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## Prevalence Of Work-Related Musculoskeletal Disorder In IT Professional In Bangalore City.

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### ABSTRACT

Musculoskeletal disorders are one the leading source of pain and disability which is highly prevalent among the IT professionals in developing countries. One of the major contributing factors for this increase prevalence is long working and sitting hours. Moreover, adapting inappropriate postures while working has significantly affected the proper functioning of the body, therefore it is essential to practice good ergonomics in workplace. Lack of preventative care is one of the major risk factors for musculoskeletal disorders. Majority of the workstations are sedentary in nature which includes prolonged sitting without adequate rest breaks, it often leads to discomfort and development of several health issues such as obesity, diabetes mellitus, and cardiovascular disorders. The population is unaware of the fact that the resultant health issues are due to maintaining poor posture. This article focuses on the importance of developing proper work ergonomics by undergoing ergonomic training that will help in reducing the pain and disability which will in turn improve the work efficiency and productivity and quality of life.

**Keywords:** long working and sitting hours, inappropriate posture, good work ergonomics, ergonomic training, improve work efficiency, productivity, quality of life

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## INTRODUCTION

Work-Related Musculo-Skeletal Disorders (WRMSDs) are common among computer professionals. The work environment and performance at work are chief contributors for exacerbation of musculoskeletal disorders provided they are not the only determining causation. Thus, a disorder is work-related when procedures, equipment, or environment at work contribute significantly to the cause of the disorder (WHO, 1985). Work-related musculoskeletal disorders (WRMSD) are defined as injuries or disorders of musculoskeletal tissues which are associated with workplace related risk factors [1]. WRMSD are also known as cumulative trauma disorders, repetitive strain injuries and overuse injuries [1]. It usually consists of conditions such as pain, tingling, numbness and inflammation mostly affecting the joints, tendons, ligaments, muscles, cartilage and adjacent connective tissue [2]. It comprises of nearly 150 different diseases/disorders that affects the musculoskeletal system leading to temporary or lifelong limitations in functioning and participation [4]. Low back pain, cervical spondylosis, and osteoarthritis are some of the common MSDs [2]. The Indian IT Industry, comprising IT and IT enabled services has grown from USD4 bn in the year 1998 to USD52 bn in 2008, employing over 2 million people (NASSCOM, 2010). Musculoskeletal disorders (MSD) are the most common causes of long-term sick-leave and disability pension in several industrial countries [1]. This category of WRMSDs takes prolonged time to develop and affect a wide range of workers in different occupations. These are the reasons of worker's absenteeism, disability, healthcare costs and compensation claims [2]. Musculoskeletal conditions are leading contributor to disability worldwide, with low back pain being the single leading cause of disability in 160 countries [4]. Globally the prevalence of MSD's among the adult population was found to range between 6.92%-76.8%. The prevalence has been reported to be in the range of 54%-64% in European studies. [6] A study done in Asia also revealed a similar prevalence of 64%. [Mohan]. The common prevalence of work-related MSD reported during last 12 months based on their body location was; neck 45%, shoulders 5%, upper back 38%, wrist/hand 8%, lower back 52%, knees 23% ankle/feet 4% respectively, where the highest suffered region of the body was lower back. The prevalence of work-related MSD reported during last 7 days based on their body locations were neck 32%, upper back 13% and lower back 18% where the highest suffered body part was neck.[5] The 'pressure to perform' ambience created among employees lead to increased work load and rising expectations and no satisfaction in the job. The unyielding work requirement at optimum performance leads to job dissatisfaction, employee turnover, reduced efficiency, illness and even death [4]. Absenteeism, illness, alcoholism, tobacco use "petty internal politics", bad or snap decisions, indifference and apathy, lack of motivation or creativity are all by-products of an over stressed workplace [5]. Chemical exposure from well-furnished wall and furniture, smoking habits etc. may leads to respiratory problems. Sedentary activity, improper food eating habit with high prevalence of alcohol consumption and smoking lead to development of musculoskeletal, ocular, systemic disorder and non -communicable disease among IT workers. (Kumar) There is a shift seen in the workplaces with respect to nature of occupation from active to sedentary lifestyles which leads to lengthy sitting behaviour. It has been observed that people sit more than 8 hours per day [3]. They spent prolonged hours sticking to their chairs in fixed postures [6]. In conditions without a backrest / armrest or desk, people often adapt to poor sitting postures that leads to increase risk of musculoskeletal disorders. Since majority of workstations are sedentary in nature which includes prolonged sitting without break it often leads to discomfort and development of several health issues such as overweight, Diabetes Mellitus and cardiovascular disease. Risk factors for the development of MSD not only include physical factors; repetitive movements, poor workstation, and awkward posture but also psychosocial demands, low social support, less break time, and high job demands at the workplace. They are unaware of the resultant causative factor of poor posture during their functioning. This eventually leads to impediments in the body stature and posture of these individuals which is a health vulnerability and results in abnormal lifestyles [6]. Musculoskeletal conditions majorly limit the mobility and skilfulness of an individual leading to early retirement from work and reduced ability to participate in the society [4]. Hence the need of the study to find out the impact of WRMSD in IT professionals in Bangalore city.

## OBJECTIVES

- To study the prevalence of work-related musculoskeletal disorders amongst IT professionals
- To identify the various risk factors leading to WRMSD
- To study the awareness of musculoskeletal disorders and body posture among IT professionals.

## MATERIALS AND METHODS

**Type of study:** This was an observational, cross-sectional based study.

**Study area:** IT hub Whitefield in Bangalore city

**Study settings:** The study was conducted in 2 information technology companies in Bangalore. Study period - Data was collected for 2 months from March 2023 to April 2023.

**Study population:** People, who were engaged to computer related work from software developers, call centre and data entry /processing, comprised our study population. The participants, who were working in the current job for past six months and also working on the computer for at least 3 h/day or 15 h/week, were included in the study.

**Exclusion criteria:** Subjects who did not give consent were excluded from the study. Individuals who were pregnant and doing internship in companies were excluded from the study.

**Sample size:** In a recent study done at Mumbai [6], it was found that prevalence of MSD among IT workers is 54% in India. This was the least among all the other morbidities suffered by the IT professionals. Now considering this prevalence with 20% allowable relative error, sample size becomes approximately 142 after applying the formula  $Sample\ size = Z^2 \frac{1-\alpha}{2pq} / L^2$  Where,  $Z_{1-\alpha/2}$  = Standard normal deviate at a desired confidence level (95%);  $p$  = previous prevalence;  $q=100-p$ ;  $L$ =allowable error, 20% of  $p$  taken. At 95% confidence level  $Z_{1-\alpha/2}$  value is 1.96. Sample size=142.

**Sampling design:** Around 3 lakhs people are employed in different information technology (IT) companies at Whitefield in Bangalore.

2 companies were randomly selected out of 50 companies (Simple Random Sampling).158 adult professionals were chosen from both the companies by probability proportionate sampling with random table method to include in the study.

### Study Tools and Technique

**Study tools:** 1. pre-designed, pre-tested structured schedule -The questionnaire included a set of general questions and a validated questions from the Cornell Musculoskeletal discomfort questionnaire in a sedentary worker. The general questions consisted the demographic details of age, gender, BMI and marital status and also included a set question based on their routine work related conditions like improper posture, food habits and break time. The Cornell questionnaire assessed their pain or discomfort levels in each area, comfortless and their interference with work 2. Stethoscope. 3. Portable weighing machine (Digital). 4. Non stretchable measuring tape (Calibrated in 1 cm). 5. Sphygmomanometer. 6. Previous medical records. 7. List of employees obtained from the organization.

**Technique:** 1. Interview of the study subjects 2. Self-administered questionnaire 3. Clinical examination and investigations. 4. Record analysis (Reviewing the previous medical reports). Data collection procedure: The purpose of the study was explained to all the participants and they were assured of confidentiality. Informed consent was obtained from the participants for participation in the study after which the questionnaire was given. The questionnaire which we used helped us in collecting data regarding the participants socioeconomic status, demographic details, behavioural characteristics along with their morbidity profile.

Anthropometric data was collected along with blood pressure measurement [9,10].

Statistical analysis and plan Data was analysed using appropriate statistical methods and represented by various tables, graphs, diagrams etc. and various statistically significant tests were applied accordingly with the use of SPSS software (version 21.0)

**RESULTS**

The study group comprised of 158 and 45% population belonged to the age group 20 to 24 years and 57% were males. The mean ages was 24 +\_ 2.6 SD.

The socio demographic characteristics of our study population is represented in Table no 1. Half of the study population (57 %) were having technical jobs and 57% enjoyed the liberty of hybrid work. 45% had to work more than 8 hours per day. The profile related to their jobs is depicted in Table no 2.

**Table 1: Socio demographic characteristics**

Characters	Frequency	Percentage
<b>Age in years</b>		
20-24	71	44.9%
25-29	43	27.2%
30-34	6	3.7%
35-39	4	2.5%
40-44	4	2.5%
45-49	19	12%
50-55	11	6.9%
<b>Gender</b>		
Male	90	56.9%
Female	68	43%
<b>Personality type</b>		
Type A	35	22%
Type B	32	20.2%
Mixed	91	57.5%
<b>Marital status</b>		
Unmarried	106	67%
Married	50	31.6%
Divorcee	2	1.2%
<b>BMI</b>		
Underweight (<18.5)	14	8.8%
Normal(18.5-24.9)	90	56.9%
Overweight (25.0-29.9)	40	25.3%
Obese		
Class 1 (30.0-34.9)	10	6.3%
Class 2 (35.0-39.9)	3	1.8%

**Table 2: Job Characteristics**

<b>Job position</b>		
Managerial	28	17.7%
Technical	91	57.5%
Administrative	1	0.6%
other	33	20.8%
<b>Place of work</b>		
At home	31	19.6%
At office	45	28.4%
Hybrid	82	51.8%
<b>Duration of work</b>		
Less than 1 year	57	36%
1-3 years	49	31%
3-5years	12	7.5%
More than 5 years	40	25.3%
<b>Hours of work each day</b>		
Less than 8 hours	33	20.8%

8 hours	53	33.5%
More than 8 hours	72	45.5%
<b>Hours of work each week</b>		
Less than 48 hours	71	44.9%
48 hours	26	16.4%
More than 48 hours	61	38.6%
<b>Sitting hours</b>		
Less than 6 hours	38	24%
6-8 hours	77	48.7%
More than 8 hours	43	27.2%
<b>Break time</b>		
1	7	4.4%
2	38	24%
3	49	31%
More than 3	64	40.5%
<b>Duration of break</b>		
15-30mins	110	69.6%
30mins	24	15.1%
More than 30mins	24	15.1%
<b>Break activity</b>		
Take a walk	81	51.3%
Have tea/coffee	107	67.7%
Attend any personal calls	56	35.4%
social media/TV	85	53.8%
Other	38	24.1%
<b>Job satisfaction</b>		
Yes	129	81.6%
No	29	18.3%
<b>Monotonous work</b>		
Yes	75	47.5%
No	83	52.5%
<b>Efficiency/productiveness at work (likert scale)</b>		
0	1	0.6%
1	3	1.8%
2	13	8.2%
3	37	23.4%
4	60	37.9%
5	44	27.8%

The study population were showed pics of 8 postures that is usually taken when working and were asked to select which posture they adapt. Option no 3 was the right posture to sit while working and only 33 % population opted for it. Out of the study group only 29 % were aware about WRMSD. Very few 15% were knowing that there are apps related to MSD and helps in improving the body posture. Among those who used these apps majority (88%) of them felt it improved their body posture and in turn reduced their pain and discomfort while working.

In our study population 63 people had WRMSD and the prevalence is 40%. One third of the study population 33 % were suffering from pain and discomfort during the time of survey .Neck and lower back was the most cited region of pain (61% and 59% respectively) Table no 3

Table no 4 represents the impact of WRMSD on the completion of tasks, day to day activities, sleep and social life.

**Table 3: WRMSD associated pain / discomfort.**

<b>Pain during past week</b>		
Yes	79	50%
No	79	50%
<b>Pain currently</b>		
Yes	63	39.9%
No	95	60%
<b>Region wise Pain</b>		
Neck	97	61
Shoulder	79	50
Upper back	74	47
Lower Back	94	59
Upper arm	42	42
Forearm	37	37
Wrist	43	43
Thigh	32	32
Knee	52	52
Lower leg	42	26
Buttocks/hip	79	50
<b>Severe Pain</b>		
Neck	16	10
Shoulder	16	10
Upper back	12	8
Lower Back	20	13
Upper arm	7	4
Forearm	6	4
Wrist	8	5
Thigh	10	6
Knee	6	4
Lower leg	8	5
Buttocks/hip	13	8

**Table 4: Impact of WRMSD**

<b>Impact on ability to complete tasks on time</b>		
Not at all	96	60.7%
Slightly interfered	44	27.8%
Substantially interfered	18	11.3%
<b>Impact on day to day activities</b>		
Not at all	86	54.4%
Slightly interfered	59	37.3%
Substantially interfered	13	8.2%
<b>Impact on social life</b>		
Not at all	103	65.1%
Slightly interfered	39	24.6%
Substantially interfered	16	10.1%
<b>Impact on sleep</b>		
Not at all	76	48.1%
Slightly interfered	58	36.7%
Substantially interfered	24	15.1%

89% of the study population had family support. More workload and completion of tasks increase the sitting hours in 70% of the study population and it increased their pain and discomfort.

Majority of the population 65% were engaged in some form of physical activity and among those 70% felt that it helped them to reduce the discomfort caused by WRMSD.

The working conditions were also assessed and is represented in Table no 5. And only 12% of the study population perceived they were comfortable in the present working condition.

**Table 5: Ergonomic working conditions**

<b>Ambience</b>		
Comfortable	123	77.8%
Not comfortable	35	22.1%
<b>Room temperature</b>		
Comfortable	22	62.8%
Not comfortable	13	37.1%
<b>Illumination</b>		
Comfortable	23	65.7%
Not comfortable	12	34.2%
<b>Noise level</b>		
Comfortable	14	40%
Not comfortable	21	60%
<b>Position of desktop comfortable</b>		
Yes	124	78.4%
No	34	21.5%
<b>Appropriate office chair</b>		
Yes	119	75.3%
No	39	24.6%
<b>Sufficient back support</b>		
Yes	114	72.1%
No	44	27.9%
<b>Arm rest</b>		
Yes	104	65.8%
No	54	34.2%
<b>Foot rest</b>		
Yes	126	79.7%
No	32	20.3%
<b>Adjustable monitor</b>		
Yes	106	67%
No	52	33%
<b>Perceived comfort level</b>		
1	7	3.5%
2	31	19.6%
3	64	40.5%
4	36	22.8%
5	20	12.7%

Among the study group 10% had morbidities like hypertension and diabetes and were on medications. The various risk factors were assessed with the WRMSD and is represented in table no 6.

**Table 6: Association of the WRMSD and the various risk factors**

<b>Risk Factors</b>		<b>WRMSD</b>	
		<b>Yes</b>	
<b>Age in years</b>	20-24	32	p = 0.005
	25-29	16	
	>30	15	
<b>Gender</b>	Male	21	p = 0.109
	Female	42	

<b>Marital status</b>	Married	20	p = 0.214
	Divorcee	2	
	Un married	41	
<b>Job duration</b>	<1	14	p = 0.0001
	1-3	10	
	>3	39	
<b>Hours each day</b>	< 8	18	p = 0.0001
	8	10	
	>8	35	
<b>Breaks during working hours</b>	1	1	p = 0.05
	2	17	
	>3	45	
<b>Job satisfaction</b>	Yes	46	p = 0.50
	No	17	
<b>Monotony</b>	Yes	36	p = 0.21
	No	27	
<b>Family support</b>	Yes	56	p = 0.05
	No	7	
<b>Reduction in efficiency</b>	Yes	43	p = 0.001
	No	20	
<b>BMI</b>	<18.5	10	p = 0.05
	18.5-24.9	22	
	>24.9	31	
<b>Sitting hours per day</b>	<8	40	p = 0.05
	>8	23	
<b>Increased workload</b>	Yes	53	p = 0.001
	No	10	
<b>Impact on ADL</b>	Yes	49	p = 0.05
	No	14	
<b>Physical activity</b>	Yes	15	p = 0.05
	No	48	
<b>Perceived comfort Level</b>	1	5	p=0.05
	2	17	
	3	25	
	4	10	
	5	6	

## DISCUSSION

Bangalore is home to the largest number of IT companies in India and ranks fourth overall among Asian cities and is called the Silicon Valley of India. This study was conducted among the IT Professionals from Bangalore to find out the prevalence of Musculoskeletal disorders and also the associated risk factors.

Majority of our study population belonged to the age group 20-24 years among which 56.9% were males and 57.5% had a technical role in the company. Almost half of the population 45% worked more than 8 hours per day and 27% of the study group were sitting for more than 8 hours per day.

In a study by Saleem et al the prevalence of work-related MSD was 69% among software professionals during last 12 months which implies that almost 3 out of every 4 professionals suffered from this condition and 49.2% during last 7 days and annual disability was 16.6%

In our study the proportion of WRMSD was 40% and the common musculoskeletal symptoms reported were pain (55%), and stiffness (14.8%). Prevalence of WRMSD in various studies ranged from 40 % to 70 %. The wide range may be due to the various job profiles and HR polices and age group included in the study. Conformance to this findings, other studies also reported musculoskeletal disorders prevalence rate of 20% to over 75% among the computer users (Hsu and Wang, 2003; Ming et al., 2004).



Sharma et al. (2006) conducted a cross-sectional study about the computer related health problems among the IT professionals in Delhi and reported that 93% of subjects had one or more than one computer related problems which is very high morbidity.

The prevalence of WRMSD had been reported in many previous studies with female predominance. This may be due to the cultural factor that females, in addition to the software job, have to look after the family and kids at home. The present study did not found such difference in the prevalence as the female population. The same was found in the study done by Arora et al.

The WRMSD in the present study for the past 12 months where the participants felt pain and discomfort was neck (61%) lower back 59% followed by knee 52% shoulder 50% and then, upper back 47%. Contrary to the findings of the present study, previous studies indicated that annual prevalence of 35.6% for Low back pain, 23.1% for Wrists and Hand and 15.7% for Shoulder pain among the Computer Professionals (Richa Talwar et al., 2009). A comparison of prevalence rate is difficult due to different definitions of musculoskeletal disorders adopted by various studies Daneshmandi report revealed that neck (53.5%) lower back (53.2%) and shoulder (51.6%) symptom were the most common MSD among the office workers in past 12 months due to prolong sitting. These data correlated with our study.

Out of 63 participants who had WRMSD 23 participants (36%) had severe pain in one of the above regions. In our study almost 40% of the study group expressed that WRMSD has made impact on their day-to-day activities, social life and sleep which was similar to other studies conducted in India. Further, the results of the present study found that the Neck problem was most debilitating causing reduction in Activities of Daily Living (ADL) in 15% of subjects. Thus, the finding of the present study validates the previous study done by Cote et al. (2008) who reported that office workers and computer users experienced the highest incidence of Neck pain of all workers with reported incidences ranging from 36 to 57.5 per 100 worker years where neck and upper limb symptoms were common among the computer users whereas, 53% (N=91) of men had annual prevalence of musculoskeletal symptoms and 40% (N=69) during the past week. Further, from the results of this study, it was also found that the musculoskeletal symptoms were most debilitating causing reduction in Activities of Daily Living (ADL) in 21% (N=27) of women and 14% (N=24) of men.

One of the important factors that helped commemorating proper ergonomics during work is the working environment/ ambience of the work room, nearly 77.8% of the population had perceived a comfortable ambience in their workplace (which included room temperature, illumination and noise levels.) Approximately 73% of our study population had followed the proper work-related ergonomics such as use of appropriate office chair, arm rest, sufficient back support, foot rest, position of the desktop and adjustable monitor height etc. These factors such as work station environment, degree of mobilization and levels of constrained posture, awareness levels and practices of workers regarding computer ergonomics may be contributing to the differences in the prevalence rate of computer related problems in various studies (Sharma et al., 2006). OSHA suggests making small adjustments to chair or back rest, stretching fingers, hands, arms, and torso, standing up and walking for few minutes periodically, and performing some tasks in standing position as healthy practices for computer professionals.

In the present study only (30%) one third of the population followed the right posture while working although all the participants were aware of the importance of posture in MSD Majority of people tend to change their work posture such as slouching and crossing the legs, according to their habits and end up maintaining a bad posture in spite of their awareness of sustaining such posture and their inclination to keep up the accurate posture. These postures tend to become a habit when they adapt them at an early age and individuals maintaining such postures consider it comfortable which can cause strain on the spine, pelvis, muscles, tendons, joints, bones, and discs, leading to fatigue and deformation. Thus, certain incorrect habits, such as over usage of laptops and computers, use of desks and chairs with inadequate height, inadequate awareness of awareness and training programs, lack of physical activity, and inappropriate postures adapted, causes an abnormal development of the bone structure, which restrict the maintenance of correct posture. Incorrect posture has a detrimental effect on the spine. Moreover, maintaining such inappropriate postures for longer duration stipulates an incomplete relationship with other body parts thereby creating an inefficient balance causing stress on the supporting structures of the body as a result of which the proper functioning of the supporting structures are hampered. In order to prevent these health problems, appropriate sitting behaviour of office workers must be cultivated.

Maintenance of appropriate work postures can be enhanced by interventions such as ergonomic modification, rest breaks, and workplace exercise.

The other factors contributing to the differences in the prevalence rate of computer related problems in various studies were work station environment, degree of mobilization and levels of constrained posture, awareness levels and practices of workers regarding computer ergonomics which was similar to the study done Sharma et al., 2006.

Various risk factors were assessed to find out the degree of association and WRMSD. In our study it was seen the proportion of MSD was higher in age above 30 year compared to below 30 years and it was statistically significant ( $p=0.005$ ) It may be due to the increased duration of work in years . In most of the similar studies significant association was found between gender and MSD and females had more prevalence which was unlike in our study. Though there was no association found between marital status and MSD but the proportion was lower in married people. May be because of the social support received by them. Participants having worked more than 3 years has higher proportion of WRMSD which was statistically significant.

The study shows that there is a significant association with the duration of hours of work each day/week and the pain/discomfort that they experience during their working hours, wherein 50% of the population worked more than 8 hrs. The sitting hours also played a significant role wherein 53.4% of the population had a continuous sitting time of more than 8 hours. There was also seen that if breaks are taken for 10 to 15 min the pain and discomfort was reduced.

Job satisfaction, monotony of work family support played a significant role in reducing WRMSD but the association was not found to be statistically significant. Nearly 48% of the population complained of monotonous work had a significant association with the pain/discomfort that they experience currently. The impact of the job satisfaction with the pain that they experience is also significant in which 58.6% who were not satisfied with their work, experienced more pain/discomfort during the working hours. However, it was found that the social support from colleagues and supervisors greatly reduces the discomfort caused. According to Karasek's Demand Control Model, a job with high demands having no or little control over the decisions such as fixed tight schedules or being in a subordinate position causes an increase in stress , strain and following illness. It is proposed that these outcomes can be improved if the person receives adequate social support from his co-workers and others who are within the employment environment. This Karasek's demand control model has also been embodied into musculoskeletal research and formulation guidelines.

The study group was asked for self-assessment on efficiency or productiveness of work and 68% of the participants suffering from WRMSD expressed there is reduction in work efficiency which was statistically significant.

Other risk factors like BMI, continuous sitting hours per day, increased workload, meeting deadlines, had statistically significant association. There was a positive association made between the increased duration of sitting hours with the amount of workload/stress they are subjected to , nearly 70.8% of the population had to sit for prolonged hours due to the increased workload as a result of which 70.5% among them experienced increase in pain. The impact of the pain/discomfort on day-to-day activities, sleep, and social life was also established among which 46% were not able to do their day-to-day activities and 52% were not able to sleep well.

Only 12% perceived that they were comfortable during the working hours and the working environment and the association was statistically significant.

Nearly 65% of the study population did some form of physical activity/exercises on a daily basis among which 70.5% of them had a relieving impact on the working posture. There was a significant association made between the physical activity/exercises that they did, with the pain/ discomfort that they experienced currently in which 51.7% those who did not do any physical activity/exercises experienced pain/discomfort. Out of the study population 72% who experienced pain/discomfort were unable to do day to day activities.

Since, our study population majorly belonged to the younger age group the association with the comorbidities was not found significant.

### **Limitations**

Limitations of current study were; the purposive sampling limits the generalizability. Causation cannot be infested with this design. More research, especially longitudinal studies is needed to find the strength of association between MSD and demographic factors.

Convenience sampling which we used may have limited the external validity of the study. Since our samples were primarily taken from small- to medium-sized companies, the prevalence and risk factors for WRMSD in large IT companies may vary. Our study with a cross-sectional study with self-reporting of symptoms and there was no objective assessment done to ascertain the morbidity. We could conduct our survey only in two locations as it was difficult to get approval from large-scale IT companies. A long questionnaire was prepared which took almost 20 min per person to complete because of which our sample size was relatively lesser when compared to studies done across the globe. However, we used a validated tool and assured anonymity of the participants to reduce under-reporting of the problem

### **CONCLUSION**

Maintaining a proper work ergonomics becomes the key factor in reducing the prevalence of work-related musculoskeletal disorders among the IT professionals. Reduction in sitting hours which includes the continuous sitting time with adequate intermittent breaks is important pre-requisite to prevent the posture related disorders. Certain work-related ergonomics such as use of appropriate office chair, arm rest, sufficient back support, foot rest, position of the desktop and adjustable monitor height becomes crucial in preventing the WRMSD. We recommend that the employees should undergo proper ergonomic training which will help in reducing the pain and thereby improving the productivity, efficiency and quality of the work and also minimize the posture related disorders. Alternating between the sitting and standing tasks and performing simple stretches at the desk can alleviate pain and fatigue as they encourage normal joint movements. This is highly beneficial among the workers as it keeps them from prolonged sitting hours in the fixed posture. Leading a active lifestyle helps \in maintaining a optimal health posture which in turns helps us in having a productive social life. From this study, It was found that the awareness about the various musculoskeletal disorders and the use of body posture evaluation apps was minimal among the study group. Therefore, sufficient steps have to be taken to impart adequate knowledge regarding the use of the newly found technologies and applications which will help us in maintaining the proper posture while working and will also increase our compliance towards the same, thereby preventing/reducing the various work-related musculoskeletal disorders.

The study suggested that the prevalence of MSD is there in population who have to sit for a long duration of time, moreover affecting low back and neck regions the most. To prevent this MSD incorporation of ergonomics in the working environments is the best option. Also, strategies to modify life style and work style should be implemented to reduce the risk of MSD. Therefore, appropriate prevention and intervention strategies must be emphasized to ensure a healthier working atmosphere in order to improve their productivity from the organizations point of view. The present study is thus a wakeup call for professionals. Therefore, various awareness and training programs are recommended for professionals who sit for long duration in order to prevent MSD.

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