Original article

Prevalence of musculoskeletal pain and factors associated with kyphosis among pedestrian back-loading women in selected towns of Bench Maji zone, Southwest Ethiopia

Andualem Henok*,[1] Tigist Bekele[2]

Abstract

Background: In developing countries including Ethiopia, it is common to see women carrying heavy loads on their back. Musculoskeletal pain and deformities are expected to be higher when there is heavy physical work. Many women lead their lives by selling heavy fire woods to residents in urban areas by back loading. This may have an impact on musculoskeletal health.

Objective: The main objective of this study was to assess prevalence of musculoskeletal pain and factors associated with kyphosis among pedestrian back-loading women in Bench-Maji zone.

Methods: The study was conducted in Bench Maji zone, Southwest Ethiopia from January to March 2016. Cross-sectional study design was employed. The sample size was calculated to be 422. Four towns found in the zone were selected to identify women who sell fire woods by carrying it on their back. Women were selected by using convenience sampling technique. Standardized questionnaire was used to collect data on musculoskeletal pain. Checklist was used to diagnose kyphosis. Cleaned and coded data was entered in to Epidata 3.1 and exported to SPSS version 20 for analysis. Binary logistic regression was used to identify factors associated with kyphosis.

Results: Among 422 participants who were involved in this study 173(41%) were in the age range of 19-34 years. In this study, majority 340(80.6%) of the study participants were protestants. Regarding the educational status, majority 339(80.3%) of the participants were unable to read and write. Majority of the study participants were from Mizan town (50.2%). Regarding musculoskeletal pain, this study indicated that the prevalence of upper back pain, lower back pain, shoulder pain, elbow pain, wrist pain, knee pain and feet pain were 67.3%, 60.4%, 68.2%, 47.2%, 36.7%, 46.9% and 44.1% respectively. The prevalence of kyphosis was 59.7%. The odds of kyphosis was higher among age greater than 40 years (AOR= 1.91: 95% CI 1.03, 3.54) and those worked for more than 10 years (AOR= 2.15: 95% CI 1.01, 4.61) than their counter parts. Town where they come to sell fire wood was also significantly associated with kyphosis.

Conclusion: The prevalence of musculoskeletal pain was high. Age, town and duration of work were significantly associated with kyphosis. Thus, it needs attention from concerned bodies. [*Ethiop. J. Health Dev.* 2017;31(2):103-109]

Key Words: Musculoskeletal pain, Kyphosis, Back loading, Ethiopia

Introduction

Musculoskeletal conditions create major burden on individuals, health systems, and social care systems. They are a diverse group with regard to pathophysiology. Among major musculoskeletal disorders, musculoskeletal pain and deformities are common (1).

Musculoskeletal pain comprises a major health problem for the general population, affecting their quality of life, demanding increased health care and organization (2). Studies reported different magnitude of musculoskeletal pain depending on the profession of their study population. Musculoskeletal pain ranks 6th (shoulder pain), 7th (neck pain) and 10th (low back pain) as the most frequently reported health complaints among school teachers (3). A study conducted among polo water sport men showed that the prevalence of shoulder pain and knee pain was 51.04% and 23.95% respectively (4). In Saudi, the prevalence of low back pain, knee pain, heel pain and shoulder pain among teachers was 38.1%, 26.3%, 24.1% and 20.6% respectively (5). The Australian rural community study indicated that most common musculoskeletal pains were lower back pain, head and shoulder pain (6). A study conducted in Gondar among nurses showed that the overall prevalence of work related musculoskeletal disorder was 57.1%. This study also revealed that Body Mass Index (BMI) and work experience were significantly associated with musculoskeletal disorders (7).

Posture is the alignment and maintenance of body segments in certain positions such as standing, walking, lying or sitting and is the most important factors affecting physical and mental status of individuals through their lives. Although postural deviation is commonly associated with the spine, other parts of the body have also been implicated in postural mal-alignment. In this regard, a decrease or increase in the normal body curves might result in uneven pressure at the joints, ligaments, muscles and bones and failure to institute timely corrective measures, degenerative changes which will occur leading to postural deviation. The effect of posture on health is becoming more evident. Spinal pain, headache, mood, blood pressure, pulse and lung capacity are among the functions most easily influenced by posture. The corollary of those

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[1]Department of public health, college of health sciences, Mizan-Tepi University, Mizan-Aman, Ethiopia, *Corresponding author Email: andualemhenok@gmail.com;
[2]Department of midwifery, college of health sciences, Mizan-Tepi University, Mizan-Aman, Ethiopia

observations is that many symptoms, including pain, may be moderated or eliminated by improved posture (8 and 9).

One of the most common postural problems is the forward head posture (FHP). Backpacks have forced the body to adapt to a forward head posture (10). Curving of the spine that causes bowing of back which is also called kyphosis is expected to be common in repetitive backpacks.

The magnitude of kyphosis among South African University students was 34% (11). The study from Egypt (12) and Serbia (13) reported 32.44% and 10.5% of kyphosis respectively. Factors affecting kyphosis include behavior of individuals including smoking, working habits and age (14).

Musculoskeletal pain and deformities are expected to be higher when there is heavy physical work. Heavy physical work has been defined as work that has high energy demands or requires some measure of physical strength (15). It is well known that carrying heavy loads has a negative effect on physical measures of human performance. Carrying heavy loads increases the Heart Rate (HR), Rating of Perceived Exertion (RPE), and metabolic work of every subject (16).

Manual material handling is still quite prevalent in most occupations and virtually unavoidable during daily activities. Although the human cervical spine can withstand substantive compressive loads *in vivo*, repeated carrying of heavy loads stresses the spinal structures and constant/ habitual carrying of load predisposes the spine to some degree of deformity. It has been opined that regular carrying of heavy loads over a prolonged period of time could be an important etiological factor in the development of spinal deformity (15).

It is common to see women carrying heavy loads on their back in developing countries including Ethiopia. Bench Maji zone is found in Southwest Ethiopia which is known in its dense forest. Many women lead their lives by selling fire woods to residents in urban areas. The way they sell wood is by carrying it on their back and moving on foot to homes of urban residents. This condition may increase the magnitude of musculoskeletal pains and deformity particularly kyphosis among women.

Despite many health impacts of heavy loading among Musculoskeletal pain, kyphosis, back loading, Ethiopia women and the very common scenario of the zone, there is no study conducted on the musculoskeletal pain and kyphosis among pedestrian back loading women in Bench Maji zone, Southwest Ethiopia. Therefore this study intended to assess prevalence of musculoskeletal pains and factors associated with kyphosis.

Methods
Study area and population: The study was conducted in Bench Maji zone, Southwest Ethiopia from January to March 2016. Bench Maji zone has 838,235 people in 247 kebeles and 10 woredas. The capital of the zone (Mizan-Aman), located 561 kilometers far from Addis Ababa in southwest direction. The zone is known in its dense forest. Many women from rural areas lead their life in selling fire woods to residents in town by carrying on their back. The source population was all females in Bench Maji zone who lives on selling fire wood with back-loading. The study population were chosen from four zonal towns of Mizan, Bachuma, Sheybench and Sheko towns.

Study design: Cross-sectional study design was employed to assess the prevalence of musculoskeletal pains and factors associated with kyphosis.

Sample size and Sampling technique: The sample size was calculated by using single population proportion formula. Since there is no related study, the proportion of 50% was taken to have maximum sample size. This gives a sample of 384 and by considering non-response rate of 10%; the final sample size was 422.

Four towns found in the zone were selected to identify women who sell fire woods with back loading. Samples were assigned proportionally based on number of women population who live by selling. Since there is no specific place to find the women, they were selected by using convenience sampling technique. To avoid repetition their names were included temporarily.

Inclusion and Exclusion criteria: Age greater than 15 years were included in the study and non-regular workers (women carrying wood not for the purpose of selling) were excluded from the study.

Data collection technique: Standardized Nordic questionnaire for analysis of musculoskeletal pain was adopted and used to collect data (17). Based on this questionnaire, musculoskeletal pain for the last 12 months was asked by locating place of pain. In addition, the weight of load and weight of women were measured to determine weight of load to women ratio. Height was measured to calculate BMI. The questionnaire contains background characteristics, musculoskeletal disorders etc. The data collection was done by trained health professionals (physiotherapists to assess kyphosis). Beam balance was used to measure the weight of the load and the weight of women. Check list was used to diagnose kyphosis. Participants were screened individually for kyphosis using the protocol described by Kendall *et al* (18).

Participants stand erect on a posture board while a plumb line is resting on a base point just anterior to the lateral malleolus. Lateral postural assessments performed from both sides to detect rotational abnormalities that might go undetected if observed from only one lateral perspective. Ideally the plumb line should pass through the ear lobe and shoulder joint. Increased posterior convexity of the vertebrae

was considered as kyphosis. One of the researchers stood at the side of the participant to note the deformity.

Variables
Dependent variable: The dependent variable was kyphosis.

Independent variables: The independent variables include sociodemographic characteristics, reproductive history and work characteristics.

Data analysis procedures: Cleaned and coded data were entered in to Epidata 3.1 and exported to Statistical Package for Social Sciences (SPSS) version 20 for analysis. Descriptive analysis was conducted to determine frequencies and percentages. Binary logistic regression was used to identify factors associated with kyphosis. Bivariate analysis was done to see the association between kyphosis and independents variables. Variables, with p-value less than 0.2 and other important variables were brought to multivariate analysis for controlling potential confounding factors. P-value less than 0.05 was considered to declare significance.

Data quality assurance: The quality of data was assured by using standardized questionnaire, by training data collectors and by recruiting trained professionals. The questionnaire was pretested before commencement of actual data collection in a town not selected for the study.

Ethical clearance: The ethical clearance was approved by research and ethical committee of college of health sciences, Mizan-Tepi University. Official letter was requested from Bench-Maji zone administration. Informed consent was taken from study participants. Their names were used only for research purposes. It was removed immediately after checking repetition (double participation). Study participants were informed on the objective of the study. Study participants were on load and data collection was done after they are unloaded. They were paid 50 birr (Ethiopian currency) for the compensation of the lost time.

Results
Background characteristics of study participants: Among 422 participants who were involved in this study 173(41%) were in the age range of 19-34 years and 130(30.8%) were in the age range of 35-49 years. In this study majority 340(80.6%) of the study participants were protestant. Regarding the educational status, majority 339(80.3%) of the participants were unable to read and write. Nearly half of the participants were from Mizan town (50.2%). Regarding weight of women, 181(42.9%) of the study participants' weight was less than 40 k.gs. In nearly half 212(50.2%) of the

study participants weight of load was less than 25 k.gs during data collection. More than half 251(59.5%) of the study participants had less than 150 c.ms. height (Table 1).

Table 1: **Background characteristics of pedestrian back loading women in Bench Maji zone, 2016 (N=422)**

Variables	N	%
Age		
15-18 years	49	11.6
19-34 years	173	41
35-49 years	130	30.8
>50 years	70	16.6
Religion		
Orthodox	11	2.6
Protestant	340	80.6
Traditional	71	16.8
Educational status		
Unable to read and write	339	80.3
Read and write	3	0.7
1 to 4	74	17.5
Above 4	6	1.4
Town		
Mizan	212	50.2
Sheko	70	16.6
Sheybench	70	16.6
Bachuma	70	16.6
Weight of women		
Less than 40	181	42.9
41-60	221	52.4
Above 60	20	4.7
Weight of load (k.g)		
Less than 25	212	50.2
26-30	147	34.8
31-40	21	5
Above 41	42	10
Height of women (c.m)		
Less than 150	251	59.5
151-170	150	35.5
More than 170	21	5

Working Habits of study participants: Among the study participants, 156(37%) worked this job (selling fire wood on back loading) for less than 2 years and 128(30.3%) for 5-10 years. Nearly half (219(51.9%)) of the study participants reported that it takes 30 minutes to 2 hours to reach the town from their home. Regarding frequency of carrying wood, it was one to two times per week in 192 (45.5%) and three to four times per week in 193(45.7%) of the study participants. Most of the study participants (88.4%) in this study had other job other than carrying fire wood. Among these, 349(93.6%) were farmers (Table 2).

Table 2: **Working habits of pedestrian back loading women in Bench Maji zone, 2016**

Variables	N	%
Work experience		
Less than 2 years	156	37
2-4 years	72	17.1
5-10 years	128	30.3
More than 10 years	66	15.6
Time to town from home		
Less than 30 minutes\	55	13
31-120 minutes	219	51.9
More than 120 minutes	148	35.1
Frequency per week		
One to two times	192	45.5
Three to four times	193	45.7
More than four times	37	8.8
Frequency per day		
Once	395	93.6
Twice	27	6.4
Have other job		
Yes	373	88.4
No	49	11.6
What other job (other than selling wood)		
Farmer	349	93.6
Merchant	24	6.4

Reproductive history: Majority (88.4%) of women was married and 354(83.9%) had children. Among those who have children, 159(44.9%) had more than four children. Among those who have children, 35(9.9%) passed less than six months since last birth. Sixty nine (16.4%) ever faced abortion. Among the study participants, 18(4.3%) were pregnant during the data collection (Table 3).

Table 3: **Reproductive history of pedestrian back loading women in Bench Maji zone, 2016**

Variables	N	%
Marital status		
Married	373	88.4
Single	49	11.6
Have Children		
Yes	354	83.9
No	68	16.1
Number of children		
1-2	105	29.7
3-4	90	25.4
Above 4	159	44.9
Time since last birth		
Less than 6 months	35	9.9
6-12 months	118	33.4
Above 12 months	200	56.7
Eve r faced abortion		
Yes	69	16.4
No	353	83.6
Current pregnancy		
Yes	18	4.3
No	404	95.7
Total	422	100
Gestational age		
First trimester	0	0
Second trimester	10	55.6
Third trimester	8	44.4

Musculoskeletal health problems: Asked for general feeling about their health status, more than one third (38.2%) reported as poor. After carrying fire wood, majority (37.9%) reported their feeling of tiredness as 'very tired'. In this study, more than two third (67.3%) had upper back pain while another two hundred fifty five (60.4%) had lower back pain. Regarding shoulder pain, 288(68.2%) had reported the pain. In this study, the prevalence of elbow pain, wrist pain and knee pain was   199(47.2%),   155(36.7%)   and   224(46.9%) respectively.   Among   the   study   participants, 186(44.1%) had feet pain. Based on standardized procedure conducted to identify kyphosis, two hundred fifty two women (59.7%) had kyphosis. In nearly two third (63.3%) of the study participants load to women weight ratio was between 0.51 and 0.75. Nearly, one third of the study participants (31.8%) were underweight based on their BMI calculation (Table 4).

Factors associated with kyphosis: In multivariable logistic regression analysis age, town and duration of work were significantly associated with kyphosis. The odds of kyphosis was higher among age greater than 40 years (AOR= 1.91: 95% CI 1.03, 3.54), those from Mizan town and those worked for more than 10 years (AOR= 2.15: 95% CI 1.01, 4.61) than their counter parts (Table 5).

Table 4: **Musculoskeletal health problems among pedestrian back loading women in Bench Maji zone, 2016**

Variables	N	%
General feeling about health status		
Good	193	45.7
Not too bad	68	16.1
Poor	161	38.2
Feeling of tiredness at end of work		
Not tired	154	36.5
A bit tire	108	25.5
Very tired	160	37.9
Upper back pain		
Yes	284	67.3
No	138	32.7
Lower back pain		
Yes	255	60.4
No	167	39.6
Shoulder pain		
Yes	288	68.2
No	134	31.8
Elbow pain		
Yes	199	47.2
No	223	52.8
Wrist pain		
Yes	155	36.7
No	167	63.3
Feet pain		
Yes	186	44.1
No	236	55.9
All pains		
At least one type of pain	371	87.9
More than one type of pain	275	65.2
Kyphosis		
Yes	170	40.3
No	252	59.7
Load to women weight ratio		
Less than 0.5	112	26.5
0.51-0.75	267	63.3
0.76-1	20	4.7
More than 1	23	5.5

Table 5: **Factors associated with kyphosis among pedestrian back loading in Bench Maji zone, 2016**

Variables	Kyphosis		Crude	Adjusted*
	Yes (%)	No (%)	PR (95% CI)	OR (95% CI)
Age				
≤40 years	95(33.0)	193(67.0)	1.00	1.00
≥40 years	75(56.0)	59(44.0)	2.58(1.70, 3.93)	1.91(1.03, 3.54)
Town				
Mizan	101(47.6)	111(52.4)	1	1.00
Sheko	19(27.1	51(72.9)	0.41(0.23, 0.74)	0.35(0.18, 0.71)
Sheybench	18(25.7)	52(74.3)	0.38(0.21, 0.69)	0.34(0.17, 0.69)
Bachuma	32(45.7)	38(54.3)	0.93(0.54, 1.59)	1.15(0.61, 2.18)
Educational status				
Unable to read and write	141(41.6)	198(52.5)	1.33 (0.80, 2.19)	0.90(0.45, 1.80
Others	29(34.9)	54(65.1)	1.00	1.00
Weight of women				
Less than 40	68(47.5)	95(52.5)	1.69 (1.14, 2.51)	1.60(0.81, 3.13)
More than 40	84(34.9)	157(65.1)	1.00	
BMI				
Underweight	68(50.7)	66(49.3)	1.88(1.24, 2.85)	1.09(0.54, 2.23)
Normal	102(35.4)	186(64.6)	1.00	1.00
Duration of work				
Less than two years	54(34.6	102(65.4)	1.00	1.00
2-10 yeas	74(37.0)	126(63.0)	1.11(0.72, 1.72)	1.21(0.67, 2.20)

| More than 10 years | 42(63.6) | 24(36.4) | 3.31(1.81, 6.03) | 2.15(1.01, 4.61) |

*Adjusted for religion, time from home, duration of work, BMI, age, educational status, town, marital status, parity

Discussion

This study showed that women were carrying heavy loads as compared with their weight. This may be seen in terms of load to women weight ratio which indicated that nearly three fourth of the study participants' load was more than 50% of their body weight. But weight exceeding 10% of body weight is believed to cause negative health consequences (19). This heavy load may burden them with different health problems. This burden may come not only from the heavy nature of the load but duration of work they have been involved; since 45.9% worked for more than 5 years. This long period of time with consideration of the heavy nature of load may affect health of women negatively. In addition to these, the distance from home to town where they sell the fire wood should also be considered. Of course, the duration of time do not explain the actual burden. Since there is no specified place to sell fire wood, they travel a long distance for a long period of time from home to home within town until they sell it.

More than half of the study participants do this job for more than three times a week and 6.4% do it twice a day. In fact, for most (88.4%) of the study participants, this is not the only job. They have also other job in their home. All these are possible burden which may affect the health of women.

In addition to the wood they carry, many women also carry their small kids when they come to town. In other cases, women carries wood while they are pregnant. This may have dangerous effect on both women and their fetuses.

Regarding musculoskeletal pain, this study indicated that the prevalence of upper back pain, lower back pain, shoulder pain, elbow pain, wrist pain, knee pain and feet pain were 67.3%, 60.4%, 68.2%, 47.2%, 36.7%, 46.9% and 44.1% respectively. These findings were high as compared with other studies conducted in Limpopo, Malaysia, Northwest Adelaide and Greece (20-23). The study conducted in Limpopo indicated that 38% had back pain and 69% had spinal pain (neck and back) (20). The Malaysian study indicated that 65.1% had at least one type of musculoskeletal pain in past one year (21). In North West Adelaide, 17.4% of participants had foot pain (22). The study conducted in Greece among dentists showed that the prevalence of shoulder pain, low back pain and wrist pain was 20%, 46% and 26% respectively (23). Our finding was consistent with the study conducted among community nurses which indicated that the 12 month prevalence of back pain was 66.8% (24). But the latter study combined upper and lower back pain together which makes the comparison difficult. Other studies also indicated that a one year prevalence of shoulder disorders ranges from 5-47% which is lower than our finding (25).

All these results were lower than the findings of our study. This could be due to the job nature of the study participants. In addition to these, the prevalence of shoulder pain was the most common among others. This could be because of nature of the way they carry woods. They tie the load with their shoulder by using rope.

In this study, the prevalence of kyphosis was 59.7%. This result was higher compared with other studies conducted in South Africa, Egypt and Serbia (11-13). The study conducted in South Africa among University students the prevalence of kyphosis was 34% (11). The study from Egypt (12) and Serbia (13) reported 32.44% and 10.5% of kyphosis respectively.

But finding of our study was lower than systematic review result among those who have achondroplasia which indicated the prevalence of kyphosis as 79% (26). This difference could be due to difference in population since achondroplasia (lack of cartilage formation) is a great risk for skeletal deformity.

This study revealed that age and duration of work was significantly associated with kyphosis. Town where the study participants come to sell fire woods was also significantly associated with kyphosis. This could be due to difference in methods of carrying across towns. There are evidences suggesting relation between level of load and postural response (19).

As limitation of the study, it is important to mention its lack of temporality as the design is cross-sectional. Using convenience sampling may also impair its generalizability.

Based on the result of this study, we conclude that: the prevalence of musculoskeletal pain was high among the study participants, the majority being shoulder and back pain. The prevalence of kyphosis was also high. This study revealed that age, town and duration of work were significantly associated with kyphosis.

Based on the result of this study, we recommend the local government to empower women and search for other source of income and local media to provide education on health risk of carrying heavy wood. We also recommend researchers to conduct similar studies with strong design.

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