

## PREVALENCE AND STATISTICAL ANALYSIS OF MUSCULOSKELETAL DISORDERS AMONG ACADEMICIANS FROM HIGHER EDUCATION

Aishwarya Mahadik, Neha Bajpai, Garima Sharma \*, D.S.Rathore.

Department of Biotechnology, Govt Kamla Raja Girls PG (Auto) College, Gwalior, India.

### ABSTRACT

Musculoskeletal disorders are one of the most commonly occurring life style related disease which significantly affect the quality of life. Other than age, body mass, nutritional factors and joint injuries, the occupation related stress and load also have substantial effect of this disease. In the present paper we have conducted a survey on Musculoskeletal diseases among academicians of our college and presented the results after statistical analysis. A Nordic based questionnaire modified suitably for this study was used. The results suggested a higher prevalence of neck and lower back pain among all faculties. The correlation studies suggested a higher positive relationship between joint pain and professional factors like prolonged standing, long term use of computers etc, which was even higher than effect of age and body weight.

**KEY WORDS:** Musculoskeletal disorders, Nordic questionnaire, Arthritis, Static load.

**Address for correspondence:** Dr. Garima Sharma, Department of Biotechnology, Govt. Kamla Raja Girls PG (Auto) College, Gwalior, India. **E-Mail:** [sharmagarima\\_s@rediffmail.com](mailto:sharmagarima_s@rediffmail.com)

### Access this Article online

#### Quick Response code



DOI: 10.16965/ijpr.2016.194

#### International Journal of Physiotherapy and Research

ISSN 2321- 1822

[www.ijmhr.org/ijpr.html](http://www.ijmhr.org/ijpr.html)

Received: 16-11-2016

Accepted: 20-12-2016

Peer Review: 16-11-2016

Published (O): 11-02-2017

Revised: None

Published (P): 11-02-2017

### INTRODUCTION

Musculoskeletal disorders represent a group of conditions that affect the muscles, tendons, ligaments, joints, peripheral nerves and supporting blood vessels in the body [1]. The term musculoskeletal disorders (MSDs) encompass a variety of conditions, ranging from acute onset and a short duration to lifelong disorders [2]. There are various forms of musculoskeletal disorders like osteoarthritis, osteoporosis, gout, ankylosing spondylitis. The major causing factors of these disorders are wear and tear, joint injury or damage, autoimmune factors and environmental factors. MSDs account for a significant proportion of the disease burden worldwide and have considerable economic implications. Musculoskeletal disorders have a substantial and detrimental effect on people of working age in all the countries including India. Previously considered as a result of wear and

tear of joints, focus is now shifted on work related incidences of these diseases. A wide range of various factors which are related to the work could also be correlated to the development of joint pain as summarized in Table 1.

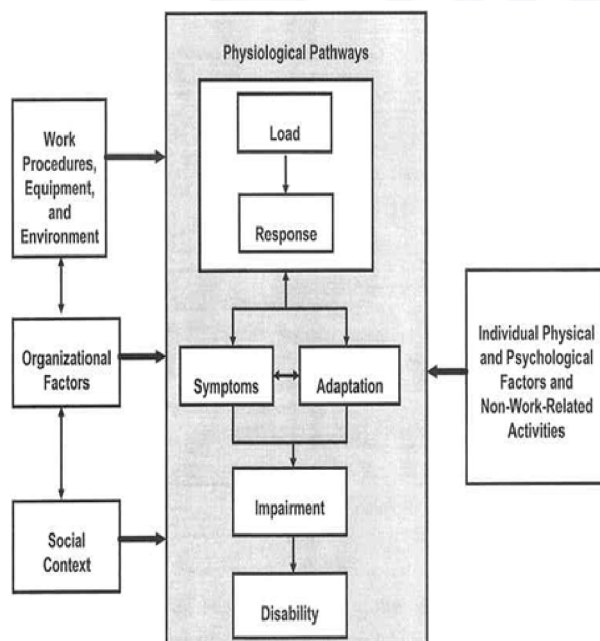
**Table 1:** Common risk factors for WMSDs.

- Excessive Force
- Repetitive forces
- Awkward Postures
- Static Postures
- Frequent./ heavy Lifting
- Working time
- Prolonged exertions

MSDs can affect all major areas of the body, including the: neck, shoulders, wrists, back (upper and lower), hips, legs, knee and feet (American Academy of Orthopaedic Surgeons, 2009). The major symptoms include joint stiffness, swelling and inflammation, dullness and aching.

Work-related joint disorders represent a common occupational problem for healthcare workers throughout the world. There is a strong interplay between work related joint disorders with personal and physiological factors in genesis of joint impairment and disability (Figure 1) [3]. Research has been conducted on the prevalence and physical risk factors of work-related musculoskeletal disorders (WMSDs) among occupations such as agriculture workers, office workers, school teachers, and health care professionals [4-7]. However, a paucity of research exists on the patterns and physical risk factors of WMSDs among the academicians in a higher learning institution. This study was conducted to determine the patterns and physical risk factors of WMSDs among the academicians. The aim is to find out association between joint disorders and work related factors using statistical analysis methods.

**Fig. 1:** Interplay of work related, physiological and personal factors in joint impairment and disability.



**Review of literature:** Musculoskeletal disorders (MSD) represent one of the most common and important occupational health problems in working populations. They are considered as a common health related reason for discontinuing work and for seeking health care. In many occupations, MSD include a wide range of inflammatory and degenerative conditions affecting the body skeletal components like muscles, ligaments, tendons, nerves, bones and

joints. They may be resulted due to a single or cumulative trauma due to continuous exposure to risk factors. MSDs affect persons in all age groups and involved in variety of physical activities ranging from mild upto heavy dynamic working conditions. However the risk factors like static and dynamic load, posture, working hours and life style factors significantly affect the disease prognosis. The professionals involved in static activities like academicians, secretarial jobs, doctors, IT professionals are equally in risk group with those in heavy dynamic professions like athletes and sports persons, construction and factory workers etc. Studies have shown the high rates of prevalence of MSD among nursing home staff in South Korea is an important cause of morbidity [8]. In other study, MSD represent a significant burden for the dental profession especially in the upper extremities [7]. Work related MSD are widely reported by the IT professionals working in the IT industries in India and 59% of them reported some form of musculoskeletal health symptoms in the past 12 months. Neck pain problems were the most frequently reported in about 30% of such professionals alongwith lower back, wrists, hands and shoulder problems. It has also been reported that women IT professionals are more prone to WRMSDs than men IT professionals. [9]. In medical laboratory professionals prevalence of MSDs is 21.2%. The results suggest that practicing medical laboratory professionals are at high risk for the development of MSDs related to cumulative trauma [10].

Work-related musculoskeletal disorders reduced presenteeism in both physical and occupational therapists. The effects were similar in both groups. The presence of a WMSD reduced presenteeism anywhere between 5% and 7.5% depending on the measure [11]. Some studies have shown that school teachers are at a high risk of MSD. Researches on school teachers of various nations like Turkey, China, Australia, Brazil, Sweden, USA, Germany, Estonia, Japan, Malaysia, Philippines, France and Greece have demonstrated the existence of musculoskeletal problem in teaching occupation [12,13]. However very few studies have been conducted on the prevalence of MSDs among higher education institute teachers. The working load,

static parameters and conditions differ significantly between school and college studies. In view of this further research is required to more thoroughly investigate the issue of MSD among college teachers, with a greater emphasis on the possible wider use of ergonomic principles. This would represent a major step forward in the prevention of MSD among teachers, especially if easy to implement control measures could be recommended. This is the most important objective of the present study.

### METHODOLOGY

A cross sectional study was conducted among 100 teachers (males and females, preferably above 30 years of age) of Govt. Kamla Raja Girls College, Gwalior. This is one of the most reputed college of this region having faculty from all disciplines' i.e. science, arts, commerce, music, law and computers. Thus forms a random group valid for the study. The data was collected using a Nordic based questionnaire modified as per the requirements of the study [14]. The aim and significance of the study was explained to the surveyed.

The survey includes questions about demographic factors like (age, height, weight etc), life style related factors and work environment. It also contains questions about self assessed or clinically diagnosed joint pain symptoms, its severity and frequency. The questionnaire was given to teachers in a sealed and anonymous envelope and data collected was analyzed using statistical tools and significance testing. Out of 100 questionnaire forms, 94 were completely filled and included in survey. The data analysis and correlation studies were conducted on the collected data.

### RESULTS

**Table 2:** Demographic characteristics of surveyed.

Age Group	Male	Female	Total
30-40Y	6	18	24
40-50Y	4	18	22
50-60Y	8	34	42
>60 Y	4	2	6
<b>Total</b>	<b>22</b>	<b>72</b>	<b>94</b>

The demographic characteristics on age and gender of the subjects surveyed are given in Table 2 which shows that survey mostly include

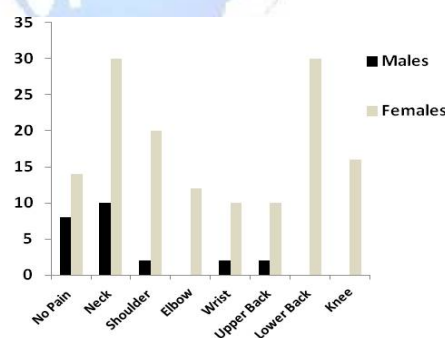
female faculties above 40 years of age however the survey forms were distributed without any preferential bias. The body mass index of the subjects is presented in Table 3 which shows that most of the subjects are under overweight category.

**Table 3:** Body mass index characteristics of surveyed.

BMI	Male	Female	Total
< 18.5 (underweight)	-	-	-
18.5-24.9 (normal )	4	24	28
25-29.9 (overweight)	14	34	48
< 30 (obese)	4	14	28
<b>Total</b>	<b>22</b>	<b>72</b>	<b>94</b>

Table 4 and Table 5 shows the distribution sites of self reported/ clinically diagnosed joint pain data in males and females related with age and BMI. The most common distribution sites of pain were neck and lower back in both males and females and least common joint pain site was elbow in males whereas wrist and upperback in females as shown in Figure 2.

**Fig. 2:** Commonly involved joint sites in subject surveyed (male and females).



**Table 4:** Joint Pain characteristics in relation with age.

Age Group	No Pain		Pain in 1-2 sites		Pain in > 2 sites	
	M	F	M	F	M	F
30-40Y	-	-	4	12	2	6
40-50Y	2	6	2	4	-	8
50-60 Y	2	8	6	12	-	14
>60 Y	2	2	-	-	2	-
<b>Total</b>	<b>6</b>	<b>16</b>	<b>12</b>	<b>28</b>	<b>4</b>	<b>28</b>

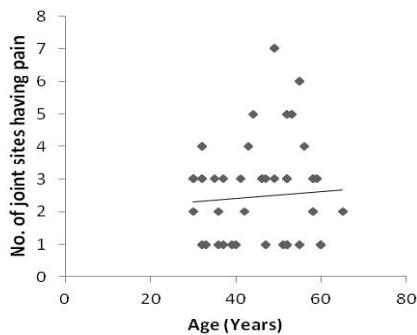
**Table 5:** Joint Pain characteristics in relation with BMI.

BMI	No Pain		Pain in 1-2 sites		Pain in > 2 sites	
	M	F	M	F	M	F
< 18.5	-	-	-	-	-	-
18.5-24.9	4	2	-	7	-	15
25-29.9	4	8	8	16	2	10
< 30	-	4	4	6	-	4
<b>Total</b>	<b>8</b>	<b>14</b>	<b>12</b>	<b>29</b>	<b>2</b>	<b>29</b>



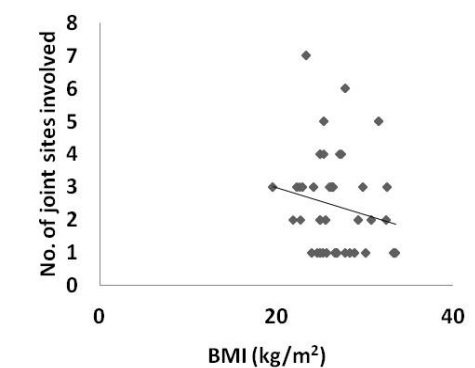
The survey form included questionnaire regarding working conditions and work load in higher education institutes. On the basis of the data collected correlation was studied between age with joint pain and BMI with joint pain. The results are presented in correlation graphs shown in Figure 3 and 4. The graph shows that there is a positive correlation of 0.04 between subject's age and no. of joint pain sites. However a negative correlation of 0.175 was found between subject's BMI and no. of joint pain sites.

**Fig. 3:** Correlation graph between subject's age and joint pain sites involved.

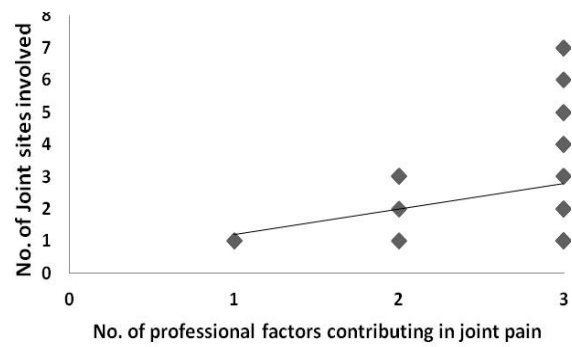


Further to assess the effect of work/ professional parameters on joint pain distribution another correlation study was designed. On the basis of survey forms collected the effect of three professional parameters i.e. total no. of years in job, no. of working hours on computers and long term standing (more than 3 hrs/day) was assessed on joint pain. Correlation between total no. of factors present out of above three and total no. of joint pain sites involved was studied. The results showed a high positive correlation of 0.35 between professional factors and joint pain occurrence (Figure 5).

**Fig. 4:** Correlation graph between subject's BMI and joint pain sites involved.



**Fig. 5:** Correlation graph between no. of professional factors and joint pain sites involved.



## DISCUSSION

The present study investigates the issue of genesis and risk factors contributing in the musculoskeletal diseases and injuries among professionals from higher education institutes. For our study we have chosen one of the most prestigious and interdisciplinary government girls college of the region. The idea is to involve faculties from different disciplines like arts, science, commerce, music, fine arts computers and home science etc. This analysis is important as working parameters like duration of theory and practical classes, research and computers use differ significantly among these disciplines. The college has mostly female teachers with more than 10-15 years of academic experience. This selection makes a suitable target group as females above 35-40 years of age are most prone to joint injuries and pain due to well established causes like hormonal imbalance, nutritional deficiency, increasing family and professional responsibilities etc. However the study also included male faculty members to study varying pattern of musculoskeletal diseases among genders. The statistical analysis survey forms showed that most of the subjects (male and female both) are in overweight category and affected with pain in more than two joints. This is because of the reason that due to pain in a joint the body posture and alignment get disturbed and undue pressure occurs on another joint as well. The most affected joints in both males and females are found to be neck and lower back. The professional factors like continuous or long term standing during theory and practical classes, long term use of computers for academic and research purposes may be contributing to it.

Most of the subject agreed of lack of resting time in between the working hours.

The correlation studies between subjects's age and no. of pain sites involved showed a slight positive correlation. This is quite an established fact that with aging many joints gets involved in excruciating pain due to changing body posture and long term adjustments between body segments. However in present study a slight negative correlation was established between BMI of the subject and no. of joint pain sites. This phenomenon is due to the fact that higher body weight significantly affects the posture of the subject and expressed as a severe/ dominating pain in one or two joints. The study also showed a high positive correlation between professional factors involved and no. of joints affected. This is most significant outcome of the study as the correlation was even higher than age effect. The result presented that job span, long term standing/ sitting, continuous reading and use of computers have detrimental effect on joint anatomy and physiology. Further studies are required to establish the role of physical/ joint strengthening exercises, resting period between working and life style factors on joint pain.

## CONCLUSION

The study showed that professional factors have a strong interplay on genesis of joint diseases which is equivalent or higher than the aging or body weight effect. The study suggest a strong need to develop and implement effective intervention strategies aimed at curbing the development of joint diseases within the higher education profession. These strategies may include well designed workplaces, teaching aids and well planned workload among others. The researchers also recommend that it should be essential in all education institutes to provide a general awareness and counseling sessions for education professional and students about the musculoskeletal risks associated with their occupation.

## ACKNOWLEDGEMENTS

Authors would like to thank Principal, Govt. Kamla Raja Girls PG College Gwalior, for provided necessary permission and facilities for conducting this survey. The authors express their sincere gratitude towards the faculty mem-

-bers who spared their valuable time for filling the questionnaire and making this study successful.

**Conflicts of interest: None**

## REFERENCES

- [1]. Punnett L. and Wegman DH. Work-related musculoskeletal disorders: The epidemiologic evidence and the debate. *Journal of Electromyography and Kinesiology*, 2004;14(1):13–23.
- [2]. Woolf AD and Pfleger B (2003). Burden of major musculoskeletal conditions. *Bul. Of WHO, The International Journal of Public Health* 2003; 81(9): 646-656.
- [3]. Gatchel RJ. Musculoskeletal disorders: Primary and secondary interventions. *Journal of Electromyography and Kinesiology*, 2004;14(1):161–170.
- [4]. Welch LS, Hunting KL and Nessel-Stephens L. Chronic symptoms in construction workers treated for musculoskeletal injuries. *American Journal of Industrial Medicine*, 1999; 36(5):532-540.
- [5]. Gerr F, Fethke NB, Anton D, Merlino L, Rosecrance J, Marcus M and Jones MP. A prospective study of musculoskeletal outcomes among manufacturing workers: II. Effects of psychosocial stress and work organisation factors. *Human Factors*, 2014;56(1) :178-190.
- [6]. Gerr F, Fethke NB, Merlino L, Anton D, Rosecrance J, Jones MP, Marcus M and Meyers AR. A prospective study of musculoskeletal outcomes among manufacturing workers: I. Effects of physical risk factors. *Human Factors*, 2014;56(1):112-130.
- [7]. Hayes MJ, Cockrell D, Smith DR. A systematic review of musculoskeletal disorders among dental professionals. *Int J Dental Hygiene* 2009;7:159-165.
- [8]. Smith DR,Choi JW, Ki M, Kim JY and Yamagata Z. Musculoskeletal disorders among staff in South Korea's largest nursing home.*Environ Health Prev Med.* 2003;8(1):23-28.
- [9]. Mohamed SHP, Alagesan S, Subbarayalu AV. Management of postural low back pain among the information technology professionals: a multiple therapeutic intervention approach.*Int J Physiother Res*, 2015;3(6):1271-83. ISSN 2321-1822
- [10]. Agrawal PR, Maiya AG, Kamath V and Kamath A. Work related musculoskeletal disorders among medical laboratory professionals: a narrative review. *International Journal of Research in Medical Sciences* 2014;2(4):1262-1266.
- [11]. Darragh AR, Campo M and King P. Work-Related activities associated with injury in occupational and physical therapists. *Work*. 2012;42(3):10.
- [12]. Mesaria S and Jaiswal N. Musculoskeletal Disorders among Teachers Residing in Various Nations: A Review. *Res. J. Recent. Sci.* 2015;4:23-27.
- [13]. Derek R and Smith A. Systematic review of musculoskeletal disorders among school teachers. *BMC Musculoskeletal Disorder* 2011;12:260.
- [14]. Kuorinka I,JonssonB, Kilbom A, Vinterberg H, Biering-Sorensen F, Andersson G and Jorgensen K. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. *Applied Ergonomics* 1987;18(3):233-237.