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Is cervicodynia associated with head load carrying in construction site workers in Lucknow

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ABSTRACT

Background: Cervicodynia is one of the most common musculoskeletal symptoms reported by construction workers, particularly those involved in head-load carrying jobs. One of the reasons for this could be accelerated degenerative changes in the cervical spine as a result of continuous stress on it owing to head-load carrying. Apart from carrying a heavy load on the head, frequently have to work in an awkward posture involving "repeated movement of the back and limbs and work above the shoulder during loading on the head and unloading as well as stacking bricks." In response to the continuous stresses on the neck muscles, Cervicodynia is a commonly occurring phenomenon among construction workers, particularly head-load carrying workers. **Aims and Objectives:** This cross-sectional study aims to determine the association between cervicodynia and head-load carrying in construction site workers in Lucknow. **Materials and Methods:** A total 68 workers were enrolled in the study and their details were recorded in the questionnaire Pro forma and they were asked to provide their job details. Those workers responding affirmatively to cervicodynia, the intensity, and its distribution along the brachial plexus and vertigo was recorded. Data were recorded on a separate case recording sheet, and statistical analysis was done using SPSS Version 21.0 statistical Analysis Software. The values were represented in number (%) and Mean ± SD. The Chi-square test and Student's "t" test was used. The level of significance was $P < 0.05$. **Results:** Out of 68 workers, 57.4% were male, whereas 42.6% were female with a mean age of 32.15 years. The overall complaints of neck pain were 55.9%. Workers with complaints of neck pain carry significantly higher weight per round, carry weight for significantly longer duration, and cover significantly longer distance with weight. **Conclusion:** It can be concluded that cervicodynia is a common occurrence among construction workers, particularly, head-load carriers. Although univariate analysis highlighted the role of occupational factors in the occurrence of neck pain, on multivariate assessment, only age emerged as an independent predictor.

Key words: Cervicodynia; Head load; Construction site workers

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INTRODUCTION

The construction industry is one of the biggest industries having the largest employers in the world and is often overlooked and undervalued. This industry contributes 15% of the world's gross domestic product.[1] Nearly 8 million employees in India are employed in construction-related works.[2] Despite their essential role in the development of the country, they are subjected to difficult working conditions with no financial, physical, or medical security facilities and inadequate wages exposing them to copious occupational-related health risks and accidents.[3-5]

Construction site workers are often required to work long hours under harsh conditions and in dangerous environments

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and it exposes them to awkward posture, extreme weather, different forces, stress, etc., which risk them to injuries and musculoskeletal disorders on the job.[6] In addition, they earn low wages which do not reflect the amount of hard work that they put in. This leaves them vulnerable to poverty and makes it difficult for them to improve their lives.

The head is supported by the cervical spine and it is subjected to shearing stresses because the upper vertebra is all time moving forward and backwards over the lower vertebra. Carrying a load on the head not only compresses the disk but also increases in shearing force due to an increase in momentum.[7] Compression of the vertebra leads to herniation of the disc which results in pain and tenderness in the neck. If herniation of the disc presses on the root will cause brachialgia, if presses vertebral artery leads to vertigo and if it presses the spinal cord leads to quadriparesis.

Musculoskeletal symptoms such as pain in the neck, shoulder, whole back, leg and foot, tingling and numbness in upper and lower limbs, and fatigue are some common problems reported by them.[8] In the abovementioned symptoms, neck pain is a commonly reported symptom, particularly in those who are involved in head load-carrying activities. In developing countries like India, neck pain is an incessant finding in head load-carrying construction workers and it remains to be one of the important occupational health issues.[9]

However, there are limited studies to understand the magnitude of this problem and various factors that cause, change, and modulate neck pain and its intensity in head load-carrying workers. Hence, this present cross-sectional study was aimed to determine the association between head load carrying and neck pain in construction site workers in Lucknow and determine other factors besides head load carrying that are significant predictors of neck pain in construction site workers in Lucknow and adjust confounding using multivariate analysis.

Aims and objectives

This cross-sectional study aims to determine the association between Head load carrying and cervicodynia in construction site workers in Lucknow. To determine the association between Head load carrying and cervicodynia; and also to determine the other factors besides Head load carrying which are significant predictors of neck pain in construction site workers in Lucknow.

MATERIALS AND METHODS

The present cross-sectional study was conducted in the Department of Orthopaedics, Era's Lucknow Medical College & Hospital, Lucknow. After obtaining ethical clearance and participants consent, total 68 workers were enrolled. The inclusion criteria were "workers in construction site of Lucknow of both sexes, age ≥18 years, BMI 18 kg/m^2 or above and exclusion criteria were "pregnant women, participants suffering from Hypertension/Diabetes mellitus/Tuberculosis/Asthma" for participation in this study. The sample size was calculated at the Department of Social & Preventive Medicine, Era's Lucknow Medical College on the basis of prevalence of neck pain (>3 days) among study population using the formula:

$$n = \frac{Z_{\alpha}^{2} pq}{L^{2}}$$

Where P=61.0% neck pain (>3) among study population) 34
q=100 – p,
Type I error α=5%, for the significance level of 95%.
Allowable error L=20% of p for detecting the results with 80% power of study.

Then the required sample size is n=68.

All the subjects were clinically examined. During examination, they were interviewed to collect the personal and demographic details, job profile, and anthropometric measurements. Workers were asked to provide details of engagement in head load-carrying activities, if engaged, to define duration, frequency, duration of weight carrying, and amount of weight being carried by them. In the case of a worker responding affirmatively to neck pain, the intensity of neck pain was measured on a visual analog scale and its distribution along the brachial plexus and vertigo was recorded. Data collected were recorded on a separate case recording sheet which was later used for analysis. The statistical analysis was done using Statistical Package for the Social Sciences Version 21.0 statistical Analysis Software. The values were represented in number (%) and Mean±SD. The Chi-square test was used to test the significance of categorical data, whereas to test the significance of two mean values, Student "t"-test was used. The level of significance was P<0.05.

RESULTS

The present study determined the association between cervicodynia and head load carrying in construction site workers in Lucknow. This study also determined other predictors of neck pain in this population. A total of 68 construction site workers age ranging from 19 to 56 years; mean age 32.15±9.05 years; 57.4% males; 88.2%

married (Table 1) were enrolled in the study and they were evaluated for their clinico-demographic profile, nature of work followed by evaluation of neck pain, and its intensity (VAS scores). Body mass index of the workers ranged from 18.7 to 32.5 kg/m^2. Majority of workers (69.1%) had BMI in 18.5–24.9 kg/m^2 category, followed by 25.0–29.9 kg/m^2 (27.9%) and 30 kg/m^2 (2.9%), respectively (Table 1). In this study, 43 (63.2%) were head load carriers. Mean weight carriage, average duration of weight carrying job, frequency of weight carriage, and distance covered with weight were 17.79±17.65 kg, 2.90±2.55 h, 3.72±3.62 and 1.68±1.60 units, respectively (Tables 2 and 3). Neck pain complaints were reported by 38 (55.9%) workers (Mean VAS score 2.43±2.39) and tenderness, brachialgia, and vertigo were revealed in 33 (48.5%), 29 (42.6%), and 32 (47.1%) workers, respectively (Table 4).

Table 1: Demographic and anthropometric of study population (n=68)

Serial number	Characteristic	Number of cases (%)
1	Age (years), mean±SD (range)	32.15±9.05 (19–56)
2	Sex	
	Male	39 (57.4)
	Female	29 (42.6)
3	Marital status	
	Married	60 (88.2)
	Unmarried	8 (11.8)
4	Comorbidities	0
5	Body weight (kg), mean±SD (range)	55.91±9.59 (39–78)
6	Height (cm), mean±SD	153.15±8.85 (133–170)
7	BMI (kg/m^2), mean±SD	23.74±2.76 (18.7–32.5)
	18.5–24.9	47 (69.1)
	25.0–29.9	19 (27.9)
	≥30	2 (2.9)

BMI: Body mass index, SD: Standard deviation

Table 2: Job profile of the study population (n=68)

S. No.	Characteristic	Number of cases (%)
1	Nature of job	
	Head load carrier (Group A)	43 (63.2)
	Nonhead load carrier (Group B)	25 (36.8)
2	Weight carriage per round (kg), mean±SD (range)	17.79±17.65 (0–50)
3	Duration of weight carrying job (h), mean±SD (range)	2.90±2.55 (0–8)
4	Frequency of weight carriage (*n*), mean±SD (range)	3.72±3.62 (0–10)
5	Distance covered with weight (km), mean±SD (range)	1.68±1.60 (0–6)

SD: Standard deviation

Table 3: Distribution of different exposures for head load carrier (Group A)

Serial number	Characteristic, mean±SD	Group A (case) (n=43)
1	Weight carriage per round (kg)	28.14±14.10
2	Duration of weight carrying job (h)	4.58±1.58
3	Frequency of weight carriage (n)	5.88±2.80
4	Distance covered with weight (km)	2.65±1.19

SD: Standard deviation

Head load carriers as compared to non-head load carrier workers had significantly higher proportion of women; however, no significant difference between two groups was observed for marital status, age, body weight, height, or BMI. Significantly higher proportion of head load carrier workers as compared to non-head load carrier workers complained of neck pain, tenderness, brachialgia, and vertigo (Tables 5 and 6).

On univariate analysis, neck pain did not show a significant association with sex, marital status, frequency of weight carriage, height, body weight, and BMI of the workers (Table 7). However, it was significantly associated with higher mean age, mean weight carriage per round, mean duration of weight carrying job, and mean distance covered with weight. On multivariate assessment, age showed a significant association with neck pain occurrence; however, none of the other demographic, anthropometric, or occupational factor showed a significant association with neck pain (Table 8).

DISCUSSION

Carrying load on head is almost-ubiquitous activity among construction workers in India where cheap and reliable mechanized transportation is often rare. In this study, we conclude that cervicodynia, tenderness, brachialgia, and vertigo as effects of head load carrying. In univariate analysis duration per day, distance covered/cycle, amount of weight carried, and frequency are exposure characteristics which are associated. Among other explanations of symptoms in univariate and multivariate analysis, age is the only related determinant of neck symptoms. This was also supported by a study which demonstrated cognizable impact of head load

Table 4: Distribution of neck pain in the study population (n=68)

Serial number	Characteristic	Number of cases (%)
1	Complaints of neck pain	38 (55.9)
2	Intensity of pain, mean±SD (VAS)	2.43±2.39 (0–7)
3	Tenderness	33 (48.5)
4	Brachialgia	29 (42.6)
5	Vertigo	32 (47.1)

SD: Standard deviation, VAS: Visual analog scale

Table 5: Comparison of distribution of neck pain, tenderness, brachialgia and vertigo among head load carrier (Group A) and nonhead load carrier (Group B) labourers

Serial number	Characteristic	Group A (case) (n=43), n (%)	Group B (control) (n=25), n (%)	Statistical significance
1	Complaints of neck pain	28 (65.1)	10 (40.0)	χ^2=4.045; *P*=0.044
2	Tenderness	25 (58.1)	8 (32.0)	χ^2=4.324; *P*=0.038
3	Brachialgia	25 (58.1)	4 (16.0)	χ^2=11.48; *P*=0.001
4	Vertigo	26 (60.5)	6 (24.0)	χ^2=8.438; *P*=0.004
5	Intensity of pain, mean±SD (VAS)	2.74±2.40	1.68±2.36	t=1.774; *P*=0.081

SD: Standard deviation, VAS: Visual analog scale

Table 6: Coexisting signs/symptoms with neck pain

Serial number	Sign/symptom	Neck pain		Statistical significance	
		Yes (n=38), n (%)	No (n=30), n (%)	χ^2	P
1	Tenderness	33 (86.8)	0	50.617	<0.001
2	Brachialgia	29 (76.3)	0	39.919	<0.001
3	Vertigo	32 (84.2)	0	47.719	<0.001

Table 7: Association of different demographic and occupational factors with neck pain (univariate analysis)

Serial number	Factor	Neck pain		Statistical significance	
		Yes (n=38), n (%)	No (n=30), n (%)	χ^2	P
1	Male sex	19 (50.0)	20 (66.7)	1.904	0.168
2	Married	33 (86.8)	27 (90.0)	0.161	0.688
Serial number	**Factor**	**Neck pain, mean±SD**		**Statistical significance**	
		Yes (n=38)	**No (n=30)**	**t**	**P**
3	Age (years)	35.37±9.24	28.07±7.04	3.582	0.001
4	Height (cm)	153.08±7.95	153.23±10.03	−0.071	0.944
5	Body weight (kg)	55.45±10.24	56.50±8.82	−0.447	0.656
6	BMI (kg/m^2)	23.55±3.11	23.98±2.25	−0.635	0.528
7	Weight carriage per round (kg)	22.37±17.85	12.00±15.84	2.498	0.015
8	Duration of weight carrying job	3.68±2.60	1.90±2.14	3.033	0.003
9	Distance covered with weight (km)	2.18±1.75	1.03±1.10	3.140	0.003
10	Frequency of weight carriage (n)	3.84±3.41	3.57±3.92	0.310	0.758

SD: Standard deviation, BMI: Body mass index

Table 8: Association of different demographic and occupational factors with neck pain (multivariate analysis)

Serial number	Variable	Unadjusted OR±SE	Wald statistic	P	Adjusted OR (95% CI)
1	Age	0.140±0.046	9.386	0.002	1.150 (1.052–1.258)
2	Male sex	−0.734±0.714	1.058	0.304	−0.480 (0.119–1.944)
3	Married	−1.560±1.407	1.229	0.268	0.210 (0.013–3.311)
4	BMI	−0.110±0.607	0.033	0.856	0.896 (0.272–2.946)
5	Head load carrying	−4.122±2.764	2.224	0.136	0.016 (0.000–3.653)
6	Duration (h)	0.633±0.360	3.100	0.078	1.883 (0.931–3.810)
7	Weight carrying per day	0.058±0.040	2.066	0.151	1.060 (0.979–1.147)
8	Distance	0.293±0.593	0.243	0.622	1.340 (0.419–4.287)
9	Frequency	−0.001±0.187	0.000	0.994	0.999 (0.692–1.441)
10	Constant	−2.728±2.157	1.600	0.206	0.065

BMI: Body mass index, CI: Confidence interval, OR: Odds ratio, SE: Standard error

carrying on neck pain, tenderness, neurological deficit, and vertigo and found age, amount of weight carried, duration of weight carried, and distance covered with weight in the head load carrier, as contributory risk factors. Head load carriers should focus on alternative methods, in which they do not have to carry load on head or back.

Limitations of the study

The scope of the present study was limited to studying the effect of head load carrying on Cervicodynia and determining other predictors of neck pain. We missed the opportunity to study the effect of Cervicodynia on opportunity loss (absenteeism), sleep disturbance, frequency of substance abuse and relationship with

spouse/family members. We recommend further studies with a wider scope. Despite meeting its objectives, the present study seems to have a smaller sample size as compared to earlier studies; this could be another limitation of the study.

CONCLUSION

It can be concluded that cervicodynia is a common occurrence among construction workers, particularly, head load carriers. Though univariate analysis highlighted the role of occupational factors in the occurrence of neck pain, however, on multivariate assessment, only age emerged as an independent predictor. The study findings suggest the need to develop ergonomically suitable techniques for load carriage and automatization of head load carrying work in order to reduce this burden.

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DP- Concept, design, definition of intellectual content, literature survey, implementation of study protocol, data collection; **VK-** Editing, manuscript revision and submission of article.

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