



PERCEPTION OF ERGONOMIC POSTURE AMONG COMPUTER OPERATORS IN VIKHE PATIL FOUNDATION

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Abstract: Today, sedentary lifestyle has become universal, as the jobs are becoming less active and more sedentary, so the increasing number of individuals spends extended periods in a sitting position. Thus, in the absence of good ergonomic design it can adversely lead to Musculoskeletal Disorders (MSDs). This study was conducted on 70 computer operators with one year of experience. Sampling technique was Simple Random sampling technique and study materials used were measuring tape, weighing machine for BMI and self-structured ergonomic questionnaire. After obtaining Informed consent, Data regarding Personal characteristics, BMI, Computer Usage, presence or absence of musculoskeletal disorder and Knowledge of Ergonomics were collected by face to face interview method using a self-structured Questionnaire. The Ergonomic awareness section of the Questionnaire composed of 16 questions related to Knowledge about Working Postures, Seating, Keyboard/Mouse, Monitor, Table and Accessories and finally Rest breaks. The study concluded that more than half i.e. 70% of computer operators are less aware and 1.42% participants are not aware about ergonomic posture. While 28.57% of Computer operators are completely aware of ergonomics.

Index term: Ergonomic posture, computer operators, work related musculoskeletal disorders, Awareness

1. INTRODUCTION:

Today, sedentary lifestyle has become universal^[1], as the jobs are becoming less active and more sedentary^[2], so the increasing number of individuals spends extended periods in a seated position at work and during free time.^[1] Ergonomics is the scientific discipline concerned with designing equipment's and techniques for maximum efficiency and safety^[3, 4] to optimize human well-being and overall system performance in the work area.^[5] In the modern working society, ergonomics plays an important role, since it has been recognised that the prevention of work-related improves productivity as well as affects satisfaction, motivation and creativity.^[6] In the absence of a good ergonomic design, extended work in the same seating position for prolonged periods can adversely lead to Musculoskeletal disorders (MSDs). Globally, the number of people suffering from musculoskeletal conditions has increased by 25 percent over the past 2 decade^[7] and these conditions make up 2% of the global disease burden. Ergonomic emerges as an issue since many of these musculoskeletal conditions are common computer related injuries.^[8] The risk factors are

1. Improper workstation design- Poor work environments augment the risk of WMSDs. "Poor work environments." Means work environments that are not conducive to their users. For example, a workstation where the keyboard and mouse are placed at different levels, which causing the user to elevate/abduct shoulders can be considered a poor workstation. A workstation without adjustable components such as work surface, office chair, monitor height and distance etc. and necessary accessories (hands-free phone, document holder, etc.) can also be contribute to the poor work environment. Further, environments with the loud noise, increased glare, and extreme temperatures are considered as poor work environments.^[9]

2. Faulty posture for extended periods- Twisting the trunk to reach file cabinets, curved sitting (bending the torso toward the monitor), cradling the phone between the neck and shoulder, sitting on a high chair with dangling feet and slouched sitting with legs placed on an object under the work surface, are some examples of awkward postures during office computer work. Postures with elevated or abducted shoulders, wrist and fingers in constantly tensed position are also considered awkward postures. These postures, when sustained for extended period, strain the lower back, shoulders, and neck muscle groups. As computer workers often engage in tasks that demand high level of concentration, they get indulge in their work and assume a given

posture for long periods of time. During prolonged static sitting, the muscles undergo a prolonged state of contraction which sustain the body posture, leading to decreased transportation of sugar and oxygen to dynamically contracting muscles. So, the waste products such as lactic acid and carbon dioxide gets accumulated in those muscles, leading to muscle spasms and fatigue.^[9] The faulty posture for prolonged period may leads to poor circulation, stiffness of joints and pain. The chance of developing an injury and repetitive strain injuries is increased by extended hours of continuous work, that develop over time may lead to long-term disability.^[10] Other than musculoskeletal disorders, prolonged sitting also has been identified as a potentially significant occupational health concern ^[11], as it have been linked to increased prevalence of chronic diseases including coronary heart disease ^[12], diabetes ^[13], obesity ^[14], and breast cancer ^[15], as well as increased mortality from all causes. ^[16] A little knowledge of the principles of ergonomics of workstation setup and exercises can prevent a lot of discomfort and maximize productivity.^[16]

2. MATERIAL AND METHODOLOGY:

2.1 Study Design – Cross sectional study

2.2 Study Set Up- In Vikhe Patil Foundation, Ahmednagar city

2.3 Sample Size – 70

2.4 Sample Techniques - Simple Random technique

2.5 Study Material- Measuring tape, weighing machine

2.6 Inclusion Criteria: Both gender, computer operators in Vikhe Patil Foundation with 8 hours of working duration and one-year experience

2.7 Exclusion Criteria: Computer operators outside the Vikhe Patil Foundation, individuals who are not willing to participate

2.8 Procedure

The ethical clearance from ethical committee of college of physiotherapy was obtained. Subjects fulfilling the inclusion and exclusion criteria were included in the study. The entire procedures involved in the study was explained to each subject. After explaining the purpose of the study, a written informed consent was obtained from the participant. Then Data regarding Personal characteristics and duration of Computer Usage was asked. Then BMI was calculated by taking weight and height of the participants by using weighing machine and measuring tape. The participant was asked whether he/she has presence of any musculoskeletal disorder or not. Awareness of Ergonomics was collected by face to face interview method using a self-structured Questionnaire.

Final conclusion will be made depending upon the score of all the participant.

2.9 Outcome Measures: Self-structured Ergonomic Questionnaire

The Ergonomic awareness section of the Questionnaire composed of 16 items related to Knowledge about rest breaks during working hour, design of workstation, proper placement of Keyboard/Mouse, Monitor, Table and Accessories and working posture. The participants have to tell that the sentence about the ergonomic is correct or not or they follow those things or not by answering in true or false manner. Participants will get '1' mark for correct response and '0' for incorrect response. Participants were graded as 'Completely aware' for scoring between 13 to 16, Less aware for scoring between 8 to 12, and 'Not Aware' for scoring less than 8

No.		बरोबर	चुक	गुण
1	आपल्या कामाच्या ठिकाणी टेबलच्या मध्यभागी बसणे तुम्हाला सोडस्कर वाटते का ?			
2	खुर्चीवर पाठ टेकण बसले असताना, खुर्चीची सीट इतकी खोल असली पाहिजे की खुर्चीच्या समोरचा आणि गुडघ्याच्या मागील भागामध्ये 6-8 इंच अंतर असणे गरजेचे आहे, असे तुम्हाला वाटते का ?			
3	तुम्हाला आवश्यक असणारे डॉक्युमेंट असे ठेवले पाहिजे कि जेव्हा तुमची नजर कॉम्प्युटर वरून डॉक्युमेंट कडे फिरवाल तेव्हा फक्त डॉक्युमेंटाची हालचाल झाली पाहिजे, डॉक्याची नाही, असे तुम्हाला वाटते का ?			
4	जेव्हा तुम्ही कामाच्या ठिकाणी खुर्चीवर बसलेले असतात, तेव्हा तुमचे पाय पूर्णपणे खुर्चीच्या पायावर टेकलेले गेले पाहिजे किंवा थोडे हवेत झुलवता येईल असे ठेवले पाहिजे असे तुम्हाला वाटते का ?			
5	टाइप करताना, आपला मनगट सरळ पाहिजे वाकलेले नाही, असे तुम्हाला वाटते का?			
6	अगर तुम्ही कीबोर्ड चा वापर जास्त न करता सतत माउस चा वापर करत असाल तर माउस हाताच्या जवळ असणे गरजेचे आहे का ?			
7	माउस व कीबोर्ड चा वापर करताना अगर तुमच्या खुर्चीचे हात तुमच्या कामामध्ये अडथळा आणत असेल तर खुर्चीचे हात काढून टाकले पाहिजे का ?			
8	अगर तुमच्या हाताला दुखत असेल तर कदाचित ते तुमच्या खुर्चीच्या किंवा तुम्ही जिथे काम करता तिथल्या चुकीच्या व्यवस्थेमुळे असेल असे तुम्हाला वाटते का ?			
9	टाइप करताना आपला मनगट सरळ राहावा या साठी कीबोर्ड तिरपा उचलून ठेवून काम करणे सोडस्कर वाटते का ?			
10	मॉनिटर ची उंची व अंतरामुळे, तुम्हाला तुमच्या मानेला, पाठीला, व डोक्याला त्रास होऊ शकतो असे वाटते का ?			
11	आपल्या कामाच्या ठिकाणी माउस किंवा कीबोर्ड च्या दीर्घकाळ वापर करणे, चुकीच्या स्थितीत बसणे आणि कामाच्या चुकीच्या सवयी एकत्रित संयोजनाने अवयाना हानी पोहचू शकत नाही ?			
12	कीबोर्ड किंवा टेबल तुमच्या कोपर्याच्या बरोबर उंचीवर असले पाहिजे असे तुम्हाला वाटते का ?			
13	आपल्या कामकाजाच्या स्थितीत बदल करण्यात मदत करण्यासाठी कामाच्या दिवसाच्या दरम्यान आपल्या खुर्चीच्या मागच्या समर्थनाचा झुकाव किंवा तणाव नियमितपणे समायोजित करण्यास प्रोत्साहित केले जाते.			
14	माउसचा वापर करताना, माउस घट्ट पकडून ठेवले पाहिजे का ?			
15	कॉम्प्युटर वर प्रत्येक तासासाठी काम केल्यावर ५ ते १० मिनिटांचे छोटे ब्रेक घेतले पाहिजे का ?			
16	२०-२०-२० नियम म्हणजे, डॉक्याचा ताण कमी करण्यासाठी कॉम्प्युटर वर २० मिनिट काम केल्यानंतर, एखाद्या व्यक्तीने २० फुट अंतरावर असलेल्या वस्तूकडे २० सेकंदासाठी पहिले पाहिजे असे तुम्हाला वाटते का ?			

सूचना

वाक्य बरोबर किंवा चुक आहे ते ओळखा

योग्य उत्तरासाठी 1- चिन्हांकित करा

चुकीच्या उत्तरासाठी 0- चिन्हांकित करा...

गुण	एकूण	/16
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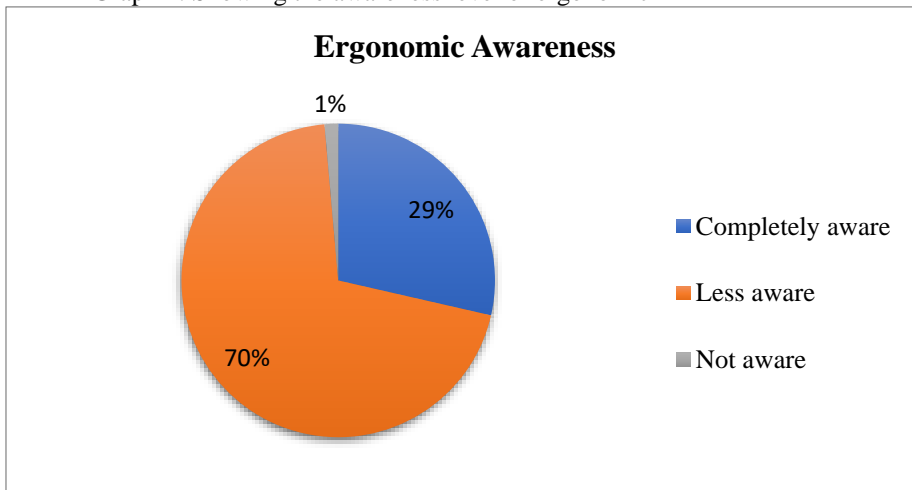
3. RESULT:

The present study was conducted on 70 computer operators who work in Vikhe Patil Foundation for minimum 8 hours and having job experience of at least 1 year to evaluate their awareness about ergonomics.

Table 1: Showing the awareness level of ergonomics

Sr no.	Awareness level	Percentage%
1	Completely Aware	28.57
2	Less Aware	70
3	Not Aware	1.42

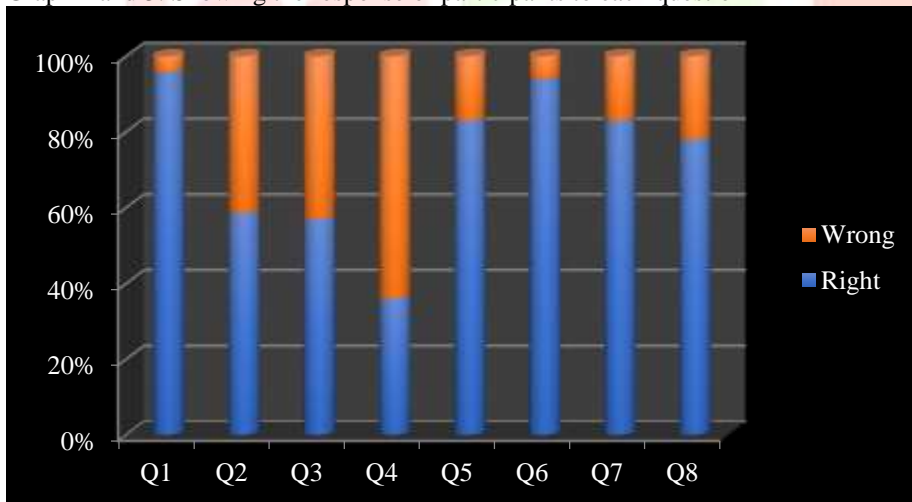
Graph 1: Showing the awareness level of ergonomic

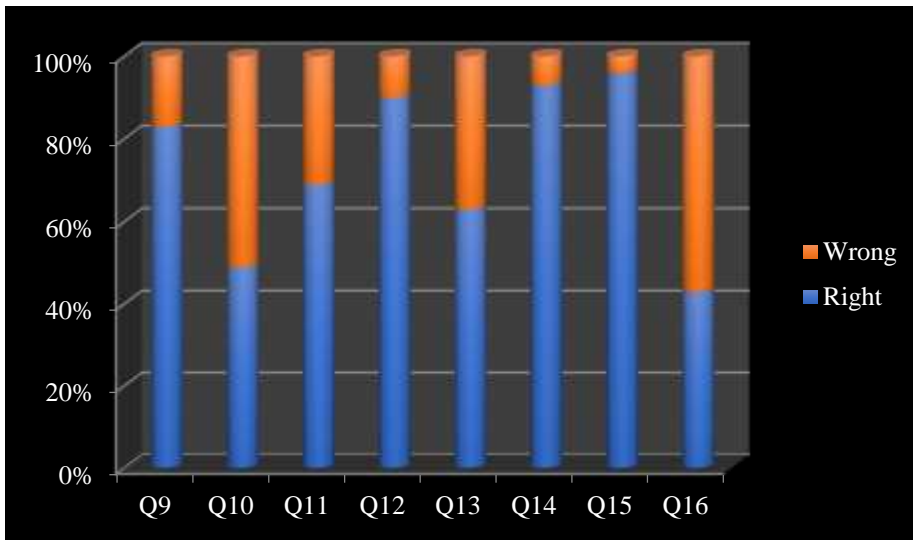


Inference

From the above mentioned table it is inferred that majority of the respondents are less aware about ergonomics and its factors

Graph 2 and 3: Showing the response of participants to each question





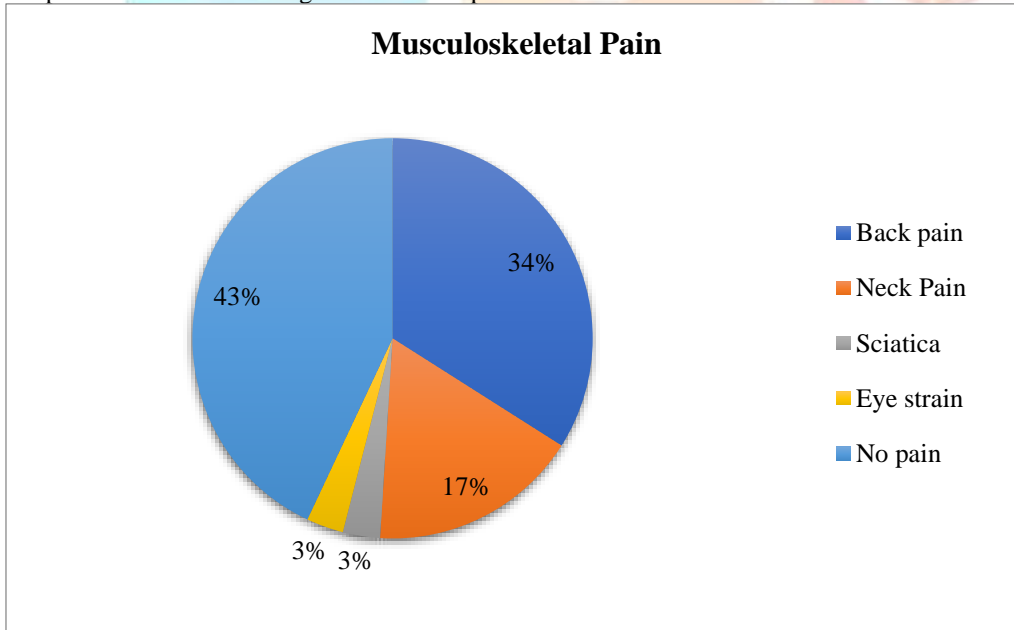
Inference

Above graph shows that maximum number of participants had incorrectly responded to the Q4, Q10 and Q20 followed by Q2 and Q3 which were based on using Foot rest, Correct placement of Monitor, 20-20-20 rule, having distance between seat pan and popliteal fossa and using Document holder respectively.

Table 2: Showing the prevalence of Musculoskeletal Pain among Computer Operators

Sr no.	Musculoskeletal Pain	Number of participants having pain (%)
1	Back pain	34%
2	Neck pain	17%
3	Sciatica	3%
4	Eye Strain	3%
5	No pain	43%

Graph 4: Showing the prevalence of Musculoskeletal Pain among Computer Operator



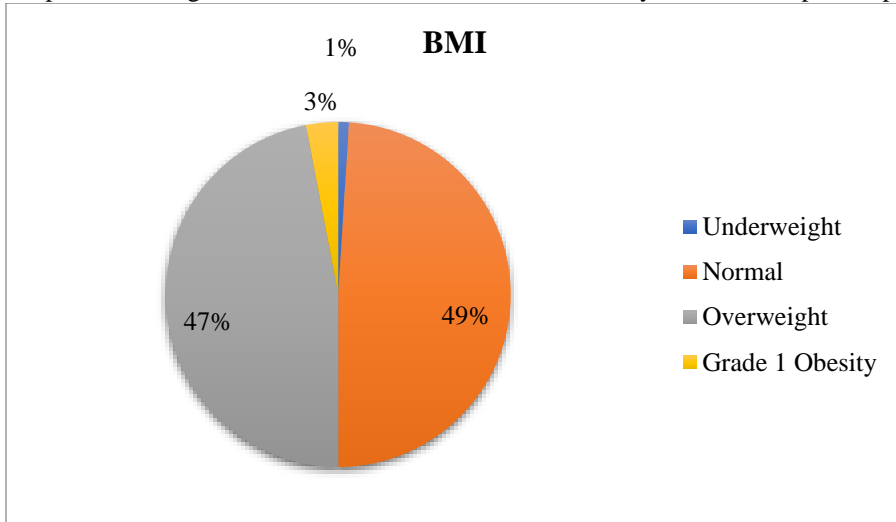
Inference

From the above mentioned table it is inferred that majority of computer operators are having musculoskeletal pain including back pain 34%, neck pain 17%, followed by sciatica 3% and eye strain 3%. While 43% participants are normal.

Table 3: Showing the association of BMI with the sedentary work of Computer Operators

Sr no.	BMI	Number of Participants (%)
1	Underweight	1%
2	Normal	49%
3	Overweight	47%
4	Grade 1 Obesity	3%

Graph 5: Showing the association of BMI with the sedentary work of Computer Operators



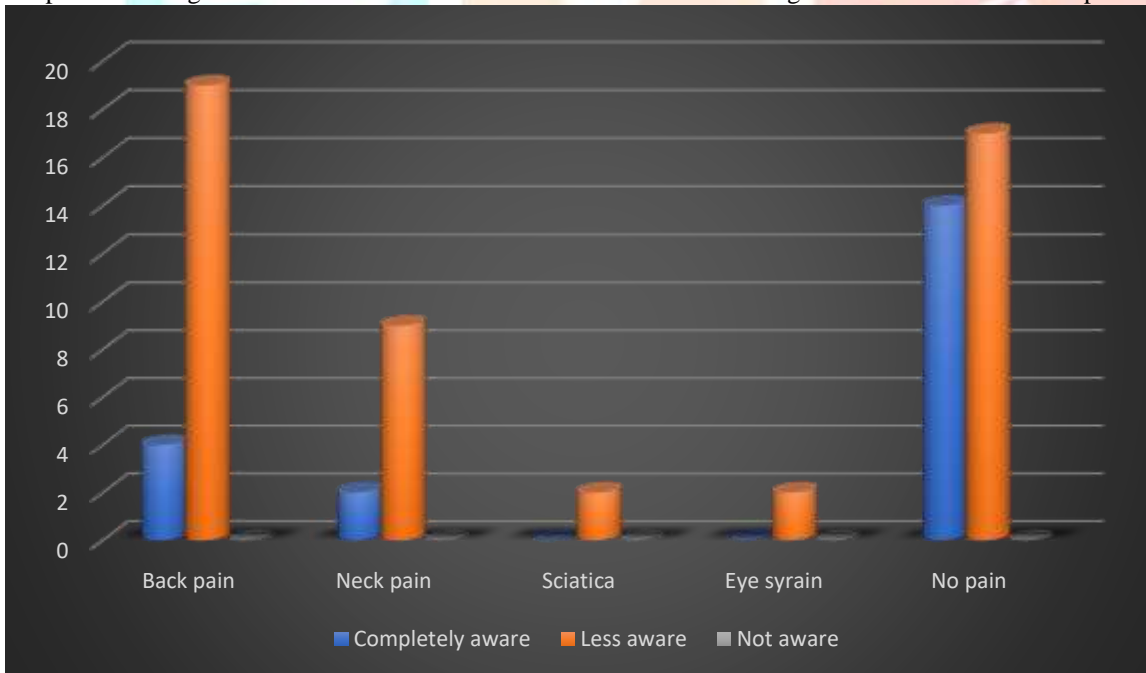
Inference

From the above mentioned table it is inferred that 50% of participants are having BMI more than normal

Table 4: Showing the association of musculoskeletal disorder with the ergonomic awareness of Computer Operators

Awareness level	Musculoskeletal Pain				
	Back pain	Neck pain	Sciatica	Eye strain	No pain
Completely aware	4	2	0	0	14
Less aware	19	9	2	2	17
Not aware	1	0	0	0	0

Graph 6: Showing the association of musculoskeletal disorder with the ergonomic awareness of Computer Operators



Inference

From the above table it is inferred that most of the participants having musculoskeletal pain are less aware

4. DISCUSSION:

The study has found that 28.57% of computer operators are completely aware about the ergonomics because of their greater number of working experience and having good ergonomic set up of computer workstation. While some have attended ergonomic programs held in their college and some were constantly searching about ergonomics on internet.

More than half (70%) are less aware because of their lesser number of working experiences, and having less idea about importance of using that equipment like document holder, foot rest, correct placement of monitor and about 20-20-20 rule. Because they were not informed about that, not searched on internet, not attended any ergonomic programs, and means mainly never bother about it. Many of the respondents have faced a problem due to wrong body postures like elevated shoulders, not taking frequent break to reduce fatigue, not changing body positions frequently and also not feeling comfortable and having pain while working.

There are problems in workstation design like primary work materials/input devices not placed in front, input devices like keyboard and mouse not placed at same height/level of keyboard

(34 %) back pain and (3%) Sciatica- not using lumbar support, foot rest, adjustable angle of backrest, and not taking short breaks (17%) Neck pain- not using document holder, incorrect position of monitor

Most (49%) having normal BMI as they were doing physical activities after job working hours and (47%) are overweight and (3%) are obese which relates with a greater number of working years as computer operators and heavy diet.

71% participants are less aware about ergonomics and out of which 47% having musculoskeletal pain due to prolonged incorrect sitting position

24% participants are less aware but having no pain because they were doing physical activities after job working hours and were following some domains of ergonomic like taking short breaks.

5. CONCLUSION:

This study concludes that more than half i.e. 70% of computer operators are less aware and 1.42% participants are not aware about ergonomic posture. While 28.57% of Computer operators are completely aware of ergonomics.

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REFERENCES:

- Bontrup C, Taylor WR, Fliesser M, Visscher R, Green T, Wippert PM, Zemp R. Low back pain and its relationship with sitting behaviour among sedentary office workers. *Applied ergonomics*. 2019 Nov 1;81:102894.
- Church TS, Thomas DM, Tudor-Locke C, Katzmarzyk PT, Earnest CP, Rodarte RQ, Martin CK, Blair SN, Bouchard C. Trends over 5 decades in US occupation-related physical activity and their associations with obesity. *PloSOne*. 2011;6:e19657. doi: 10.1371/journal.pone.0019657. [[PMC free article](#)] [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
- Chang BJ: Ergonomic benefits of surgical telescope systems: selection guidelines. *J Calif Dent Assoc*, 2002, 30: 161–169. [[PubMed](#)] [[Google Scholar](#)]
- Yoser AJ, Mito RS: Injury prevention for the practice of dentistry. *J Calif Dent Assoc*, 2002, 30: 170–176. [[PubMed](#)] [[Google Scholar](#)]
- Gupta A, Bhat M, Mohammed T, et al. : Ergonomics in dentistry. *Int J ClinPediatri Dent*, 2014, 7: 30–34. [[PMC free article](#)] [[PubMed](#)] [[Google Scholar](#)].
- Lagerström M, Hagberg M. Evaluation of a 3years education and training program: for nursing personnel at a Swedish hospital. *AAOHN journal*. 1997 Feb;45(2):83-92.
- Sirajudeen MS, Pillai PS. Test-retest reliability of a questionnaire to assess the ergonomic knowledge of computer professionals. *International Journal of Health and Rehabilitation Sciences*. 2015;4(4):239-43.
- Hopkins WG. Measures of reliability in sports medicine and science. *Sports medicine*. 2000 Jul 1;30(1):1-5.
- Mani K. Ergonomics Education for Office Computer Workers: An Evidence-Based Strategy. In *Anatomy, Posture, Prevalence, Pain, Treatment and Interventions of Musculoskeletal Disorders 2018 Jun 6*. IntechOpen
- Karsh BT, Moro FB, Smith MJ. The efficacy of workplace ergonomic interventions to control musculoskeletal disorders: a critical analysis of the peer-reviewed literature. *Theoretical Issues in Ergonomics Science*. 2001 Jan 1;2(1):23-96.
- van Uffelen JG, Wong J, Chau JY, van der Ploeg HP, Riphagen I, Gilson ND, Burton NW, Healy GN, Thorp AA, Clark BK, Gardiner PA, Dunstan DW, Bauman A, Owen N, Brown WJ. Occupational sitting and health risks: a systematic review. *Am J Prev Med*. 2010;39:379–388. doi: 10.1016/j.amepre.2010.05.024. [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]

12. Hu G, Tuomilehto J, Borodulin K, Jousilahti P. The joint associations of occupational, commuting, and leisure-time physical activity, and the Framingham risk score on the 10-year risk of coronary heart disease. *Eur Heart J*. 2007;28:492–498. doi: 10.1093/eurheartj/ehl475. [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
13. Hu G, Qiao Q, Silventoinen K, Eriksson JG, Jousilahti P, Lindström J, Valle TT, Nissinen A, Tuomilehto J. Occupational, commuting, and leisure-time physical activity in relation to risk for Type 2 diabetes in middle-aged Finnish men and women. *Diabetologia*. 2003;46:322–329. [[PubMed](#)] [[Google Scholar](#)]
14. Hu F, Li T, Colditz G, Willett W, Manson J. Television watching and other sedentary behaviors in relation to risk of obesity and type 2 diabetes mellitus in women. *JAMA*. 2003;289:1785–1791. doi: 10.1001/jama.289.14.1785. [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
15. Thune I, Brenn T, Lund E, Gaard M. Physical activity and the risk of breast cancer. *N Engl J Med*. 1997;336:1269–1275. doi: 10.1056/NEJM199705013361801. [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
16. Hu G, Eriksson J, Barengo N, Lakka TA, Valle TT, Nissinen A, Jousilahti P, Tuomilehto J. Occupational, commuting, and leisure-time physical activity in relation to total and cardiovascular mortality among Finnish subjects with type 2 diabetes. *Circulation*. 2004;110:666–673. doi: 10.1161/01.CIR.0000138102.23783.94. [[PubMed](#)] [[CrossRef](#)] [[Google Scholar](#)]
17. Dr. Elizabeth Chacko Ms. Rashmi Chetan. Awareness on computer ergonomics and prevention of MSD among the millennials in Bangalore. *Research Review International Journal of Multidisciplinary* 2018; 03(11): .
18. Chacko E. Awareness of Ergonomics, Ergonomics of Sitting Impact on Health Safety of Employees with reference to Banking Sector in Bangalore City.
19. Sirajudeen MS, Pillai PS, Vali GM. Assessment of knowledge of ergonomics among information technology professionals in India. *Age (Years)*. 2013;20(29):135.
20. Mahmud N, Kenny DT, Heard R, Mahmud N. Office ergonomics awareness and prevalence of musculoskeletal symptoms among office workers in the University Teknologi Malaysia: A Cross-Sectional Study. *Malaysian Journal of Medicine and Health Sciences*. 2011;1:8-29.
21. Shikdar AA, Al-Kindi MA. Office ergonomics: deficiencies in computer workstation design. *International Journal of Occupational Safety and Ergonomics*. 2007 Jan 1;13(2):215-23.

