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Implications of Work from Home on the Musculoskeletal System and Stress Level in Information Technology Professionals during the COVID-19 Pandemic

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Abstract: ***The COVID-19 pandemic lockdown led all the companies to adopt work from home. The present study was conducted on information technology professionals to see the implications of work from home. Since information technology professionals have long working hours without proper break and workplace environment, they seem to the most affected sector in terms of physical and mental health due to work from home. The main purpose of this study was to find out the implications of work from home on the musculoskeletal system and stress level in information technology professionals during the COVID-19 pandemic. An online survey was conducted which consisted of 115 participants chosen according to the inclusion and exclusion criteria. Nordic musculoskeletal questionnaire and Perceived stress scale was used to evaluate the impact of work from home on musculoskeletal system and stress level respectively. The results showed that employees faced musculoskeletal pain in multiple joints in which the highest affection was seen in the lower back region and neck region along with a significant increase in stress levels, where females showed higher stress levels than males.***

Keywords: Work from home, Information Technology professionals, COVID- 19 pandemic, musculoskeletal system, stress levels

1. Introduction

The COVID-19 pandemic has become a global threat. The resultant effect of this pandemic has pushed more than 60 % of the world indoors. [1] The studies on the impact of COVID-19 across the globe thus far have targeted in the main on factors associated with the economic downswing, psychological trauma, stress of state, and so on. Only a few have checked out its impact on physical health and well-being throughout the lock-down.

IT, also known as information technology, indicates the transfer or other use of information through computers or computer systems. [2] IT professionals do a number of different tasks. They are the people who test, build, install, repair, or maintain the hardware and software associated with complex computer systems in one or more locations. [2]

The legal working hours in IT companies is 8 hours plus a 1hour lunch break. But sometimes employees have to work for more than 8 hours depending on the company requirements.[3] Sitting for prolonged periods may have consequences for musculoskeletal discomfort and cognitive function. [4]

Workplace atmosphere influences their psychological feature and emotional states, concentration, behavior, actions, and talents. It plays a very important role within the employees' engagement further as in their performance. In fact, workplace atmosphere incorporates a massive contribution for the organization in maintaining a high level of employees' productivity and thence the structure productivity.

For lots of IT professionals within the new "electronic world, "one in all the foremost serious health hazards presently is stress. Studies on work related stress has shown that IT skilled have higher levels of stress than the other cluster of staff, attributable to the character of labor concerned. The high stress aspects of IT jobs are coupled to numerous contractile organ issues, heart and alternative diseases further.

Since very few researches have been done on the stress level and musculoskeletal impact due to work from home, this study will focus on the implications of work from home on the musculoskeletal system using the Nordic musculoskeletal questionnaire and the stress level using the Perceived stress questionnaire.

Objective

- To study the implications of work from home on the musculoskeletal system.
- To observe which joint is most impacted
- To observe the stress level due to work from home

2. Literature Survey

Researcher Geetha Suresh did an observational study aimed to understand the most ignored aspect during this global pandemic i.e. physical well-being and postural challenges in a WFH scenario. An online survey was

conducted through the use of Google forms. A total of 326 respondents participated across the world (majority being from India). The results showed that majority of the homes are not designed to suit for the WFH and though the participants were aware of the work space and postural challenges, the pain level indicated that very soon it can lead to the severity level if the existing home space is not redesigned for work from home-office environment. [5]

Researchers Chung and Van der Lippe in 2018, observed that women workers are expected to do more domestic work along with the office work at home than men. [6]

Researchers Richelle Baker, Pieter Coenen, Erin Howie, Ann Williamson and Leon Straker, observed in their laboratory-based study that sitting for prolonged periods may have consequences for musculoskeletal discomfort and cognitive function in the short term and breaks to change position are recommended. [7]

Researcher Stuti Gupta observed that the effect of occupational stress on health and performance is very serious concern not only for IT professionals engaged with and suffering from but also from industry's aspect as this may create a negative view about the organization or even the whole industry and occupation. [8]

3. Methods

Study type: Observational study
Sampling method: Convenient sampling
Study subject: IT professionals who are working from home
Sample size: 120
Study duration: 6 months
Study area: Pune

a) Inclusion criteria
25-35 years of age
Both genders
IT professionals working from home
Work duration: 45-50 hours a week
Working from home since minimum of 3 months

b) Exclusion criteria
Any diagnosed musculoskeletal condition
Recent musculoskeletal and emotional trauma
Individuals undergoing physical therapy treatment, counselling and psychiatric treatment
Any diagnosed stress disorders

c) Outcome measures
Nordic musculoskeletal questionnaire
Perceived stress scale

d) Procedure
The study was conducted between the month of March and June 2021 using a convenient sampling method. A Google form containing the Nordic Musculoskeletal questionnaire and Perceived stress scale was made. This study involved both men and women working as IT Professionals. The subjects were selected on the basis of inclusion and exclusion criteria. The Google form was circulated through various virtual platforms like Email, Whatsapp and Facebook. Online consent was taken from the participants. Instructions regarding the form filling were explained in a detailed manner. Participants were also assured of the confidentiality. The questionnaire was then sent to the participants through various virtual platforms. The responses of the participants were noted and analyzed further. The data was further presented in statistics format.

4. Results

Table 1: Shows the number of individuals who participated in the study.

Gender	Male	Female
Number of individuals	63	52

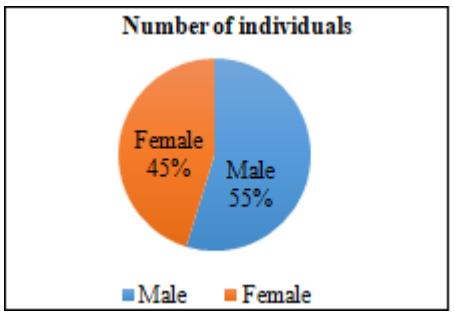

Figure 1: Representation of number of individuals who participated in study

Interpretation: Pie diagram showing Total of 115 participants in percentage out which 55% are Male and 45% are Female participants.

Table 2: Shows the responses of the perceived stress scale by the participants.

Perceived stress scale	Number of individuals
Low perceived stress	26
Moderate perceived stress	74
High perceived stress	15

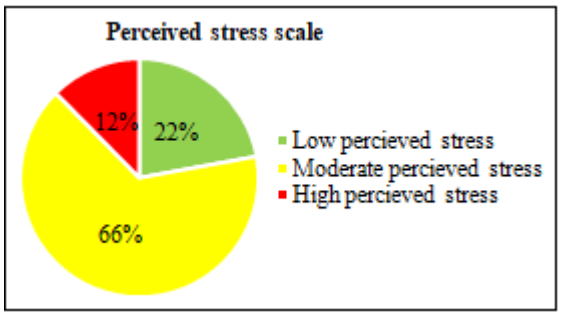

Figure 2: Shows the responses of the perceived stress scale by the participants

Interpretation: *The pie chart showing the responses of the perceived stress scale which is suggestive of the participants experiencing high perceived stress (12%), moderate perceived stress (66%) and low perceived stress (22%)*

Table 3: Shows gender wise classification of the responses received in the perceived stress scale

Perceived stress scale	Males	Females
Low perceived stress	16	10
Moderate perceived stress	41	34
High perceived stress	6	8

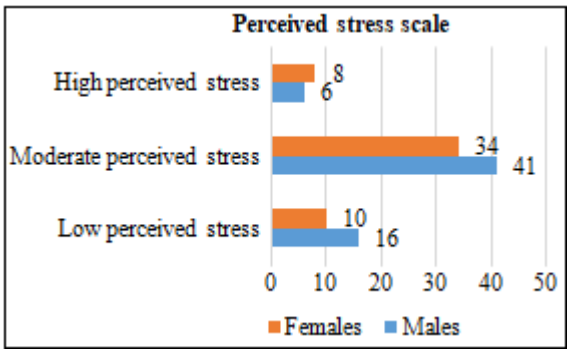

Figure 3: Shows gender wise classification of the responses received in the perceived stress scale

Interpretation: The bar graph showing the gender wise classification of the perceived stress scale is suggestive of more number of females having higher perceived stress than males and more number of males having moderate and low perceived stress.

Table 4: Shows classification of the responses received in the Nordic Musculoskeletal questionnaire

Area of pain	Number of individuals
Neck	75
Shoulders	56
Elbows	18
Wrist/Hands	36
Upper back	59
Lower back (small of the back)	78
One or both hips/thighs/buttocks	36
One or both knees	32
One or both ankles/feet	16

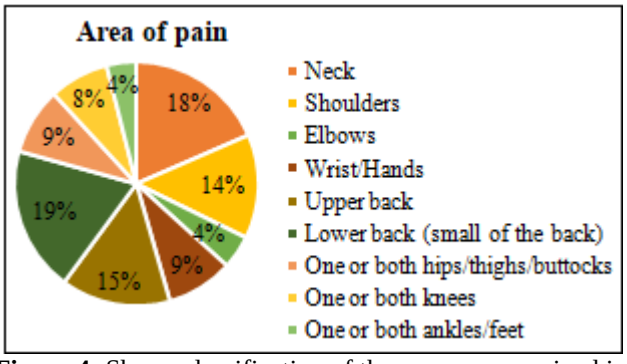

Figure 4: Shows classification of the responses received in the Nordic Musculoskeletal questionnaire

Interpretation: *The pie chart showing the classification of area of pain with accordance to the musculoskeletal questionnaire is suggestive of 19% participants experiencing low back pain, 18% participants facing neck pain, 15% participants with upper back pain, 14% with shoulder pain, 9% with both hips/thighs/buttocks, 9% with wrist/hands, 8% with one/both knee pain, 4% with elbow pain and 4% with one or both ankles/feet.*

Table 5: Shows gender wise responses and classification of area of pain experienced by the participants in accordance to the Nordic musculoskeletal questionnaire.

Area of pain	Males	Females
Neck	38	37
Shoulders	27	29
Elbows	8	10
Wrist/Hands	20	16
Upper back	29	30
Lower back (small of the back)	39	39
One or both hips/thighs/buttocks	18	18
One or both knees	13	19
One or both ankles/feet	5	11

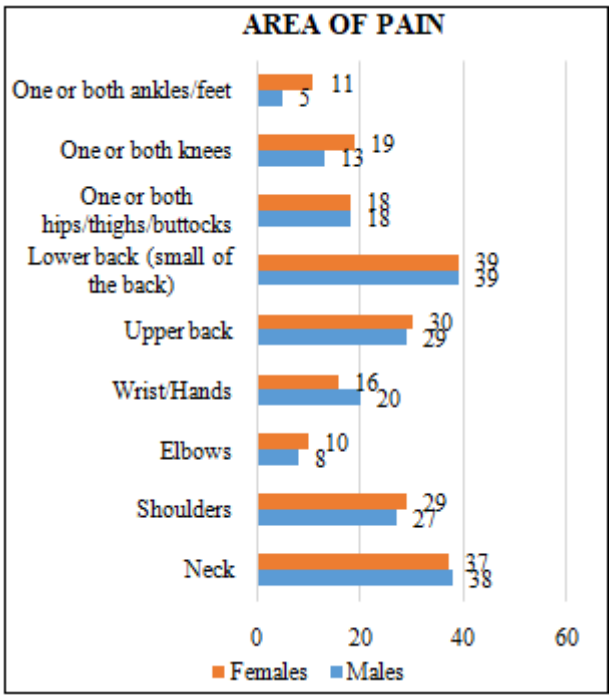

Figure 5: Shows gender wise responses and classification of area of pain experienced by the participants in accordance to the Nordic musculoskeletal questionnaire.

Interpretation: The above bar graph is suggestive of more number of females experiencing ankle/feet pain, one/both knee pain, upper back pain, elbow pain and shoulder pain than males. It is suggestive of more number of males experiencing wrist/hand pain and neck pain. It is also indicative of same number of males and females experiencing pain in one or both hips/thighs/buttocks and lower back pain.

5. Discussion

In majority of the households, there are not any demarcations or boundaries between work space/study space and family activities. Specialists have delineated this as 'role blurring'. The term role blurring is explained in simple terms as the confusion that arises or the difficulty in distinguishing one's role from work and family, when both settings are located at same space. [9]

India being a growing sector in IT mostly depends on its staff and therefore physical and psychological state matters for its development. Physical symptoms which will occur attributable to occupational stress are fatigue, headache,

symptom, muscular aches and pains, chronic gentle ill health, sleep disturbances, and feeding disorders. **S. Karthikeyan Arasu, R. Dhivakar, J. Cibi Chakravarthi, M. Kausik and M. Arun Kumar** in their article published that psychological and behavioral problems that may develop include anxiety, irritability, alcohol and drug use, feeling powerless and low morale. [10] The spectrum of effects caused by activity stress includes absence (frequently staying off from work without a sensible reason), poor deciding and even lack of creative thinking. If exposure to stressors within the place of work is prolonged, then chronic health issues will occur. An excessive amount of stress at work place includes a deadly impact whereas insufficient stress might lead to dissatisfaction and apathy and low performance. Activity stress (job stress/work stress) ought to be unbroken controlled and reduced to supply contributory work surroundings within the organization.

Several studies identified frequent exposure to social media/news relating to COVID-19 as a cause of anxiety and stress symptoms (**Gao et al., 2020; Moghanibashi-Mansourieh, 2020**). [11] Frequent social media use exposes oneself to potential pretend news/reports/disinformation and also the chance for amplified anxiety. With the unpredictable state of affairs and loads of unknowns concerning the novel coronavirus, information and faux news square measure being simply unfold via social media platforms (**Erku et al., 2020**), cultivating excess fears and anxiety. According to this study, 12% experienced high perceived stress, participants 66% experienced moderate perceived stress and 22% experienced low perceived stress.

Research indicates that interest strain may have an impact on every males and females. Important versions among males and females are observed with regards dangerous task stress or its results on opportunity symptomatic variables. **Rivera-Torres, Rafael Angel Araque-Padilla, and María José Montero-Simó** in their study ended that women appear to suffer additional from issues like mental disorders, depression, anxiety and psycho-somatic sicknesses, whereas men suffer additional from cardiac pathologies, that is caused by variety of activity factors, together with stress. [12] Alternative analysis suggests that stress incorporates a stronger negative impact on aspects like innovative behavior within the work among women. Women are also exposed to inordinate stressors. Women have greater exposure to monotonous tasks than men, are less likely to do jobs involving problem solving or learning, are less likely to be able to choose when to take a break in their work, and are more likely to be interrupted with unexpected tasks. [12] In this study, females are experiencing higher perceived stress compared to males. Since females have to manage family, household work and office work, it could be a contributing factor for their higher stress levels.

Work-related musculoskeletal disorders (WRMSD) are defined as injuries or disorders of musculoskeletal tissues associated with workplace related risk factors. [13] WRMSD are also known as cumulative trauma disorders, repetitive strain injuries and overuse injuries. Musculoskeletal disorders (MSD) are the most common causes of long-term sick-leave and disability pension in several industrial countries. [13] According to this study, 19% participants experiencing low back pain, 18% participants facing neck pain, 15% participants with upper back pain, 14% with shoulder pain, 9% with both hips/thighs/buttocks, 9% with wrist/hands, 8% with one/both knee pain, 4% with elbow pain and 4% with one or both ankles/feet was noted. When the responses of the male and female participants were compared it was noted that the lower back was equally affected in both genders. The second most affected area was noted to be the neck region. The upper back, shoulder, elbow and ankle pain is experienced more by the females than males.

Margareta Nordin, Gunnar B. J. Andersson, Malcolm H. Pope suggested that because intervertebral disks are avascular, their nutrition depends entirely on diffusion and sedentary occupations involve prolonged exposure to static loads, hastening this process and making the disk more vulnerable to injuries. [14] Intervertebral disks are viscoelastic. When an individual is sitting, the load on the disk is a hundred and fortieth of that obligatory by standing. This static load associated decreases the water content of a disk; an inflated load accelerates this method. Loss of water from a disk makes the diffusion method harder and leads to reduced oxygen tension and lack of nourishment, resulting in disk degeneration.

Since increased co-contraction of muscles increases the force on the spine, this increased muscle activation can result in increased activation and pain as proposed by the pain-spasm-pain model first described by **Simons and Travell (1981).** [15]

In a recent study, work-family imbalance, exposure to hostile work atmosphere, and job insecurity were related to low back pain once adjusting for various demographic, socioeconomic and activity factors. Long work hours (41–45 hours) were related to an exaggerated risk of low back pain. In particular, younger workers working for 60 hours or longer; and female workers working for 41–45 hours were associated with increased reporting of low back pain. [16]

Work connected neck pain is additionally rising as major downside among people that pay a good deal of their time in front of computers. Another study highlighted the work connected factors like perception concerning breaks, posture, and height of the screen as freelance determinants of WRNP among desktop workers. Varied studies from India have been linked to poor or awkward sitting posture at the work place with WRNP. Prevalence of neck pain among office workers is higher than in the general community. [17]Causal association of prolonged computer use and neck pain is already established. [18] Awkward postures, repetitive work and aggravation of previous pain episodes are contributing factors of work related neck pain (WRNP). Neck pain related disability has health and economic impact both at individual and community level. [19]

Since majority of the homes are not designed to suit for work from home and even though the participants were aware of the work space and postural challenges, it can lead to increase in the severity level of musculoskeletal pain and psychological stresses if the existing work space at homes are not redesigned for work from home-office environment.

6. Conclusion

Work from home of IT professionals during the COVID-19 pandemic has led to an increase in stress levels irrespective of the gender, where females are experiencing higher stress levels than males. Work from home has also resulted in the employees facing musculoskeletal pain of multiple joints, with lower back and the neck region being affected the most. Hence, work from home is not a good option for IT professionals in the long run, unless appropriate work duration with sufficient breaks, workplace environment and lifestyle modifications are implemented.

7. Future Scope of Study

Correlation between psychological stresses and its effect on the musculoskeletal system can be done.

This study can be conducted on a larger population.

Study duration can be longer to check the prolonged effects of work from home.

This study can be conducted in other work from home professions.

Correlation of parameters like age, body mass index and gender etc. can be done between musculoskeletal and psychological stresses.

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