RESEARCH PAPER

Association between rural work practices and low back pain in Mizoram: a case-control study.

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ABSTRACT

Background: The Mizo people (Mizo hnam) are an ethnic group of north-eastern India, western Burma (Myanmar), and eastern Bangladesh. Agriculture is the mainstay and the major source of income and employment. Mizoram practices traditional subsistence agriculture as about half of the state's total population is involved.

Objectives: Primary objective is to identify the risk factors contributing to low back pain in the middle-aged working population of Mizoram.

Methods: The sample was collected from Presbyterian Church of India members of Mizoram in Aizawl District. The church secretary announced in church and the people who attended church between the age group of 40- 55 were given a questionnaire. Those replying to the questionnaire were included in the study.

Data Analysis: Data analysis was done using SPSS version 22.0 and significance was considered as $p \leq 0.05$, descriptive statistics and frequencies were taken. The odds ratio was calculated by weighting cases by frequency and crosstabs.

Results: A bamboo basket increase in hours/ week OR is more, >10 hours/week is 6.894. The load on the shoulder of carrying water is 2.356. People having more than one job versus no secondary job OR is 13.895, farming practices 2-4 hours/ day versus no farming practices OR is 9.579.

Conclusion: People having more than one job, farming practices, a long-standing, bamboo basket used for more hours per week, and mode of carrying water- load on the shoulder is at high risk..

Keywords: low back pain, back pain, risk factors, middle-aged, farmer, India, China, lumbago, sciatica pain, biomechanical factor

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INTRODUCTION

The Mizo people are an ethnic group of north-eastern India, western Burma (Myanmar) and eastern Bangladesh. The overall population of Mizoram is estimated around 1.116 million, above 40 years population is 256049 according to census 2011 (census office, Mizoram).[1]

The history of the Mizo was based on documented and vocabulary stories of the legends, traditions, customs and beliefs as a result of which the administrators and scholars faced difficulties in tracing the historical evolution of the Mizo tribes. There are innumerable folksongs, tales and fables which provide materials for the study of their migration and early settlement in the regions. There is a common ` belief among the Mizo that, their ancestors migrated from a place called 'Chhinglung' which is believed to be located in southern China according to the historians and anthropologists. Majority of the Mizoram State population belongs to the Kuki - Chin group of Tibeto-Burman branches of Indo-Mongoloid race.[2]

Ethnicity studies in India show the tribal and the caste populations are highly differentiated, and the Austro-Asiatic tribal's are the earliest settlers in India. A major wave of humans entered India through the northeast; the Tibeto-Burman tribals share considerable genetic commonalities with the Austro-Asiatic tribals, supporting the hypothesis that they may have shared a common habitat in southern China, but the two groups of tribals can be differentiated on the basis of 'Y' Chromosomal Haplotypes.[3]

Most of the tribal societies in northeastern India, particularly women in the rural areas are still very far away from present technological advancement. The tribal women have to perform labor-intensive work which leads to severe musculoskeletal problems.[4] Agriculture is the mainstay and the major source of income and employment. The

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livelihood of the people largely depends on the output from agricultural production. Mizoram practices traditional subsistence agriculture as about half of the total population of the state is involved.[5] Due to the challenging nature of agriculture, musculoskeletal disorders (MSD) are a common work-related problem among farmers, among various others. Workers in the less technically advanced sectors (i.e. agriculture, construction, handicraft, etc.) which involve repetitive manual tasks and working in stooped postures are the main factor of these problems.[6] In general, the people of Mizoram, especially in rural area, are mostly dependent on agriculture for their daily living. The lifestyle and traditional beliefs differ from the rest of the Indians. Mizo women and men carry vegetables and wood for cooking using a traditional bamboo basket (em) and head gears (hnang) from far distance (hills and forests). This is widely practised in rural areas and by day-to-day street sellers in urban areas. Street seller in Mizoram are mainly women selling vegetables using a traditional bamboo basket (em) and had to carry loads from a far distance and approach each house individually to sell those vegetables, which is still commonly practised in Mizoram.

Each locality has their own water preservation spring source (tuikhur), women carry buckets filled with water keeping the load on their head. Men carry loads on their shoulder, using a firm long stick made of bamboo, where they carry one water-filled bucket in front and the other at the back. These methods are often practised in rural areas, due to inadequate water supply and urban areas due to their strong traditional beliefs. Though some of these methods are practised in other states of India the concept of morality has a major effect on Mizo people. The society has a strong appreciation of a person giving great importance to their duties and services, which gives them a good reputation in the society and consider them as a gentle, responsible, honourable and respected individual. So they continue to work or practice these things even if they are in pain.

In 2010, 21.8 million (95% UI 14.5–30.5 million) Disability Adjusted Life Year (DALYs) were reported from Low Back Pain (LBP) arising from ergonomic exposure at work, accounting for 35% of all DALYs arising from occupational risk factors worldwide. Persons aged 35-55 years experienced the greatest absolute burden from LBP, and per capita rates were highest in these age groups. Relative risk was found to be highest in agriculture and related work at 3.7, over double that estimated in all other occupational groups. Regions with high populations such as South Asia, East Asia, Southeast Asia, Northern Africa and the Middle East had the highest number of DALYs.[7]

The studies of LBP in middle-aged working population have never been conducted in Mizoram and rarely in the North-eastern part of India. Although studies related to low back pain in middle-aged working population is available from mainstream India, due to a difference in race, culture and lifestyle, their findings and results may show variation or inapplicability to the people of Mizoram.

METHODS

This study was conducted in Aizawl district, Mizoram, India. The study population was drawn from Presbyterian Church of Synod. The study design is a case-control study. Sampling strategy was convenience sampling. The sample size was calculated with the formula

$$n = \left(\frac{r+1}{r}\right)\frac{(\bar{p})(1-\bar{p})(Z_{\beta}+Z_{\alpha/2})^2}{(p_1-p_2)^2}$$

The sample size for this study was minimum 860 (case group- 430 samples and control group- 430 samples). This study was conducted for 1 year. Church secretary announced and informed the members and an advertisement was put in the notice board. People who attended church function under Presbyterian Church of India between the age group of 45- 55 were given questionnaire. Those replying to the questionnaire were included in the study and regular home visit was also done.

Permission was taken from the Institution Research Committee (IRC) of JSS College of Physiotherapy, Mission hospitals in Mizoram i.e., Synod Hospital, Durtlang and from the 'Synod Office-Presbyterian Church of India' in Mizoram for viewing medical records if required and data was collected from the church; and home visits were also done. Two questionnaires were generated: The first questionnaire included individual demographic details like age, sex, address, and phone number, and if the subject had the positive history of LBP (pattern and duration of low back pain were also asked). Based on the questionnaire1, the subjects were allocated into case and control group. The second questionnaire was generated based on the literature review and expert opinion and was used to get pain information and coping strategies and work behaviour using the standardized questionnaire as per the guidelines. Individuals presenting with low back pain >24 <72 hours and recurrent LBP not lasting more than 72 hours, with age above 40 – 55 years, having well documented medical records, either with them possess or in hospital records, without cognitive Impairment and able to read and write were included in the case group. For people without any medical records, detailed examination was done to verify mechanical back pain for the case group. For control group, individual without low back pain or no history of injury or trauma, transition age 40-55 without cognitive impairment, able to read and write were included in the control group. Low back pain which can be due to a condition like kidney stones and pregnancy, low back pain continuously or complain of worsening LBP (Red Flag), history of major low back trauma such as a motor vehicle injury, cancer, Tuberculosis (TB) of the spine were excluded.

This study was conducted in six urban local churches and six rural churches under Synod - Presbyterian Church of India. For collecting data, a church member under the 'Synod – Presbyterian church of India' was approached. The secretary of each church was approached individually and presented with the permission letter from the Synod office. The secretary announced to the church member and put in the notice board. Each church has a separate youth group (14 – 40 years) with a youth leader who takes care of church events. The youth leader was approached and meeting was conducted and the study procedure were

explained. The youth leader was requested to allocate some of the youth members to distribute the first questionnaire to the population of 40- 55 years to their respective member, informed consent in local language was taken from each of the participants and the questionnaire was collected.

This first questionnaire was given on Tuesday night, Wednesday night, Friday night and Sunday Church functions. Tuesday night is mainly for the middle-aged women of the church, Wednesday night function for all the members, Friday night for the middle-aged men, and Sunday function was conducted in the morning, afternoon and night session. The questionnaires collected were reviewed and individuals were allocated to case groups and control groups. A question was included in the first questionnaire which gave details of hospitals and doctors' visits. Most of the people in Mizoram go to Synod Hospital, Durtlang which is the biggest Mission Hospital in Mizoram. If the participants did not have details of medical records with them, an examination was done and was referred to the hospital if necessary. After reviewing the first questionnaire, individuals were allocated to control group and was verbally asked regarding their health status.

The second questionnaire was given to the included participants in both groups either by approaching them individually by home visit or through group approach from the church. After collecting the questionnaire 2, variables were identified and after finalization of variables data were entered in SPSS version 22.0. Each variable was coded respectively. Data analysis was done using SPSS version 22.0 for calculating odd ratio.

DATA ANALYSIS

Data analysis was done using SPSS version 22.0 and significance was considered as $p \leq 0.05$. Data analysis was done using descriptive statistics and frequencies were taken. Weighting cases by frequency and crosstabs were done to find the risk, and odds ratio was calculated.

RESULTS

Group sizes were unequal, six hundred ninety-two individuals with low back pain and three hundred and twenty without low back pain were selected for the study (**Table 1**). In both the groups, 46.4% were male and 53.6% were female. The age percentages of the participants among the age group 40-45, 46-50, 51-55 were 36.3%, 36.7% and 27.1% respectively and mean age of participants was 47.16 ± 4.187 (**Figure 1**). The participants from rural are 53.8% and urban area is 46.2 % (**Figure 2**). The highest reported job was manual labour 48.3%, followed by casual worker 27.4% and office worker 24.3% (**Figure 3**). The manual labour was reported to be highest amongst the age group 46-50 years of age followed by 40-45 years and 51-55 (**Table 2**).

Plate1. Carrying wood using a bamboo basket (em)

Plate2. Initiation to standing with loads

Plate3. Posterior view of the load carried with a bamboo basket

Plate4. Load carried on head

Plate 5. Load carried on one side of the shoulder

Table 1: Demographic data of both control and case group

Characteristic	Total participants N=1012			
	Low back pain (case)- 68.4% n=692		No low back pain (control)- 31.6% n=320	
	Female n= 542 participants 53.6%		Male=470 participants 46.4%	
Location				
	Participants		Frequency	
Urban	468		46.2%	
Rural	544		53.8%	
Gender	Control (female) n= 160	Case (female) n= 382	Control (male) n=160	Case (male) n=310
Age 40-45 n= 367 36.3%	Case n= 251		Control n=116	

Age 46-50 n= 371 36.7%	Case n= 253	Control n=118
Age 51-55 n=274 27.1%	Case n= 188	Control n=86
Job status		
Primary job alone n=198 19.6%	Case n= 198	Control n=0
Primary and secondary job n=814 80.4%	Case n= 494	Control n=320

Table 2: Demographic data of the type of job-related to age

Manual worker n= 489											
Male n= 219						Female n= 259					
Case n= 172			Control= 47			Case n = 221			Control n= 38		
40-45 age	46-50 age	51-55 age	40-45 age	46-50 age	51-55 age	40-45 age	46-50 age	51-55 age	40-45 age	46-50 age	51-55 age
62	54	56	17	15	15	71	92	58	13	11	14
Casual worker n= 277											
Male n= 117						Female n= 150					
Case n= 62			Control= 55			Case n = 90			Control n= 60		
40-45 age	46-50 age	51-55 age	40-45 age	46-50 age	51-55 age	40-45 age	46-50 age	51-55 age	40-45 age	46-50 age	51-55 age
26	23	13	20	22	13	30	39	21	21	23	16
Office worker n= 246											
Male n= 134						Female n= 133					
Case n= 76			Control= 58			Case n = 71			Control n= 62		
40-45 age	46-50 age	51-55 age	40-45 age	46-50 age	51-55 age	40-45 age	46-50 age	51-55 age	40-45 age	46-50 age	51-55 age
31	23	22	23	24	11	31	22	18	22	23	17

Table 3: Percentages of number of participants exposed to variables

Exposure		Frequency	Percentage
Occupation	Office worker	246	24.3%
	Casual worker	277	27.4%
	Manual worker	489	48.3%
Primary and secondary	Primary strenuous job	199	19.7
	<10 hours/week	380	37.5
	11-20 hours/week	343	33.9
	21-30 hours/week	77	7.6
	31-40 hours/week	12	1.2
	>40 hours/week	1	.1
Farming practices	No	482	47.6
	mild (<2 hours/day)	224	22.1
	moderate (2-4 hours/day)	237	23.4
	severe (>4 hours/day)	68	6.7
Bamboo basket	No	446	44.1
	<1 hour/week	113	11.2
	1-5 hours/week	274	27.1
	6-10 hours/week	135	13.3
	>10 hours/week	44	4.3
Mode of carrying water	No	439	43.4
	load on head	193	19.1
	load on shoulder	283	28.0
Long-standing	No	242	23.9
	Mild (<2hours/day)	329	32.5
	moderate (2-4hours/day)	356	35.2
	severe (>4 hours/day)	84	8.3

Table 4: Analysis of Variables as possible risk factors for low back pain

Variables		Odd ratio	95% - Confidence Interval
non-strenuous primary Job with a secondary job	<10 hours	13.895	7.126- 27.092
	10-20 hours	11.824	6.037- 23.156
	20-30 hours	4.957	2.138- 11.496
	30-40 hours	1.718	0.201- 14.657
Farming practices	<2 hours/day	2.069	1.476- 2.899
	2-4 hours/day	9.579	5.858-15.662
	>4 hours/day	7.819	3.507- 17.432
Bamboo basket	<1 hour/week	0.702	0.464- 1.062
	1-5 hours/week	2.309	1.645-3.240
	6-10 hours/week	5.515	3.122- 9.743
	>10 hours/week	6.894	2.425- 19.603
Mode of carrying water	Load on head	1.591	1.104- 2.292
	Load on shoulder	2.356	1.674- 3.317
	Lifting bucket	1.453	0.907- 2.327
Long-standing	<2 hours/day	1.937	1.382- 2.714
	2-4 hours/day	5.413	3.730- 7.857
	>4 hours/day	12.721	5.639- 28.695

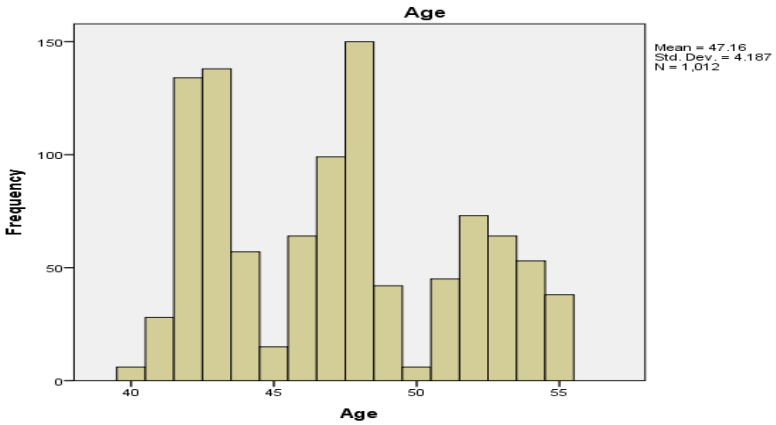

Figure 1: Age of participants from both the groups

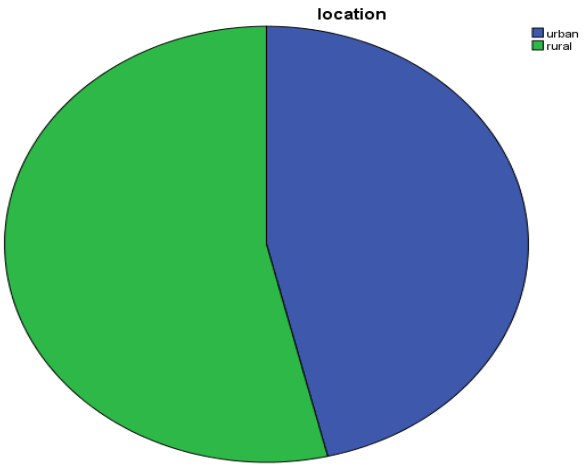

Figure 2: Percentage of participants from urban and rural area

The odds ratio was calculated using bivariate analysis, chi-square test which gives the unadjusted odds ratios. The proportion was unequal for the group- expected count <5 Fisher's Exact test was reported for more than one job and farming practices, expected count >5 Chi-square was reported for a bamboo basket and mode of carrying water.

From the participants, 80.4% were exposed to having both primary and secondary jobs. The odds ratio of exposure to a secondary job (<10 hours/week) versus no secondary job was 13.895 (95% CI, 7.126- 27.092), secondary job (10-20 hours) versus no secondary job was 11.824 (95% CI, 6.037-23.156), 21-30 hours of secondary job per week versus no secondary job was 4.957 (95% CI, 2.138-11.496), 31-40 hours of secondary job versus no secondary job was 1.718 (95% CI, 0.201-14.65) respectively. Among the participants, 83.5% were exposed to prolonged long-standing compared to 16.3% of the controls. The odds ratio of exposure to prolonged long-standing (<2hours/day) versus no prolonged long-standing was 1.937 (95% CI, 1.382-2.714), 2-4 hours of prolonged long-standing versus no prolonged long-standing was 5.413 (95% CI, 3.730-7.857), more than 4 hours of prolonged long-standing versus no prolong long-standing was 12.721 (95% CI, 5.639-28.695) respectively. 58.4% were exposed to farming practices to 41.6% of controls. The odds ratio of farming practices (<2 hours/ day) to no farming practices was 2.069 (95%, CI 1.476-2.899), 4 hours of farming practices versus no farming practices was 7.819 (95% CI, 3.507-17.432), more than 2-4 hours of farming practices per day versus no farming practices was 9.579 (95% CI, 5.858-15.662) respectively.

From the participants, 61.8% were exposed to using bamboo baskets compared to 38.2% of the controls. The odds ratio of using bamboo basket (1-5 hours/week) versus not using bamboo basket was 0 .702 (95% CI, 0.464-1.062), 6-10 hours of using bamboo baskets per week versus not using bamboo baskets was 2.309 (95% CI, 1.645-3.240), more than 10 hours per week of using bamboo baskets versus not using bamboo baskets was 6.894 (95% CI, 2.425-19.603) respectively. 63.7% were exposed to carrying water using different mode compared to 36.3% of the controls. The odds ratio of mode of carrying water by load on head versus not carrying water was 1.591 (95% CI, 1.104-2.292), mode of carrying water by load on shoulder versus not carrying water was 2.356 (95% CI, 1.674-3.317), mode of carrying water by lifting bucket versus not carrying water was 1.453 (95% CI, 0.907-2.327) respectively.

DISCUSSION

In this present study, the groups were unequal for control and case group. In the case group, 692 participants were having low back pain, and in the control group, 320 participants experienced low back pain. 68.4% of the participants had low back pain which is quite high. In accordance with the report of the World Health Organization in 2002, LBP constituted 37% of all occupational risk factors, and epidemiology of LBP on the basis of studies in Indian population, prevalence has been found to range from 6.2% to 92%.[44] The sample was collected from six urban and six rural areas, as the sample was collected from a group of people attending church function there is no such difficulty in collecting the sample. People are co-operatives and we do not face any ethical issues from the church leaders from respective churches. One problem from collecting the samples especially for the case group is that most of the people do not have medical records with them, which cannot be included for the study. The inclusion criteria were changed, as many of them do not have medical records with them, a detailed examination was done to verify mechanical back pain and referral to respective health system available in their areas was done and they were included for the study. The participants answering questionnaire one was allocated to case and control, the questionnaire two were given to them following the same process but some were approached by home visit either daytime or night time.

Among 692 participants from the case group, women reported more pain than men. The present study identified several risk factors for low back pain due to work practices among the Mizo population. Group sizes were unequal for control and case groups. Manual labour was reported to be the commonest occupation reported by the participants, but

the percentage of primary strenuous job was less when compared to the total number of reported manual labour, the possible reason could be that those reported manual labour amongst the participants are mainly farmer and their work might be related to seasonal, not every day work. The highest risk factors for low back pain were people having more than one job. The unique feature of this study is that people having more than one job showed that with more hours of work per week, the odds ratio decreases, which could be due to the fact that the type of job they are exposed in secondary job was not specifically asked whether it was of strenuous type or sedentary job. And the possibility is that grouping for the subgroup variables were done by the hours reported by the participants, not the type and physical weights of work done by the participants. Strenuous activity and prolonged bending odd ratio are less than 1 for the entire sub group's hours; this could be due to the fact that the type of strenuous activity is not specifically mentioned in the questionnaire which was given to the participants. The type of strenuous activity and weight of loads etc. was not specifically asked in the questionnaire. As according to the ergonomic principle this were the risk factors for musculoskeletal pain, but this study shows contrast results and the result for this is unclear and was not mentioned in the result table.

Bamboo basket practices are not commonly practised in the urban area compared to the rural areas as reported by the participants. Urban areas, especially women carried bamboo basket only for shopping in markets for carrying goods such as rice and vegetables, often once a week or less. A bamboo basket is not practised by men in urban areas except for some rural farmers who tend to report using it for agricultural use. Rural farmer especially women reported to the used bamboo basket for at least two hours per day for six days in a week. Mode of carrying water odd ratio is highest on the load on shoulder, which could be due to that load on the head for carrying water is only done by women, while the load on a shoulder is mainly done by men and also reported to be practised by women as well. There are fewer reports of practice by participants in urban areas and is only used by a small minority without access to indoor plumbing.

Strengths

The strength of this study is that it is an unprecedented study as no prior studies have been conducted on the relationship between low back pain and work practices in the state of Mizoram. Because of this, many risk factors have been identified; and the study has revealed the need for public awareness and policy-making in regards to the provision of treatment and facilities.

Limitations

The main limitation of this study arises which can be recall bias and imperfect memory. Furthermore, as the survey focused more on the number of hours worked, less importance was given to elements such as intensity and type of work and the physical weight of loads carried by participants. In addition, the validity of the questionnaire suffered due to inconsistencies in the testing procedure.

Future Implication

Study has shown the relation between rural work practices and lower back pain but is limited to one district of the state, albeit the largest district. Further studies in other districts and remote parts of the state with expanded parameters not included in this study are recommended.

CONCLUSION

This study concludes that

People having more than one job, using a bamboo basket for more hours per week, mode of carrying water- load on shoulder, farming practices, long-standing are at increased risk for low back pain.

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