

# Work-related Neck Pain Among Desk Job Workers of Tertiary Care Hospital in New Delhi, India: Burden and Determinants

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## ABSTRACT

**Background:** Work-related Neck Pain (WRNP) is a leading cause of disability and absenteeism. There is dearth of information about burden and determinants of WRNP in health facility setting in India. **Materials and Methods:** A cross-sectional study was carried out at tertiary care hospital in New Delhi. All Group C desk job workers involved in the administrative work were included in the study. Participants were screened for WRNP by using pretested semi-structured questionnaire. Detailed information on probable risk factors was collected among patients with WRNP. Neck examination by trained investigator was done. Work place assessment was done by using observation check-list using the recommendations of the ISO Standard (Ergonomic requirements for office work with visual display terminals). Crude and adjusted odds ratio was calculated with 95% confidence interval to understand the determinants of WRNP. **Results:** In total, 441 participants were included in the study. Of them, 58% were males. Majority of participants aged between 31-50 years. One-year prevalence of neck pain and WRNP was reported as 43.3%, (95% CI 38.7%-47.9%) and 28.3%, (95% CI 24.3%-32.7%) respectively. On multivariate analysis, female gender (OR-2.0 95% CI) and poor perception of breaks during working hours (OR-2.4 95% CI), along with work place related factors such as posture (OR-5.4 95% CI) and height of the screen (<10 cms) (OR-2.6) were identified as independent determinants of WRNP. **Conclusion:** High one-year prevalence of WRNP was reported among desk job workers. Burden of WRNP was reported more among females as compared to males. Most common factor identified was Computer use for more than 4-6 hours was most important predictor of WRNP followed by work related factors such as height of screen and posture are associated with WRNP.

**Keywords:** Association, neck pain, office workers, prevalence, work related

## Introduction

Work-related musculoskeletal disorders (WRMSD) are defined as injuries or disorders of musculoskeletal tissues associated with workplace related risk factors.<sup>(1)</sup> WRMSD are also known as cumulative trauma disorders, repetitive strain injuries and overuse injuries.<sup>(2)</sup> WRMSDs

of the neck are major problem among people who spend a great deal of time using computers.<sup>(3,4)</sup> Musculoskeletal disorders (MSD) are the most common causes of long-term sick-leave and disability pension in several industrial countries.<sup>(5)</sup> Community based studies worldwide reported annual prevalence of neck pain ranging from 15 to 44%.<sup>(6)</sup> Globally one-year prevalence of neck pain related disability has been reported ranging from 7%<sup>(7)</sup> to 11%.<sup>(6)</sup> Prevalence of neck pain among office workers is higher than in the general community.<sup>(8)</sup> Globally, one-year prevalence of neck pain among administrative workers has been reported between 15%<sup>(9)</sup> to 34.4%.<sup>(10)</sup>

Causal association of prolonged computer use and neck pain is already established.<sup>(8)</sup> Factors such as awkward

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postures, repetitive work and aggravation of previous pain episodes are reported to contribute to WRNP.<sup>(6,7)</sup> Females are more affected with neck pain than males.<sup>(10)</sup> Neck pain related disability has health and economic impact both at individual and community level.<sup>(1,4,5)</sup>

There is dearth of information about burden WRNP among office workers in health facility in India. Hence, we undertook the study to assess burden of WRNP among desk job workers in tertiary care hospital in National Capital city in India. We have also studied individual and work related factors contributing to WRNP among desk job workers

## Materials and Methods

A cross sectional study was carried out among Group C workers at All India Institute of Medical Sciences (AIIMS), New Delhi in the year 2012. Group C worker is an employment position mainly at the desk. Office workers aged 18 years and above and employed in the current position for at least one year with or without computer were included in the study. Information about self reported illness such as Ankylosing Spondylosis, Rheumatoid Arthritis, Osteoarthritis and other Connective Tissue Disorders was obtained at time of the screening. Participants with self reported illness were excluded from the study. Also, workers suffering from injury and who underwent surgery of the upper extremity for musculoskeletal conditions were excluded from the study. Sample size of 415 was calculated based on prevalence of WRNP as 30%<sup>(11)</sup> and 15% relative precision with 95% confidence interval. By considering 5% of refusal, effective sample size of 440 was estimated for the study. The list of Group C workers was obtained from the administration section of AIIMS. In the study, a desk job worker was defined as workers who are expected to spend at least 50% of their working time at desk with or without a computer. The study participants were screened as per pre-decided inclusion and exclusion criteria.

Basic demographic details were collected and participants were enquired for self reported neck pain in last one year. Neck pain was defined as self reported neck pain experience, neck ache or neck discomfort during the previous one year.<sup>(3)</sup> Neck area was defined from the base of the skull (occipital) to the upper part of the back and laterally to the outer and superior bounds of the shoulder blade (scapula).<sup>(12)</sup> Severity of neck pain was measured on Numerical Rating Scale as "mild", "moderate" and "severe."<sup>(13)</sup> Study participants with neck pain were screened for Work-related Neck Pain (WRNP). WRNP was defined as neck pain that is aggravated at the end of the working day in absence of any other apparent causes of neck pain on history and clinical examination.

Work place assessment was done as per the recommendations of the ISO Standard (Ergonomic requirements for office work with visual display terminals).<sup>(14)</sup> Observation check-list was used to record the parameters of work place such as height of the computer screen, distance of key-board and mouse from the operating worker. The observations were categorized as 'good' and 'poor' grades. Study participants were also observed for their working posture without bringing it to their notice. Criteria followed for defining good working posture included sitting in straight position, feet touching the ground with or without foot rest, availability of elbow support, with back support, not leaning forward.

Anthropometric examination of the participants was also carried out.

The data was entered in Epi info version 7 and transferred into Microsoft excel version 2010 for windows. Data analysis was done using the SPSS version 17 for windows. *P*-value  $\leq 0.05$  was considered a statistically significant. Odds ratio (OR) with 95% confidence interval was calculated. Multivariate analysis using binomial logistic regression by enter method was carried out to identify the determinants of WRNP. Results of multivariate regression are presented with adjusted OR with 95% confidence interval.

## Ethical issues

Written informed consent was obtained from the study participants. Ethical clearance for the study was obtained from Institutes ethics committee of All India Institute of Medical Sciences, New Delhi, India.

## Results

A total of 489 Group C workers were enlisted, out of which 441 were found to be eligible for inclusion. Out of them, 257 (58.2%) were males and 184 (41.8%) were females. The mean age of the study participants was around 43.4 years (SD: 7.8). According to Body Mass Index (BMI), 205 (46.5%) and 116 (26.3%) study participants were categorised as overweight and obese respectively. Distribution of participants as per demographic characteristics is described in Table 1. A total of 192 (43.3%, 95% CI: 38.7%-47.9%) study participants reported neck pain in past one year, 61 (31.7%, 95% CI: 25.6%-38.6%) of them had neck pain at the time of study. Work-related Neck Pain (WRNP) was found in 125 (28.3%, 95% CI: 24.3%-32.7%) of study participant. The participants who are reported neck pain had spent more than 42 hours per week and more than 80% were working on the desk and chair. Severe neck pain was present in 26 (20.8%) mild and moderate neck pain were reported by 19 (15.2%) and

**Table 1: Distribution of participants by demographic variables (n = 441)**

Category	Male nos. (%)	Female nos. (%)	Total nos. (%)
<b>Age group (Years)</b>			
21-30	13 (5.0)	6 (3.2)	19 (4.3)
31-40	104 (40.4)	52 (28.2)	156 (35.4)
41-50	89 (34.6)	67 (36.4)	156 (35.4)
>50	51 (19.8)	59 (32.0)	110 (24.9)
Total	257 (58.2)	184 (41.8)	441 (100)
<b>Education</b>			
<Class 12	8 (3.1)	5 (2.7)	13 (2.9)
Class 12	51 (19.8)	27 (14.7)	78 (17.7)
Graduation	198 (77.0)	152 (82.6)	350 (79.4)
<b>Designation</b>			
Assistant non-secretarial	29 (11.3)	29 (15.8)	58 (13.1)
Upper divisional clerk	109 (42.4)	63 (34.2)	172 (39.0)
Lower divisional clerk	77 (30.0)	50 (27.2)	127 (28.8)
Stenographer	21 (8.2)	28 (15.2)	49 (11.1)
Data entry operator	21 (8.2)	14 (7.6)	35 (7.9)
<b>Department</b>			
Establishment section	105 (40.8)	78 (42.3)	183 (41.4)
Centres	69 (26.8)	57 (30.9)	126 (28.5)
Departments	58 (22.5)	34 (18.4)	92 (20.8)
Examination section	12 (4.6)	3 (1.6)	15 (3.4)
Engineering section	13 (5.0)	12 (6.5)	25 (5.6)
<b>Duration in similar kind of job</b>			
Up to 5 years	15 (5.8)	10 (9.1)	40 (8.8)
5 to 15 years	110 (42.8)	76 (41.3)	183 (40.0)
16 to 25 years	105 (40.9)	69 (37.5)	177 (38.7)
26 and above years	28 (10.5)	29 (15.8)	57 (12.5)

80 (64.0%) study participants respectively on numeric rating scale.

Of total, 387 (87.7%) worked with computer. Prevalence of WRNP was higher in study participant using computers compared to who were not using (29.6% Vs 21.7%) but this association was not statistically significant ( $P = 0.18$ ). Neck examination of 125 study participants with WRNP was carried out. Out of them, 56 (45.7%) did not have any positive findings on clinical examination. Remaining study participant had tenderness at paraspinal area (24.4%), tender spinous process (14.2%), raised local temperature (10%) and localized neck swelling (1.6%).

Prevalence of WRNP was double in females as compared to males (OR = 2.1, 1.3-3.1) ( $P = 0.01$ ). Age (>41 years) and obesity (BMI >30) were significantly associated WRNP on bi-variate analysis [Table 2].

### Work place assessment

Of total, 341 (77.5%) study participants rated perception about breaks during daily working hours as "good." Of 441 study participants, 315 (71.4%) were observed to maintain straight posture and 439 (99.5%) kept their feet on ground. Chair with Elbow support was

used by 439 (99.5%) study participants. Observation of study participants on other parameters as per the recommendations of the ISO Standard (Ergonomic requirements for office work with visual display terminals) is presented in Table 3.

Perception about breaks (OR-8.4, 95% CI), sitting posture (OR-12.5, 95% CI), height of computer screen (OR-8.03), distance of the key board 5.1 (2.8-9.4), distance of the mouse 8.2 (3.4-19.7) were significantly associated with WRNP on bi-variate analysis.

### Multivariate regression analysis

Female gender [OR-2.0(1.1-3.4)], Perception about breaks [OR-2.4(1.2-4.8)], posture [OR - 5.4(2.9-9.8)], Height of computer screen [OR-2.6(1.1-6.0)] were identified as independent determinants of WRNP among study participants [Table 3].

### Discussion

This study reported high (43.3%) one-year prevalence of neck pain among group C desk job workers at tertiary care hospital in New Delhi. One-year prevalence of neck pain among desk job worker in this study was higher as compared various studies in India.<sup>(15-17)</sup> Present study reported one year prevalence of neck pain similar to studies in developed countries.<sup>(17,18)</sup> More than one fourth (28.3%) of the desk job workers suffered from WRNP over the period of one year in this study. Study among software professionals in metro cities such as Chennai,<sup>(19)</sup> Hyderabad, Bangalore and Coimbatore<sup>(11)</sup> reported higher prevalence of WRNP.<sup>(20)</sup> High WRNP prevalence in these studies as compared to present study might be attributed to higher duration of work on computers among the employees.<sup>(21)</sup> As IT professional assumed to spend more time on computer as compared to group C desk job worker.

Present study reported higher prevalence of WRNP among females as compared to males. Similar finding was reported by previous studies from India<sup>(22-24)</sup> and from developed countries.<sup>(25,26)</sup>

Present study highlighted the work related factors such as perception about breaks, posture, and height of the screen as independent determinants of WRNP among desk job workers. Various studies from India reported association of poor or awkward sitting posture at the work place with WRNP.<sup>(20,21,23)</sup> Studies from developed countries also supported finding of this study about association of poor work place related factors and WRNP.<sup>(3,8,15)</sup>

High one-year prevalence of neck pain and WRNP was observed among desk job workers in tertiary care

**Table 2: Association of WRNP with respect to selected individual factors (n = 441)**

Variable	Category	Odds ratio (95% CI) for presence of WRNP		P value*
		Crude	Adjusted*	
Gender	Male	Referent	Referent	<0.01
	Female	0.48 (0.3-0.7)	2.0 (1.1-3.4)	
Age in years	21-40	Referent	Referent	0.76
	41 and above	0.8 (0.5-1.2)	1.1 (0.6-1.9)	
Education	Not completed graduation	Referent	Referent	0.52
	Graduation	0.5 (0.1-2.1)	0.5 (0.1-4.1)	
BMI	Non-obese (BMI<30)	Referent	Referent	0.47
	Obese (BMI ≥30)	1.6 (1.1-2.5)	1.2 (0.6-2.2)	
Perception about breaks	Good	Referent	Referent	0.006
	Poor	8.4 (5.1-13.8)	2.4 (1.2-4.8)	
Posture	Good	Referent	Referent	<0.001
	Poor	12.5 (7.6-20.5)	5.4 (2.9-9.8)	
Height of computer screen (n=372)	Good	Referent	Referent	0.01
	Poor	0.26 (0.1-0.5)	2.6 (1.1-6.0)	
Distance of the key board (n=372)	Good	Referent	Referent	<0.01
	Poor	5.1 (2.8-9.4)	1.4 (0.6-3.1)	
Distance of the mouse (n=372)	Good	Referent	Referent	0.03
	Poor	0.24 (0.09-0.6)	0.41 (0.1-0.8)	
Distance of screen (n=372)	Good	Referent	Referent	0.10
	Poor	0.3 (0.06-1.3)	1.6 (0.2-9.5)	

\*P value is for adjusted odds ratio, Bold - Statistically significant

**Table 3: Workplace assessment of study participants**

Parameter	Category	WRNP*	WRNP*
		present number (%)	absent number (%)
Perception about breaks (N=441)	Good	61 (17.8)	281 (82.2)
	Poor	64 (64.6)	35 (35.4)
Posture (N=441)	Good	42 (13.3)	273 (86.7)
	Poor	83 (65.9)	43 (34.1)
Distance of screen (N=372)	Good (50-70 cm)	106 (29.0)	259 (71.0)
	Poor (<50/>70 cm)	4 (57.1)	3 (42.9)
Height of computer screen (N=372)	Good (≥10 cm)	79 (24.2)	247 (75.8)
	Poor (≤10 cm)	31 (67.4)	15 (32.6)
Distance of the key board (N=372)	Good (≥15 cm)	85 (25.9)	243 (74.1)
	Poor (<15 cm)	25 (56.8)	19 (43.2)
Distance of the mouse (N=372)	Good (≥15 cm)	99 (28.0)	255 (72.0)
	Poor (<15 cm)	11 (61.1)	7 (38.9)

\*WRNP: Work related neck pain

hospital in capital city of India. Female gender and poor sitting posture were identified as independent determinants of WRNP among desk job workers. Worker working with closely placed keyboard and screen of the computers were at double the risk of suffering from WRNP. Less time duration of breaks in working hours as perceived by the worker was reported as important reason for WRNP. There is urgent need for screening all desk job workers working in this tertiary care hospital for WRNP. Services of Physical Medical and Rehabilitation should be made to all workers diagnosed with WRNP. Multipronged strategy is needed to prevent WRNP in the desk job workers. This may include sensitization of all employees about WRNP and its effects, training programme for maintaining

good working posture and improvement of physical working environment. Addressing work place related disorders such as neck pain should be dealt on priority basis. This will not only improve the health status but also efficiency of the employees and increase the productivity of the institute.

### Limitations

Computer use was found to be associated with WRNP<sup>(26)</sup> globally. But present study did not have sufficient power to detect this difference of WRNP among computer using and non-computer using desk job workers. As information about neck pain and work place related assessment was done at the working station of the worker. Hence, chance of "Hawthorne Effect" could not be ruled out. Hawthorne Effect might have lead to underestimation of workplace related factors and WRNP. Possibility of recall bias could not be ruled out in determination of on-year prevalence of neck pain. A trained investigator collected the information in this study that ensured the quality of data of neck examination and work place related factor assessment.

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