

# Load Carrying Pattern by Women Labourers

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**ABSTRACT:** In the developing countries, women carry a heavy load on their head at construction sites as most of the work is manually done by them. Most of them adopt the wrong posture while carrying the load and face several problems related to health. The present study was conducted on 100 women labourers from Hisar and Gurgaon districts of Haryana. Fifty respondents were selected from each district, from which 25 each were engaged in construction activity either at the residential or commercial site. The paper focuses on different activities in which the women labourers are involved at the construction sites and posture adopted by them while performing various activities. The results revealed that headload carrying activity was performed by a majority (74%) of women labourers, followed by those engaged in breaking bricks (14%) and cleaning activity (12%). Most of them carried concrete mixer and cement mixer. About two-third of the respondents lifted load by bending their back whereas only 28 percent of them lifted load by bending their knees.

**KEYWORDS:** Construction workers, women, headload, work posture

## I. INTRODUCTION

Health hazard conditions become more severe in developing and under developing countries mainly where the workers work without safety. In developing countries, neither the company nor the labour contractor pays attention to the safety of the poor labour. Out of a total 68,484 industrial injuries (not including service sector, the private sector and agriculture), 9283 were caused by handling different objects. It was also mentioned that the most injury prone area was where the labour was forced to manually handle heavy weights (~100)[1]. In India, most of the materials and equipment's are handled manually by the women construction labourers usually in ergonomically hazardous postures. Women are mostly engaged in manual material handling tasks and these manual material handling tasks require lifting, loading, carrying, pushing, and pulling etc. activities [2]. The safe load limit for adult female worker has been described as 30kg [3] which is higher than recommended weight limit (RWL) of 23kg suggested by NIOSH committee [4] revealed that the load carried by the workers is within the permissible limit, but their rigorous work schedule can be attributed to the high incidence of work-related musculoskeletal disorders. About 32.50 per cent of respondents reported that they had swelling in the various parts of the body in the recent past. This recurrent occurring of swelling may be due to the fact that the workers do not lift weight properly and assume improper postures of the body. Cuts and bleeding were one of the phenomena which was not much 'frequently occurring incidence' as experienced by most of the workers. The present study was conducted to know the headload carrying pattern with the following objectives: (1) To study the activities performed and material carried by the women labourers. (2) Posture adopted during different stages of carrying the headload.

## II. METHODOLOGY

The present study was conducted in Hisar and Gurgaon districts of Haryana state. A random sampling procedure was used to draw a sample of 100 women labourers. Residential and commercial construction sites were selected purposively for the study. Fifty respondents were selected from each district, out of which 25 worked at residential construction sites and 25 at commercial construction sites. A field survey was conducted with the help of a structured interview schedule and observational studies to assess the type of activities performed, materials carried, posture adopted while carrying the headload by women labourer at construction sites.

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 9, September 2016

### III. RELATED WORK

The constant use of machinery and power tools, working on elevated work surfaces, manual handling of heavy construction materials, etc. are important contributing factors to make this construction industry as one of the most hazardous industries [5]. According to the International Labor Organization (ILO), Maximum Weight Recommendation, 1967, (No. 128), stated that an adult man can carry up to 55 kg weight, but a female or weak person should carry less compared to a healthy adult man[6].

The attention towards health and safety aspects of these construction workers is relatively poor compared to other industries (including office work) and only a few places in the world are active in research in this field over a sustained period of time [7]. Female workers in Delhi, stating that ‘construction work’ is the only kind of work left open to women, work is very strenuous and they lift loads of up to 100 kg, so they faced problems in hands and feet pain. Working in the high temperature may cause injury and decrease the efficiency of work and as the worker generally work barefooted, without any protective device and are clothed in their traditional loose garment [8].

Workers categorised themselves as performing heavy work. Factors that contributed to a heavy workload as observed in the workplace were that the joints were not in a neutral position while performing the work. The workers maintained those abnormal postures for a long time, which contributed to their easy fatigability. Work was not close to the body of the workers and they had to adopt awkward postures to perform such works [9].

### IV. RESULTS

Results pertaining to varied activities performed by women labourers at construction sites, material carried by the women labourer at construction sites, posture adopted during different stages of carrying headload, load lifting, carrying and landing pattern of women labourer at construction sites, assistive used while carrying headload are presented and discussed in tables as follows:-

**Table: 1: Type of activities performed by women labourers at construction sites**

**n=100**

Type of activity	f*(%)
Breaking bricks	14
Carrying headload	74
Cleaning	12

\*Frequency is equal to the percentage as the sample size was 100.

Table 1 depicts that headload carrying activity (74%) was performed by maximum women labourer followed by breaking bricks (14%) and cleaning activity (12%). Activity performed by most of the respondents was found to be aheadload. So for further ergonomic assessment in phase II, the headload carrying activity was selected. In construction industry more than two- third of women construction workers have to work in multiple types of construction works like water feeding, material supply, mixing cement and stone shaping [10].

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**Table 2: Material carried by the women labourer at construction sites**

**n=100**

Variables	Categories	f*(%)
<b>Type of material</b>	Water	9
	Bricks	27
	Cement	24
	Concrete mixture	30
	Any other	10
<b>Weight of material</b>	<10 kg	9
	10-20 kg	32
	>20 kg	59

\*Frequency is equal to the percentage as the sample size was 100.

Table 2 shows the material carried by the respondents on their head was a concrete mixture (30%) followed by those who carried bricks (27%) cement (24%) and water (9%). Ten percent respondents carried sand, gravel etc. materials. The majority of the respondents (59%) carried the heavy load on the head with the weight which was greater than 20 kg, followed by those who carried the weight in between 10-20kg (32%) whereas only a few (9%) reported to carry less than 10kg. Similar results were found in a study that majority (44%) of the respondents were found to be carrying bricks, cement and stones. One-fourth filters sand at the work sites. Another one-fourth assisted the masons in the work and carry water for construction purpose site [11].

**Table 3: Posture adopted during different stages of carrying headload**

**n=100**

Activity	Posture	f*(%)
Lifting	Knees bent	28
	Back bent	72
Carrying	Using one hand	21
	Using both hands	64
	Hands-free	15

\*Frequency is equal to the percentage as the sample size was 100.

Table 3 indicates that 72 percent of respondents lifted load by bending their back whereas only 28 percent of them lifted the load by bending their knees. Most of the times they used to hold the load by both the hands (64%) raised above shoulder level whereas 21 percent reported that they used to carry the load by holding it with alternate hands followed by carrying the load without holding it (15%). While placing the concrete block, female workers first placed one block on their head, then they bent their knees and placed other blocks on their heads and then stood up carefully and started walking. It was also seen that during concreting columns and staircase formwork lifting was done at ground level and vertical lifting distance at chest level or above. While lifting up the concrete mixture women workers stood on their toe and lifted up the load with a jerk to take it up [12].

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(a) Posture adopted during lifting headload (b) Posture adopted during carrying headload

**Table 4: Load lifting, carrying and landing pattern of women labourer at construction sites**

n=100

Activity	Pattern	f*(%)
Load lifting	Lifting by self	25
	Lifting with others help	75
Load carrying	Manually	63
	Shift load	20
	lifting machine	17
Load landing	Direct dropping on ground	76
	With the help of others	24

\*Frequency is equal to the percentage as the sample size was 100.

Table 4 describes the lifting, carrying and landing pattern of the construction women labourer while performing headload carrying activity. A higher majority of them (75%) needed somebody's assistance in lifting the load from ground to their head and one fourth of them was able to lift loads by themselves (25%). In load carrying pattern, manual lifting was done by the majority of the women (63%) while sometimes they shift their load (20%). Only a few respondents lifted a load with the help of lifting machine (17%). Mostly they used to drop the load directly from their head (76%), whereas 24 percent of them needed somebody's help in landing the load. The landing pattern depended on the type of material they were carrying like if it was bricks and sand, gravels they used to directly drop it and in the case of heavy stone they took assistance whereas for cement and concrete mixture they unloaded it themselves. The results are consonance with the findings that while carrying soil, a worker used to dump directly at the particular place. While working on the floor waste materials, garbage, spillage cement etc. were carried with the help of trolley and brought down manually by the female workers [12].

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(c) Load Lifting (d) Carrying (e) Landing Pattern

Table 5 presents the information on assistive used by women labourer while carrying the headload. Rubber slippers were used as foot wears by most of the respondents (60 %), followed by those respondents (23%) who did not use any assistive while carrying the headload and boots/shoes (27%). In a similar study it was concluded that 84 percent of female construction labourer working in unorganised sectors used only slippers or chappals whereas others were barefoot [13]. Tasla(60%) was generally used for carrying sand, gravel, cement mixture and concrete mixture. While carrying the load like bricks they used twisted cloth (27%) which was made according to their comfort and size of head whereas few respondents used *indi* for carrying the headload. *Indi* made of indigenous materials like cloth, grass or leaves were used for keeping it on head under the load.

**Table 5: Assistive used while carrying headload**

n=100

Category	Assistive used	f*(%)
Walking while load carrying	No assistive	23
	Rubber slippers	60
	Boots/ Shoes	17
Load carrying	Round twisted cloth	24
	Tasla/bucket	60
	Indi	16

\*Frequency is equal to the percentage as the sample size was 100.

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(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 9, September 2016

## V. CONCLUSIONS

Headload carriage followed by brick breaking was the predominant activity carried out by maximum women labourers. Material usually carried by the respondents on their head was a concrete mixture with the slight difference of bricks, cement and water. The majority of the respondents (59%) carried the heavy load greater than 20 kg. About two-third of the respondents lifted load by bending their back, whereas only 28 percent of them lifted the load by bending their knees. The majority (64%) used to hold the load by both the hands raised above shoulder level whereas 21 percent carried the load by holding it with alternate hands followed by carrying the load without holding it (15%). Rubber slippers were used as foot wears by most of the respondents. Tasla was generally used for carrying sand, gravel, cement mixture and concrete mixture. While carrying the load, the women should avoid twisting the spine to turn but move their feet instead. Help from another worker should be taken or a trolley should be used to move heavy objects. While lifting the load, knees should be bent and back should be kept straight with the load being lifted slowly and smoothly. Headload carrier should be used for carrying a heavy load on the head.

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