorders.

Keywords: *Traditional weaver, Work-Related Musculoskeletal Disorder, Low Back Pain, Nordic Musculoskeletal Questionnaire, Modified-Oswestry Low Back Disability Questionnaire.*

Introduction

Weaving is recognized to be one of the oldest surviving crafts in the world¹ and it is the second biggest source of rural employment after agriculture.² Handloom is an important cottage industry among developing countries like India, Pakistan, Bangladesh, Iran, Turkey and China, where traditional ways of weaving is still significantly practiced.³ India has the highest capacity of loom with a share of 61 percent in the world loom age.⁴ According to The Fourth All India Handloom

Census 2019-20 by Ministry of Textiles, Government of India, total number of households engaged in weaving activities (weaving and allied activities) is 26.73 lakhs, of which 22.5 lakhs are located in rural areas with 72% of handloom weavers being female.⁵

Weaving is considered to be one of the most tedious profession, that demands long hours of static work which can develop Musculoskeletal Disorders (MSD) as awkward posture, repetitive movements and contact stress are common.⁶ It involves numbers of repetition

in work, causing musculoskeletal strain increasing the possibility of fatigue and insufficient tissue recovery period leading to pain and discomfort.⁷

Domestic weaving provides livelihood to a considerable group of population exposing weavers to occupational risk factors.⁸ A high prevalence of musculoskeletal problem was reported among Iranian handloom weavers due to the constraints of working positions, poor design of loom, working times, repetitive work and seat type.^{9,10} Arunachal Pradesh has a total of 77,600 weavers,⁵ still preserving its ancient culture and traditions and renowned for its striking garment designs. Weaving is one of the oldest cultural practice being followed from generation to generation. Though modern tool has been introduced with the advent of modernity, the importance of the traditional loom and products made from it have not at all diminished.

“Work-Related Musculoskeletal Disorders” (WRMDs) is a term used to describe a painful or disabling injury to the muscle, tendon or nerves caused or aggravated by work.¹¹ Several studies on handloom weavers have showed that there are a high rate of work-related musculoskeletal problems throughout the World and is a major cause of disability affecting not only individual but the society as a whole.¹²

Low Back Pain (LBP) is considered to be one of the most common occupational health problems. It is defined by Last JM et al. as “a non-specific condition that refers to complaints of acute or chronic pain and discomfort in or near the lumbosacral spine”.¹³ Kraemer et al. 1985 stated prolong sitting leads to isometric contraction of back muscles leading to endomuscular pressure restricting blood flow, resulting in ischemia which reduces energy requirements of the muscles causing muscle fatigue.¹⁴ Prolong flexion of the spine leads to increase intervertebral joint laxity and fluid loss in the intervertebral discs¹⁵ and the intra-discal pressure at the lumbar region is high both in sitting and trunk bent forward posture.¹⁶ Insufficient recovery time are the contributing factors to develop Low Back Pain (LBP).¹⁷

The weaving method of Arunachal Pradesh also consist of several occupational related risk factors where it demands them to remain in a long sitting, trunk

forward bent position for many hours at a stretch and an activities like pulling, pushing, lifting the tools, working while bent or twisted at the waist and repetitive motions with hands/wrists and gripping is required.

The activity like twisting and bending of vertebral column subject weavers to undue stress while working in sitting position.^{12,18,19}

Study done in Lakhimpur District Assam have reported highest prevalence of discomfort in the waist among weavers. Also, a study done by D. C. Metgud et al²⁰ on women textile workers of Belgaum in the spinning section with similarly long sitting posture without back rest revealed highest pain in the low back. A study done by Geetashree B on weavers also showed that, about 47.5% respondents perceived very severe pain in back and less than 45% respondents made complaint of severe pain in low back.²¹

Although several studies on Work-Related Musculoskeletal Disorders (WRMDs) and occupational Low Back Pain (LBP) has been conducted in various states of India, the weaving tool and method used by the local weavers in Arunachal Pradesh is different from the mainstream India, their findings and results may show variation or in-applicability to the people of Arunachal Pradesh. Hence, there is a need to establish prevalence of Work-Related Musculoskeletal Disorders (WRMDs) and severity of disability due to Low Back Pain (LBP) among traditional weavers of Arunachal Pradesh for the ergonomic changes to bring about and to assist in planning management strategy including awareness, education and treatment to prevent Work-Related Musculoskeletal Disorders (WRMDs).

Aim and Objectives of the Study

Primary objective:

To estimate the prevalence of Work-Related Musculoskeletal Disorders among traditional weavers of Arunachal Pradesh.

Secondary objective:

To assess the prevalence of severity of disability due to Low Back Pain among traditional weavers of Arunachal Pradesh.

Materials and Method

Research design –A Cross sectional study.

Source of data - Five districts of Arunachal Pradesh (West Kameng, Lower Subansiri, West Siang, East Siang and Namsai).

Study settings - Individuals, self-help groups, societies, private small scale industries and Government textiles and handicraft centres.

Sampling design - cluster sampling technique (randomly recruited).

Sample size (n)=210, from each cluster, sample size (n)= $210/5 = 42$.

Inclusion Criteria

Traditional weavers. >14 years of age.

Women weavers.

Weaving experience of more than 12 months and beyond. Should be into weaving phase.

Had no history of MSDs before starting the weaving. Residing within the Study settings.

Willing to participate in the study and sign the informed written consent. Parents willing to sign the informed written consent for minor weavers. Minor weavers willing to sign the informed written assent.

Exclusion Criteria

Musculoskeletal disorder due to trauma or any accident. Musculoskeletal disorder due to neurological disorders. Congenital deformities.

Musculoskeletal degenerative conditions. Any spinal surgeries.

Pregnant and lactating mother.

Procedure

A pilot study was conducted at one of the private weaving industry at Lepakshi, Andhra Pradesh with 10% of the calculated sample size to standardize the questionnaire.

The five districts (West Kameng, Lower Subansiri, West Siang, East Siang and Namsai) of Arunachal Pradesh were randomly selected for the study. These five districts were considered as clusters to give over all representation to the entire State. An approval was obtained from the Institutional Ethics Committee (IEC) of R. V. College of Physiotherapy®. The researcher contacted the Director Textile and Handicrafts, Government of Arunachal Pradesh and permission was obtained to collect data across the five districts. Individuals, self-help groups, societies, private small scale industries and Government textiles and handicraft centers had been visited to screen the weavers population matching inclusion and exclusion criteria. From each cluster 42 subjects were selected based on cluster sampling technique. An informed written consent from the subjects were obtained after explaining to them the purpose of the study in their own language. The researcher collected the data from each selected subjects by direct oral interview technique using the Nordic Musculoskeletal Questionnaire (NMQ)²² including demographic data to estimate the prevalence of Work-Related Musculoskeletal Disorder (WRMD) and the Modified Oswestry Low Back Pain Disability Questionnaire (M-OSW)^{23,24} were administered to the subpopulation of weavers who reported experiencing low back pain on the NMQ to assess the level of severity of disability due to low back pain. The collected data was analyzed.

Result Analysis

All the categorical variables was presented in the form of frequency tables and graph wherever necessary. The quantitative variables was summarized using mean \pm standard deviation with 95% confidence interval. The data was entered using Statistical Software namely SPSS version 25.0, Microsoft Excel 2013 and Microsoft word 2013 was used to draw tables and graphs.

In the present study, the mean (\pm SD) age of the weavers was 38.79 (\pm 12.844) years.

Maximum weavers (28.1%) were age ranged from 21-30 years (Table 1). The present study shows that majority of the weavers (40.7%) were having high school education.

The analysis shows that maximum weavers (63.3%) belong to middle income level in Standard of Living Index. 25.4% belong to low income level and 11.3% belong to high income level.

Duration of weaving (yrs)	Number (n=221)	Percentage (%)
1-10	95	43.0
10-20	62	28.1
20-30	30	13.5
30-40	27	12.2
40-50	5	2.3
50-60	2	0.9
Mean=16.63 (\pm 12.966)		

In this study, the mean (\pm SD) of working hours distribution was 5.88 (\pm 1.636) hours per day. 61.5% weavers were working for 6-10 hours per day and 38.5% weavers were having 1 to 5 hours of weaving per day.

Present study showed that maximum weavers were affected in Lower Back(79.2%) during the last 12 months. Followed by Upper Back (62.9%), Knee (52.5%), Neck(52.0%), bilateral Shoulder (50.3%), Bilateral Elbow (43.0%), Ankle (43.0%), Bilateral Wrist(42.6%), Hips (36.7%), Right Wrist (7.2%), Right Shoulder (5.4%), Right Elbow (2.7%), Left Shoulder (0.9%), Left Elbow (0.9%) and Left Wrist (0.9%).

Table 2: The Prevalence of Musculoskeletal Disorders in weavers during last 12 months.

Pain in body parts	Number (n=221)	Prevalence (%)
Neck	115	52.0
Shoulder	Right	12
	Left	2
	Both	111
Elbow	Right	6
	Left	2
	Both	95
Wrist	Right	16
	Left	2

Cont... Table 2: The Prevalence of Musculoskeletal Disorders in weavers during last 12 months.

	Both	94	42.6
Upper Back		139	62.9
Lower Back		175	79.2
Hips		81	36.7
Knee		116	52.5
Ankle		95	43.0

Among all weavers mostly found in lower back (69.7%) had problem during last 7 days. Upper back was the second highest (49.8%), Knee (45.7%), Neck (38.9%), Bilateral Shoulder (38.5%), Ankle (33.5%), Bilateral Wrist (33.0%), Bilateral Elbow (30.8%), Hips (25.8%), Right Wrist (8.1%), Right Shoulder (6.3%), Left Shoulder (0.5%), Left Elbow (0.5%) and Left Wrist (0.5%) was having trouble due to musculoskeletal disorders during last 7 days.

Table 3: The Prevalence of Musculoskeletal disorders in weavers during last 7 days

	Pain in body parts	Number (n=221)	Prevalence (%)
Neck		86	38.9
Shoulder	Right	14	6.3
	Left	1	0.5
	Both	85	38.5
Elbow	Right	7	3.2
	Left	1	0.5
	Both	68	30.8
Wrist	Right	18	8.1
	Left	1	0.5

Cont.. Table 3: The Prevalence of Musculoskeletal disorders in weavers during last 7 days

Both	73	33.0
Upper Back	110	49.8
Lower Back	154	69.7
Hips	57	25.8
Knee	101	45.7
Ankle	74	33.5

The prevalence of musculoskeletal disorder affecting ADL during last 12 months showed more than a half of the weavers i.e 62.9% were affected by lower back. Less than a half i.e. 42.5% due to knee and 42.1% due to Upper Back. Followed by 36.2% due to shoulder, Wrist (34.4%), Neck (32.6%), Ankle (31.2%), Elbow (29.0%) and Hips (24.4%)

Table 4: The Prevalence of Musculoskeletal disorders affecting ADL during last 12 month in weavers

Pain in body parts	Number (n=221)	Prevalence (%)
Neck	72	32.6
Shoulders	80	36.2
Elbows	64	29.0
Wrist	76	34.4
Upper Back	93	42.1
Lower Back	139	62.9
Hips	54	24.4
Knee	94	42.5
Ankle	69	31.2

The present study observed that from the total prevalence of Musculoskeletal Disorders in Low Back 36.6% had minimal disability, 60.6% had moderate disability and 2.8% had severe disability.

Table 5: The Prevalence of Severity of disability due to Low Back Pain

Severity of Low Back	Number (n=175)	Prevalence
Pain		(%)
Minimal Disability (Score	64	36.6
0-20%)		
Moderate Disability	106	60.6
(Score 21-40%)		
Severe Disability	5	2.8

Discussion

Weaving is one of the most tedious profession, with long hours of static work that develops Musculoskeletal Disorders (MSD).⁶ In the World of mechanization, the traditional domestic weavers plays a major role in preserving culture with its unique design and method of weaving, providing livelihood to a large section of population.

The numbers of repetition in work causes musculoskeletal strain increasing the possibility of fatigue and insufficient tissue recovery period leading to pain and discomfort.⁷ Awkward postures adopted by the workers is one of the most important factors of their poor working efficiency and prevalence of Musculoskeletal Disorders (MSD).

The findings of this study confirm the work-related stress on weavers. In the present study, the highest prevalence of musculoskeletal disorder was found in low back, of which 79.2% had trouble in last 12 months, 69.7% was having trouble during last 7 days and 62.9% were prevented from doing normal activities during last 12 months. The prevalence of musculoskeletal disorders during last 12 months revealed that maximum of them

i.e. 79.2% were having pain in lower back. A previous study finding by Naz H et al. showed highest prevalence of pain due to musculoskeletal disorders during last 12 months in Right Wrist (76.56%)³ and in a study by Rahman M et al. the highest prevalence was found in Hips (78.0%).²⁵

The weaving method consists of several occupational related risk factors where it demands them to remain in a long sitting, trunk forward bent position for many hours at a stretch and an activities like pulling, pushing, lifting the tools, working while bent or twisted at the waist and repetitive motions with hands/wrists and gripping is required. The activity like twisting and bending of vertebral column subject weavers to undue stress while working in sitting position.^{12,18,19}

Among all weavers mostly found in lower back (69.7%) had problem during last 7 days. Similarly, in a study by Naz H et al. maximum trouble during last 7 days was found in lower back (59.38%)³. A finding by Rahman M et al. showed 69.72% respondents had trouble in Neck pain.²⁵

In this study it was observed that due to Lower back pain 62.9% weavers were prevented from carrying out

their normal activities during last 12 months . Less than a half i.e. 42.5% due to knee and 42.1% due to Upper Back, followed by 36.2% due to shoulder, Wrist (34.4%), Neck (32.6%), Ankle (31.2%), Elbow (29.0%) and Hips (24.4%) were prevented from their normal activities in last 12 months.

A study done by D. C. Metgud et al²⁰ to outline cardio-respiratory and musculoskeletal profile before, during and at the end of work on women textile workers of Belgaum in the spinning section with similarly long sitting posture without back rest. The study revealed that 91% of the subjects suffered from at least one work-related musculoskeletal pain in relation to length of occupational exposure and region-wise mapping of pain showed that percentage of postural pain in the low back (47%) was highest.

In the present study, among 177 weavers who reported lower back pain in musculoskeletal disorders questionnaire, 29.8% had mild disability, 48.0% moderate disability and 2.3% severe disability . A study done by Bori G et al. on weavers also showed that, about 47.5% respondents perceived very severe pain in back and less than 45% respondents made complaint of severe pain in low back.²¹ A study conducted by Hossain A et al. to find out the pattern and associated factors of musculoskeletal pain among handloom weavers revealed that 12.9% had mild lumbar spine pain, 55.9% had moderate pain and 31.2 % had severe pain in lumbar spine.²⁶

From the above discussion it can be concluded that traditional weavers of districts of Arunachal Pradesh are equally affected with a high prevalence of musculoskeletal disorders that effects their ADL and productivity. There is an utmost and urgent need of appropriate measures to prevent musculoskeletal disorders among traditional weavers keeping in mind the cultural value of ancient weaving method.

Conclusion

The study found high rate of musculoskeletal disorders among traditional weavers. More than 79.2% of weavers suffered from musculoskeletal pain and Lower Back were the most prevalent site. Frequent breaks during work period and back support would

reduce the Musculoskeletal stress on lumbar region. Based on the observations made, the study concluded that there is ample scope for ergonomic improvement keeping in view the need for maximum comfort to the weavers and the cultural importance of the traditional weaving method to promote their health and well-being and enhance their productivity and quality of work.

Limitations:

Unavailability of scales in local language.

Larger geographical area could have been included (present study included only five districts).

Current study was only determined to find the prevalence of WRMSD and did not include management to prevent WRMSD.

Scope for further study:

A high prevalence of musculoskeletal disorders exists among traditional weavers that effects their ADL, productivity and the quality of work. Further studies are needed to identify the specific risk factors for the ergonomic changes to bring about and to assist in planning management strategy including awareness, education and treatment to prevent Work-Related Musculoskeletal Disorders WRMDs.

Ethical Clearance - taken from R. V. College of Physiotherapy®, Bangalore, Karnataka.

Source of Funding- Self.

Conflict of Interest- Nil

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