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A Cross Sectional Study Among Information Technology Professionals of Vishakhapattanam City to Study the Prevalence of Musculoskeletal Work Related Disorders

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ABSTRACT

Background: The Information technology has revolutionized many changes throughout the society, and also in bringing up the economic growth of the country.IT professionals are prone to various job-related complaints and symptoms which can be reduced or eliminated by using proper ergonomics. The present study was carried out to study the prevalence of Musculoskeletal disorders among the Information technology (IT) professionals and to determine the factors associated with musculoskeletal problems.

Objectives:1.To study the prevalence of Musculoskeletal disorders among the Information Technology (IT) professionals. 2. To determine the factors associated with Musculoskeletal disorders among IT Professionals.

Methodology: A cross-sectional study was done among 400 Information technology professionals of selected IT companies of Visakhapatnam city using multistage sampling technique. Structured Interview schedule was taken to collect socio-demographic, personal and working details of employees. Standardised Nordic Musculoskeletal questionnaire was used to assess the work-related musculoskeletal symptoms in relation to various body regions during last 12 months and last 1 week.

Results: The overall musculoskeletal disorders among IT professionals was 74% of which lower back (56.7%) is the most common body region affected in the last 12 months followed by neck (43%), shoulder (28.2%), wrist/hand (8.5%), elbow (5.7%), knee (4%) and ankle (3.7%).

Conclusions: The study concludes that, prevalence of work-related health problems among IT professionals are of concern. Work related musculoskeletal problems were widely reported and it was observed that, individuals who have regular physical activity are less prone to Musculoskeletal disorders (MSD).

KEYWORDS: IT Professionals, Ergonomics, Musculoskeletal Work-Related Disorders(MSWDs)

INTRODUCTION:

Information Technology industry in India has been one of the most significant growth contributors for the Indian economy. [1] India is now the topmost offshoring destination for IT companies across the world. [2]Although the Information technology has revolutionized many changes throughout the society, and is bringing up the economic growth of the country, IT professionals are prone to various job-related complaints and symptoms which can be reduced or eliminated by using proper ergonomics.

Ergonomics means “The science that seeks to adapt work or working conditions to suit the employee.” [3]The application of this science to design a workplace in terms of tasks of the worker, use of equipment and the overall environment is called ergonomic design. A good ergonomic design not only maximizes the capabilities of workers by increasing productivity and job satisfaction but also benefits the employer by decreasing the cost for health and absenteeism. In other words, ergonomics enables “fitting the task to the worker”. [4]

If a good ergonomic design was not established, extended work for prolonged periods could adversely affect not only vision, but also the muscles of the neck, upper back, shoulders, and arms, leading to visual and muscular fatigue and discomfort. The risks for developing musculoskeletal symptoms include improper work station design, and faulty posture as prolonged sitting for prolonged periods may lead to poor circulation, stiffness of joints and pain. While handling computer it is necessary to consider the duration of total work spent on a computer, the number of consecutive hours on it, nature of the job, the span of computer usage, and the type of machine used. Inappropriate seating, lack of short breaks during work, and improper viewing distance

may lead to musculoskeletal and ocular problems in IT professionals. Organization of workplaces, like maintaining a proper height of the seat, working posture, proper use 4 of armrest, backrest, straight alignment of wrist and elbow and positions on the keyboard can prevent various health hazards.

Hence, the present study aim is to describe the work-related health problems and to identify risk factors associated with work-related health problems among the IT Professionals and to suggest necessary remedial measures.

OBJECTIVES: To study the prevalence of Musculoskeletal disorders among the Information Technology(IT) professionals and determine the factors associated with Musculoskeletal disorders among IT Professionals.

METHODOLOGY: An observational analytical cross-sectional study was done during 2019 in Visakhapatnam which is one of the largest cities and the financial capital of Andhra Pradesh which is one of the state in India. It is also the 9th most populous metropolitan area in India with a population of nearly 45 lakhs and also the ninth-largest contributor to India's overall gross domestic product as of 2016. [5]IT Professionals including software developers, call center operators and data entry operators working for more than 6months in IT companies of Visakhapatnam city were considered as study population.

The employees working in the current job for at least the past 6 months and spending at least 4 hours per day on computer, for at least 5 days in a week or a minimum 20 hours per week and gave consent to participate were included in study. Taking the prevalence as 59% according to study done by S.Arunvijay et al., [6]and applying the sample size formula N = 4pq/L2 (where N is the sample size, p is prevalence, q is 100-p, and L is absolute precision) with an absolute precision of 5% and β error at 20%, the sample size obtained was 387. Rounding the sample size to 400, data was collected from 400 software employees working in Visakhapatnam city. Multi stage sampling technique was used to select the study subjects. There are around 108 registered IT companies in all the 6 zones of Visakhapatnam city.In the first stage, the total companies were listed out and five companies were selected by simple random technique through lottery method. The details of the companies were not disclosed to ensure confidentiality. The five companies which were selected are from the following areas, one from APIIC SEZ Duvvada, one IT company from Seethammadhara, two from IT SEZ Visakhapatnam and the last one from Siripuram.In the second stage total employee strength of the five companies were listed and study subjects were selected proportionately from all the five companies using simple random technique.

[Figure 1 about here.]

Study subjects were explained about the purpose of the study and were assured about the confidentiality of the information that is shared. Structured interview schedule was used for data collection using Standardised Nordic Musculoskeletal questionnaire was used to assess the work-related musculoskeletal symptoms in relation to various body regions during last 12 months and last 1 week along with socio-demographic characteristics.

Ethical clearance was obtained from the Institutional Ethics Committee, i.e., Andhra Medical College, Visakhapatnam. Prior permission was obtained from the firm authorities. The informed written consent was obtained from study participants.Data entry was done in Microsoft Excel worksheet and analysis was done by using SPSS software (trial version 21). Chi-square test was done for finding out the significance of association. P value < 0.05 is considered as statistical significance at 95% confidence interval. Bivariate logistic regression analysis was used to identify predictors for MSD.Figure 1

RESULTS:

A total of 400 Information Technology (IT) professionals were consulted from 5 selected companies of Visakhapatnam city. The mean age of the study population was 27.27 years (standard deviation = 4.88yrs) ranging from 22 to 46 yrs. About 53.2%of study population were males and 46.70%were females and 32.2% of the study population were married. The median working experience of study population working in IT company was 2yrswithmean working hours of 8.9 $\pm$ 1.5 hours per day. About 56.2 %of them work in day shifts and 43.7% worked in night shifts. Only 16 %of IT professionals were involved in physical activities like sports, yoga, or exercise for about 30 minutes at least thrice in a week out of which males were 14.09% and females were 18.18%.

[Figure 2 about here.]

As per the data obtained by Standardized Nordic musculoskeletal questionnaire, the overall IT professionals who reported musculoskeletal disorders was 74%. Table 1

Figure 2 depicts that, in the last one year, lower back (56.7%) was the most common body region followed by neck (43%), shoulder (28.2%), wrist/hand (8.5%), elbow (5.7%), knee (4%) and ankle(3.7%).Musculoskeletal problems observed during last 7 days was lower back in 49% followed by neck pain (28%), shoulder pain (15%), wrist or hand pain (3.75%), knee and ankle (2%) respectively.

[Table 1 about here.]

[Table 2 about here.]

how's that majority (71.9%) of the study population was in 21 to 25 years of age group. Majority (79.4%) of the

study population in the age group of 26 to 30 years had Musculoskeletal Disorders. It was observed that, with increase in age, musculoskeletal problems also increase, however this difference was not found to be statistically significant.Table 2

It was observed that $3/4^{th}$ of the males (76%) had musculoskeletal disorders compared to females (71.6%), however this difference was not statistically significant. Marital status did not show any association with MSDs. The prevalence of MSDs was above 70%, irrespective of their nutritional status.

In the present study, only 16%reported of doing physical activity for at least 30 minutes a day thrice in a week. About 84.5% who did physical activity were free from MSDs. It was observed that statistically significant association exists between physical activity and musculoskeletal symptoms. It was observed that working experience showed no significant impact on MSDs.

Working for more hours was associated with prevalence of MSDs and this was found to be statistically significant. Among employees having day shifts about 77.7% had musculoskeletal symptoms and compared to employees having night shifts about 69.2% had musculoskeletal symptoms. This difference in working shifts was found to be statistically significant.Table 3

[Table 3 about here.]

The above table shows that significant association was found for physical activity, working shifts, duration of working hours and consecutive hours of work with that of MSDs. As the model is fit to run logistic regression test, bivariate logistic regression was applied to the above table variables. A test of the full model against a constant only model was statistically significant, indicating that the predictors as a set reliably distinguished between acceptors and decliners of the offer (Omnibus chi square value was 126.176. Nagelkerke's R square test value is 0. 397. This indicates a good relationship between prediction and grouping. Prediction success overall was 74%. The Wald criterion demonstrated that lack of exercise made a significant contribution to prediction (P= <0.000).Exp(B) = 32.44 indicating that IT professionals who do not exercise regularly are 32 times likely to develop Musculoskeletal disorders compared to study population who does exercise regularly.

DISCUSSION

In the present study the mean age of the study population was 27.27± 4.88years, and around half of them (52.5%) were under 25 years of age. As the study was conducted in Visakhapatnam, which is exhibiting an exponential growth in IT industry after the State division in 2014, the number of IT companies have also drastically increased. Employment for young graduates from engineering sector is high in the existing scenario which may be one of the reasons for less mean age in the present study and having a greater number of young adults < 25 years. Similar findings were observed in a study conducted by Hameed P et al. [7]Saleem .M et al. [8]Ali KM et al. [9]. In contrast, it was high in studies done by ,Basu R et al., [10]and LIM V.K.G et al., [11]

In the present study, only 16% of study population were involved in physical activities like sports, yoga or aerobicsThis decreased physical activity might be because of increased working hours, lack of time and target driven workloads. Whereas it was 28% in studies done by Saleem.M et al., [8]and Soroush M et al., [12].

In the present study,mean working hours of IT employees was 8.9 ± 1.5 hours per day. Among them 48.5% of study population work for less than 8 hours on computer in a day and 51.5% work for more than 8 hours a day. This might be due to inclusion of firms which were upcoming and newly established demanding overtime work from employees making them target driven. Similar findings were reported in studies done by Suparna et al., [13]Talwar R et al., [14]and by Shrivatsava et al., [15]. In contrast, higher working hours among study population were reported in studies done by Sharan D et al., [16]Saleem M. et al., [8]and Ali K M et al., [9].

In the present study the median working experience of IT Professionals working in IT companies was 2 years. Presence of less experienced study population in the present study was due to newly appointed staff in recently established companies in Visakhapatnam. Majority (90%)had working experience less than 5 years. Similar findings were observed in a study done by Ali KM et al., [9] where the mean working experience was 3 years. Contrarily in studies done by Saleem .M. et al., [8]and Moom RK et al., [17]mean working experience of 10.5years and 6years respectively was observed.

In the present study using Standardized Nordic musculoskeletal questionnaire for evaluation of MSDs, it was observed that 49% and 74% of the study population reported with one or more MSDs in the past 7 days and last 12months respectively. This may be because of prolonged working hours, consecutive hours of work and working in shifts. It was observed that significant association was found forworking shifts, duration of working hours and consecutive hours of work with that of MSDs.Similar findings were observed in studies done by Sivaraman et al. [18]Thomas J et al., [19] ,Talwar R et al., [14]Suparna et al., [13]. In contrast, it was28.5% in a study done by Fouad El. Bestar S et al., [20]which assessed only the relation between computer use and carpal tunnel syndrome not considering other body regions.

In the present study the most common body region contributing to musculoskeletal disorders was lower back followed by neck and shoulder during last 12 months. This might be because of poor posture, incorrect use of equipment , lack of exercising stretching and lack of micro-

breaks throughout the day. Similar findings were observed in studies done by Suparna et al., [13],Iti JL et al., [21],Hameed P et al., [7], Moom. RK et al., [17]Basu R et al., [10]. In contrast the most affected body region was neck in studies done by Oha.k et al., [22], Fouad El Bestar S et al., [20], S A Vijay et al., [6], Saleem .M et al., [8]and wrist ,fingers in a study done by Basu R et al. [10]

In the present study, only 16% reported of doing physical activity like exercise, yoga, walking for at least 30 min a day for at least 30 minutes a day thrice in a week. About 84.5% who did physical activity were free from MSDs. It was observed that statistically significant association exists between physical activity and musculoskeletal symptoms.Similar findings were reported by **Saleem .M et al.,** [8].

LIMITATIONS OF THE STUDY: Since the present study was a cross-sectional observational study causal factors may not be concluded. The study was based on self reporting of symptoms by the professionals and did not include any lab investigations or clinical examination

CONCLUSION:

Prevalence of work-related health problems among IT professionals are on rise which are need of concern. Individuals who have regular physical activity are less prone to MSDs.

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SOCIO-DEMOGRAPHIC VARIABLES		MUSCULOSKELETAL DISORDERS		
		YES	NO	
AGE	21 TO 25 YRS	151 (71.9%)	59 (28.1%)	210(100%)
	25 TO 30 YRS	85 (79.4%)	22 (20.5%)	107(100%)
	>30 YRS	60 (72.2%)	23 (27.7%)	83(100%)
	Chi-square= 2.21 at df 2, P value= 0.32			
GENDER	MALE	162 (76%)	51 (23.9%)	213 (100%)
	FEMALE	134 (71.6%)	53 (28.3%)	187 (100%)
	Chi-square=1.0 at df 1, P value=0.3			
MARITAL STATUS	MARRIED	96(74.4%)	33(25.6%)	129(100%)
	UNMARRIED	200 (73.8%)	71(26.2%)	271(100%)
	Chi-square= 0.017 at df 1, P value=0.894			
BMI	Underweight	26 (76.4%)	8 (23.5%)	34(100%)
	Normal	161 (75.2%)	53 (24.7%)	214(100%)
	Overweight	109 (71.7%)	43 (38%)	152(100%)
	Chi-square= 0. 691 at df 1, P value=0.70			
PHYSICAL ACTIVITY	YES	10(15.6%)	54 (84.3%)	64 (16%)
	NO	286(85.1%)	50 (14.8%)	336 (84%)
	Total	296(74%)	104 (26%)	400(100%)
	Chi-square= 134.94 at df 1, P <0.01			

Table 1: Distribution of study population according to Socio-demographic and workingenvironment of study population in relation to musculoskeletal disorders

WORKING CHARACTERISTICS	MUSCULOSKELETAL DISORDERS		
		YES	NO	
WORKING EXPERIENCE	<5 years	268(73.5%)	97 (26.5%)	365(100%)
	5 TO 10 Years	13(81.2%)	3 (18.7%)	16 (100%)
	>10 Years	15(78.9%)	4 (21%)	19 (100%)
	Chi-square= 0.742 at df 2, P value=0.69			
DURATION OF WORK IN HOURS	<8 HOURS	135(69.5%)	59 (30.4%)	194 (48.5%)
	>8 HOURS	161(78.1%)	45 (21.8%)	206 (51.5%)
	Chi-square= 3.81 at df 1, P value= 0.05			
CONSECUTIVE HOURS OF WORK	1 to 2 hrs	39(62.9%)	23(37%)	62 (100%)
	3 to 5 hrs	208(77.3%)	61 (22.6%)	269 (100%)
	>5 hrs	49(71%)	20 (28.9%)	69(100%)
	Chi-square= 5.832 at df 2, P value= 0.054			

Table 2: Working Characteristics of study population in relation to musculoskeletal disorders.

Categories		TOTAL	WITH MSD	WITHOUT MSD	p value
Exercise	YES	64	10(15.6%)	54 (84.3%)	P<0.001
	NO	336	286 (85.1%)	50 (14.8%)	
Work hrs	<8HRS	194	135(69.5%)	59 (30.4%)	0.05
	>8HRS	206	161(78.1%)	45 (21.8%)	
Working shifts	NIGHT SHIFTS	175	121(69.1%)	54(30.8%)	0.05
	DAY SHIFTS	225	175 (77.7%)	50 (22.2%)	
Consecutive hours of work	<5 hrs	331	247(74.6%)	84(25.3%)	0.054
	>5 hrs	69	49(71%)	20(28.9%)	

Table 3: Predictors of MSD among study participants

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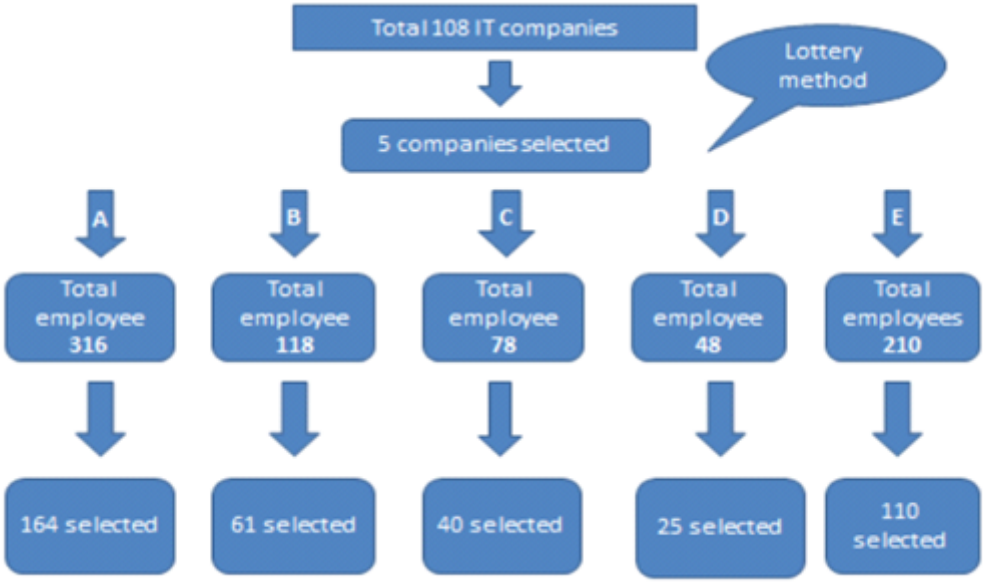

Figure 1: Diagrammatic representation of Multistage sampling technique

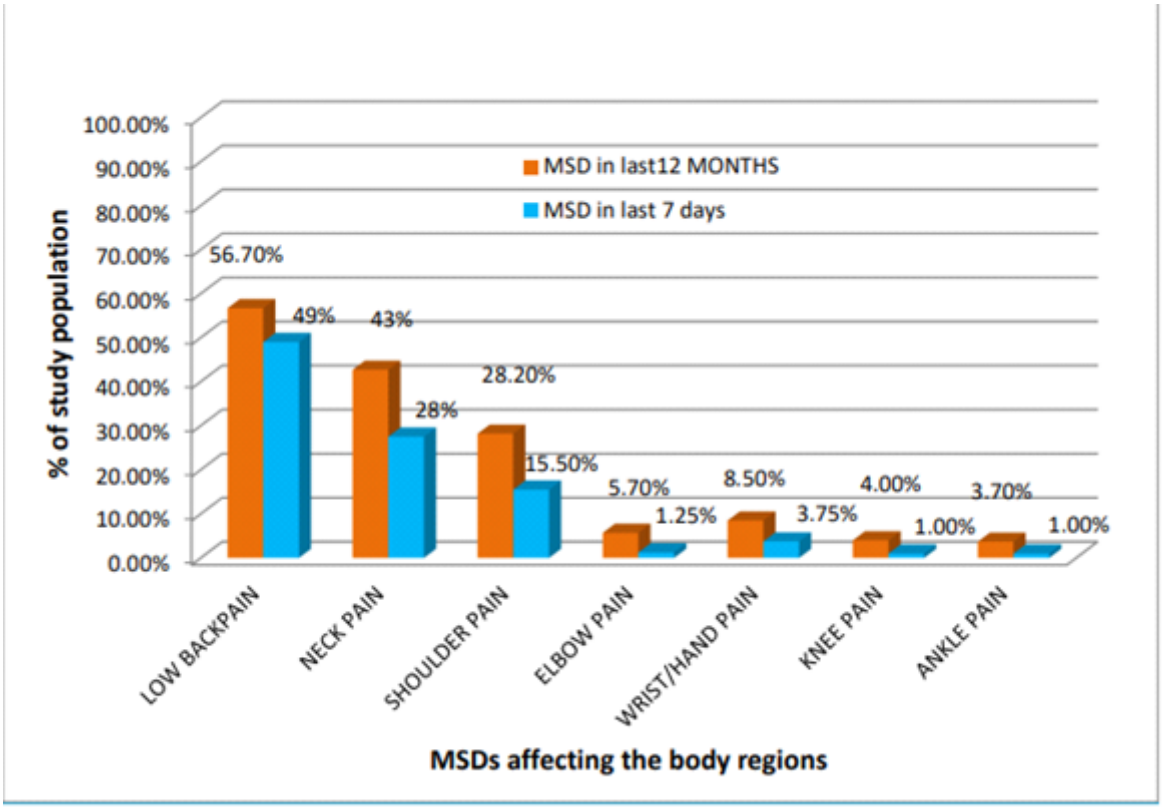

Figure 2: Overall Musculoskeletal problems among study population during last 12 months and last 7 days.