Original Article

Study on Association between Daily Office Activity and Low Back Pain among the Desk Job Workers

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Abstract

Low back pain (LBP) is a common, disabling, and expensive condition. Sedentary work has become more common as we move into a highly-industrialized and highly robotic era. Low levels of physical activity can lead to LBP and have a negative impact on job satisfaction among desk job workers, the main objective of the study was to determine whether daily office activity is associated with low back pain. Within this study, desk job workers in Dhaka city were surveyed cross-sectionally. Randomly selected 280 respondents met the inclusion and exclusion criteria. Data was collected using a pretested, modified semi-structured questionnaire and entered into a database using SPSS software. It was found that 50.7% of respondents work in the office between 4 and 8 hours a day. Four out of five respondents didn't do exercise daily. Radiating pain was reported by 52.1% of respondents to this study. Also, most respondents use computers for about 3-6 hours per day. Desk job workers with LBP have an average age of 11-19 years and most have 11-19 years of experience. The majority of people work for 1 to 3 hours without taking a break. Respondents sat with a forward bending posture in 52.99% of all situations. Lumber support in chairs is rare among most people. A significant association has been found between gender and knowledge of negative impacts of using computers, gender and knowledge of negative impacts of long-term sitting, pain increasing time and lumber support in chair, type of pain and job experience, type of pain and trauma, type of pain and lumber support in chair, history of trauma and lumber support in chair; and the p-values were respectively 0.000, 0.018, 0.001, 0.038, 0.042, 0.004. In spite of a few clear associations between daily physical activity and low back pain among desk job workers, prospective studies are required to accurately evaluate each association. A clear definition of the causes and consequences of LBP will enable proper education and prevention methods to be developed.

Keywords: Office Activity, Low Back Pain, Desk Job, office ergonomic.

INTRODUCTION

The condition of low back pain (LBP) is highly prevalent, disabling, and expensive [1,2]. Having a negative impact on the world, it can induce a lack of enthusiasm, mental unrest, and physical discomfort or burden for its bearer [3]. Among the working population, LBP caused a significant amount of sick leave and early retirement [4]. The prevalence of low back pain (LBP) has increased among office workers [5]. The causes of disability adjusted life years (DALYs) associated with low back pain (LBP) are among the top four in the twenty five to forty nine year old age group [6]. Moreover, back pain has become one of the leading causes of lost productivity [7]. Physical inactivity can lead to lower back pain [8], and negatively affect job satisfaction [9]. It is one of the common health problems among full-time office employees that causes employees absenteeism from work [10].The most common occupational health problem in industrialized countries is low back pain, which accounts for 20% to 30% of all workers' compensation claims [11]. A prolonged sitting period combined with ungainly postures, or working in a forward bending position as often as possible, will increase the probability of LBP [12]. We are seeing an increase in low back pain occurrences in our country day by day and the problem of lower back pain (LBP) is extremely common[13]. Globally, lower back pain causes more disability than any other condition. There were 58.2 million disability adjusted life years (DALYs) in 1990 and 83 million in 2020 [14]. In both developed and developing countries, it is causing an enormous economic burden [15,16,17]. Doctors encounter LBP most often, with a prevalence of 9.4% worldwide [18]. Low back pain (LBP)

is estimated to affect 50 to 84 percent of people in their lifetime [19]. There is an important public health problem associated with low back pain (LBP) in all industrialized countries. About 40% of all compensation claims in the United States are based on this type of claim [20,21,22,23,24]. LBP affects more than one-quarter of the working population each year [25], with a lifetime prevalence of 60–80 percent [26], and numerous claims for long durations of more than 90 workdays lost [27]. Modern technology has made sitting the most common posture at work today [28]. The majority of workers in industrialized countries have sedentary jobs that require long periods of sitting [29]. A sitting posture is defined as an upright posture in which the head and trunk are vertical, the lower legs are bent at about 90° at the hips and knees, and the feet are firmly planted on the ground [30]. It is common for western workplace environments to be desk-based, with a high level of sitting and limited movement during work hours [31, 32, 33]. Considering that workplace physical activity interventions can have positive effects on musculoskeletal pain[34], anxiety and depression symptoms [35], and work performance outcomes [36], there is reason to be concerned about the lack of movement and physical activity among desk-based workers [37]. It has been suggested that increasing the PA levels of desk-based employees could have significant benefits for both workplaces and individuals [38].

METERIAL AND METHOD

A pretested, modified, interviewer administered, semi structured questionnaire was distributed to desk job workers in different banks in Dhaka city who complain of low back pain. Overall, 280 respondents were selected in both males and females, using a purposive sampling technique that was non-randomized. Using the computer for at least one year and above, collecting data, and analyzing it using descriptive statistics such as means, standard deviations, percentages, and Pearson's chi squared test to determine prevalence and association. A data base in the software package was used to enter the data into the computer. Social science statistical package (SPSS version 29). 0.5 was considered significant.

DATA ANALYSIS AND INTERPRETATION

Table 1: Distribution of respondents by daily working hours **(n=280)**

Daily working hours	Frequency	Percentage	Mean ± SD
1-4 hours	28	10%	**2.29 ± 0.640**
5-8 hours	142	50.70%	
More than 8 hours	110	39.30%	
Total	280	100%	

The table-1 revealed that the mean of daily working hours of respondents was 2.29 ± 0.640 and it was found that 10%, 50.7% and 39.3% of the respondents belonged to 1-4 hours, 4-8 hours and more than 8 hours. This table found that 4-8 hours daily worked respondents were more.

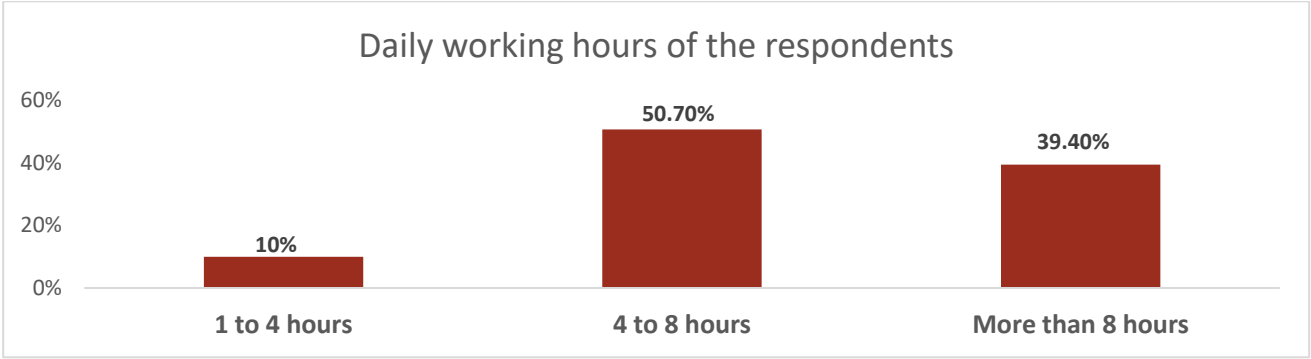

Figure 1: Distribution of respondents by Daily working hours.

Table 02: Distribution of respondents by nature of pain feel **(n=280)**

Nature of Pain	Frequency	Percentage	Mean ± SD
Tingling	38	13.60%	**2.34 ± 0.870**
Radiating	146	52.10%	
Numbness	60	21.40%	
Burning	36	12.90%	

Total	**280**	**100%**	

Table-02 revealed that the mean nature of pain of respondents was 2.34 ± 0.870 and it was found that 13.6%, 52.1%, 21.4% and 12.9% of the respondents belonged to tingling, radiating, numbness and burning natures of pain. This table found that radiating nature pain was more.

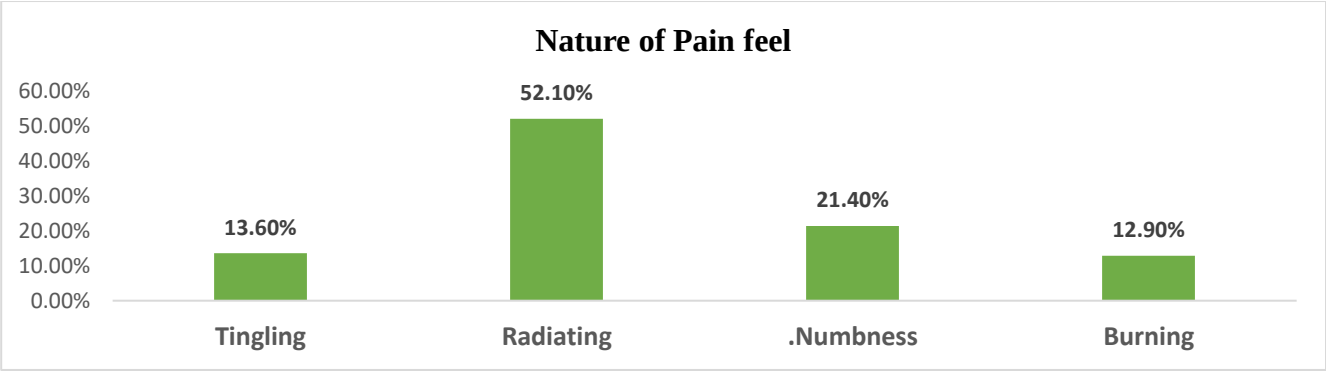

Figure 02: Distribution of respondents by nature of pain

Table 03: Distribution of respondents by job experience **(n=280)**

Job Experience	Frequency	Percentage	Mean ± SD
1to10 years	68	24.30%	**2.10 ± 0.761**
11 to 19 years	116	41.40%	
Above 20 years	96	34.30%	
Total	**280**	**100%**	

The Table-03 revealed that the mean of job experience was 2.10 ± 0.761 and it was found that 1 to 10 years, 11 to 19 years and above 20 years of the respondents belongs to 24.30%, 41.40%and 34.30% respectively. This table found that most of the respondent's job experience was 11-19 years.

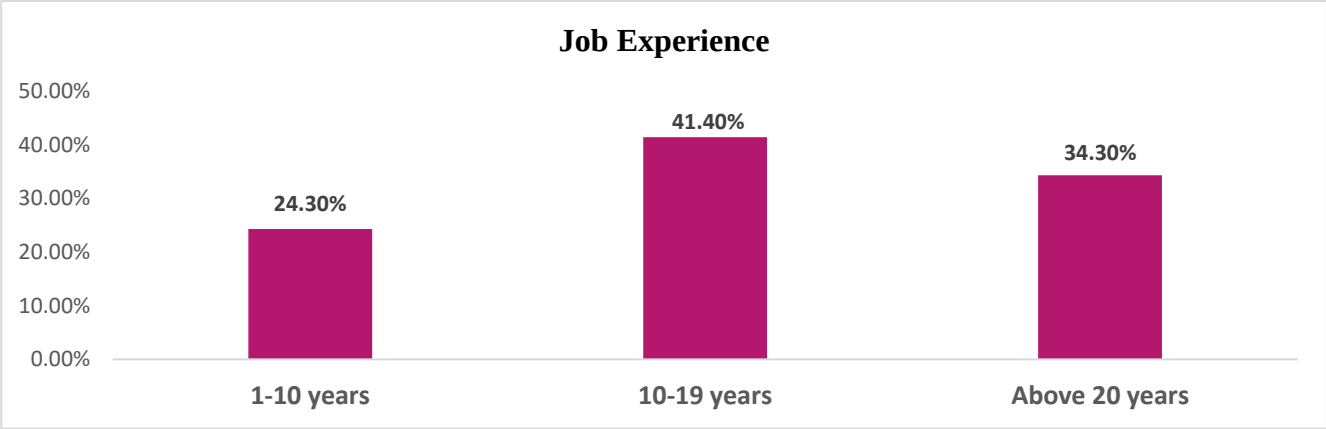

Figure 03: Distribution of respondents by job experience

Table 04: Distribution of respondents by working time in office without interval **(n=280)**

Working Time in office Without Interval	Frequency	Percentage	Mean ± SD
1-3 hours	120	42.90%	**1.69 ± 0.690**
3-6 hours	124	44.30%	
Above 6 hours	36	12.90%	
Total	**280**	**100%**	

Table-04 revealed that the mean of the working time without interval was 1.69 ± 0.690 and it was found that 1 to 3 hours, 3 to 6 hours and above 6 hours of the respondents belongs to 42.90%, 44.30% and 12.90% respectively. This table found that most of the respondents working time without interval was 3 to 6 hours.

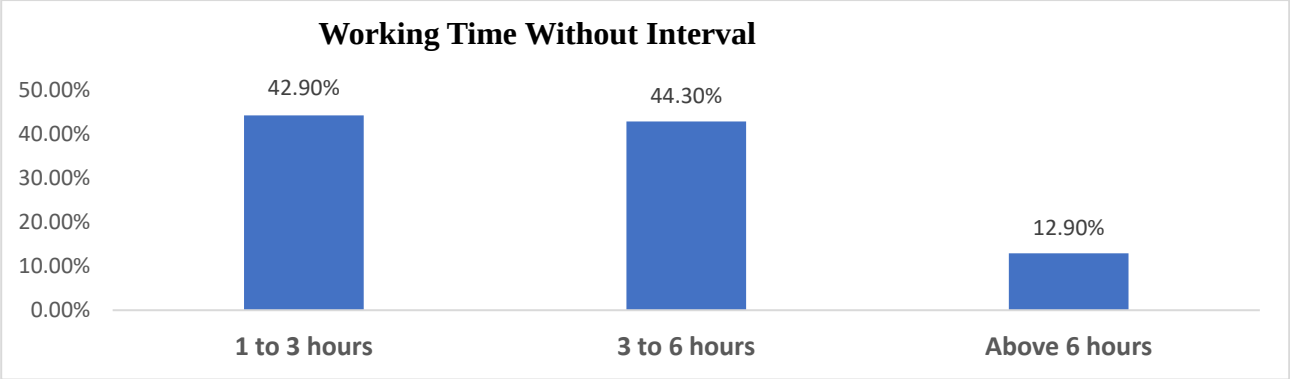

Figure 04: Distribution of respondents by working time without interval

Table 05: Distribution and association of respondents between pain increasing time and lumber support use in chair

Pain increase time	Lumber support use in chair		Total	P-value
	Yes	No		
Day	74	90	164	**0.001**
No	52	64	116	
Total	**126**	**154**	**280**	

P value obtained from Pearson Chi-square (x^2) test

Table 05 found that p-value was 0.001 which was less than 0.05 that was statically significant and showed association between pain increase time and lumber support use in chair.

Table 06: Distribution and association of respondents between type of pain and job experience

Type of Pain	Job Experience			Total	P-value
	1 to 10 years	11 to 19 years	Above 20 years		
Continuous	34	60	50	144	**0.038**
Intermittent	34	56	46	136	
Total	**68**	**166**	**96**	**280**	

P value obtained from Pearson Chi-square (x^2) test

Table 06 found that p-value was 0.038 which was less than 0.05 that was statically significant and showed association between type of pain and job experience.

DISCUSSION

This research took 280 samples and tries to find out the association between daily office activity and low back pain among the desk job workers. The mean age of the respondents were 46.60 ± 8.33, male was 45% and female was 55% near about same number of male female ration found by another article [39]. Average weight were 61-70 kg and height were 140 cm to 180 cm (4.8 inches to 5.9 inches). Married respondents were more near about 77%. Average office work were 4-8 hours. 50% respondents felt sometimes mental stress due to prolong duty hours this relation was near about similar another study [40]. Most of the respondents (41%) didn't continue regular physical exercise [41] due to long time office work and mental stress. 52.1% respondents complained low back pain in radiating in nature. More of the respondents (52%) felt moderate types of pain and pain gradually increase during the day specially working time that were near about (58.6%). Half of the respondents felt pain in continuously. In office work 41.4% of the respondents used computer average 3 to 6 hours per day. History of pain felt near about 6 to 9 months. Most of the respondent average job experience about 11 to 19 years and worked time without interval was 1 to 3 hours this findings was similar to another authors [42]. Forward banding posture was most common and similar to another findings [43] within the respondents and didn't used any lumber support not used lumber support in

chair. Most of the respondents used movable chair this finding is similar another's study [44]. Most of the people haven't knowledge about negative impact of using computer and long time sitting. This study found that, there are statistically significant association between gender and knowledge about negative impact of using computer. The p-value was 0.000 which was less than 0.05.There are significant association between gender and knowledge about negative impact of long time sitting. The p-value was 0.018. There are also significant association between pain increasing time and lumber support in chair and the p-value was 0.001. There are also significant association between type of pain and job experience and the p-value was 0.038. There are significant association between type of pain and history of trauma and the p-value was 0.002. There are significant association between type of pain and lumber support in chair and the p-value was 0.042. There are significant association between history of trauma and lumber support in chair and the p value was 0.004.

CONCLUSION

Having LBP causes severe long-term physical disability and creates huge societal costs. Approximately one-third of disability is caused by low back problems. Despite the fact that a few studies have clearly demonstrated an association between daily office activity and low back pain among desk workers, further prospective studies are needed to accurately evaluate each association. Proper education and prevention strategies can be developed after defining clear associations for LBP.

RECOMMENDATION

To prevent and minimize desk job workers' low back pain, the following recommendations are made based on the study findings. A recommendation for program implications is as follows:

Recommendation for program implication:

- Provide information about low back pain.
- Good posture should be maintained.
- Exercise regularly, such as back strengthening exercises.
- Whenever possible, avoid activities that aggravate back pain.
- Enhance flexibility.
- Minimize over weight.
- Further prospective studies are required to accurately evaluate each proposed association for LBP

COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

Throughout the process of developing the study concept, preparing the study materials, and interpreting the results, all authors collaborated. Analyzed and wrote the manuscript based on the collected data. In the final version of the manuscript, all authors read and approved the order of presentation of the authors.

REFERENCES

1. Alzahrani H, Mackey M, Stamatakis E, Zadro JR, Shirley D. The association between physical activity and low back pain: a systematic review and meta-analysis of observational studies. Sci Rep. 2019 Jun 3;9(1):8244. Available in URL : https://doi.org/10.1038/s41598-019-44664-8
2. Ingrid H, Ivar H, Knut H, John AZ. Physical activity level at work and risk of chronic low back pain: A follow-up in the Nord-Trondelag Health Study. PLOS ONE.2017;12(4): e0175086.Available in URL: https://journals.plos.org/plosone/article?id=10.1371/journal
3. Hanna F, Daas RN, El-Shareif TJ, Al-Marridi HH, Al-Rojoub ZM, Adegboye OA. The Relationship Between Sedentary Behavior, Back Pain, and Psychosocial Correlates Among University Employees. Front Public Health. 2019 Apr 9; 7:80. Available in URL: https://doi.org/10.3389/fpubh.2019
4. Lötters F, Burdorf A. Prognostic factors for duration of sickness absence due to musculoskeletal disorders. Clin J Pain. 2006 Feb;22(2):212-21. Available in URL: https://doi.org/10.1097/01.ajp
5. Carolin Bontrup, William R. Taylor, Michael Fliesser, Rosa Visscher, Tamara Green, Pia-Maria Wippert, Roland Zemp. Low back pain and its relationship with sitting behaviour among sedentary office workers.Applied Ergonomics.2019;81: 102894. Available in URL: https://www.sciencedirect.com/science/article/pii/S0003687019301279
6. GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2020 Oct 17; 396(10258):1204-1222. Available in URL: https://doi.org/10.1016/S0140-6736
7. Carregaro RL, Tottoli CR, Rodrigues DDS, Bosmans JE, da Silva EN, van Tulder M. Low back pain should be considered a health and research priority in Brazil: Lost productivity and healthcare costs between 2012 to 2016. PLoS One. 2020 Apr 1;15(4):e0230902. Available in URL : https://doi.org/10.1371/journal.pone.0230902
8. Shariat A. Musculoskeletal disorders and their relationship with physical activities among office workers: a review. Malaysian J Public Health Med.

2016;16(1):62–74. Available in URL: http://www.mjphm.org.my/mjphm/
9. Montakarn C, Nuttika N. Physical activity levels and prevalence of low back pain in Thai call-center operators. Indian J Occup Environ Med. 2016 Sep-Dec; 20 (3):125-128. Available in URL: https://doi.org/10.4103/0019-5278.203136
10. Loghmani A, Golshiri P, Zamani A, Kheirmand M, Jafari N. Musculoskeletal symptoms and job satisfaction among office-workers: a cross-sectional study from Iran. Acta Med Acad. 2013;42(1):46-54. Available in URL: https://doi.org/10.5644/ama2006-124.7010
11. Mohammad A, Gias U. Ahsan, Ahmed H. Prevalence and associated occupational factors for low back pain among the bank employees in Dhaka City. Journal of Occupational Health.2019. Available in URL: https://www.medrxiv.org/content/10.1101/19012328v1.full
12. Kerr MS, Frank JW, Shannon HS, Norman RW, Wells RP, Neumann WP, Bombardier C; Ontario Universities Back Pain Study Group. Biomechanical and psychosocial risk factors for low back pain at work. Am J Public Health. 2001 Jul;91 (7):1069-75. Available in URL: https://doi.org/10.2105/ajph.91.7.1069
13. Tofayel A, Prevalence of low back pain in long time sitting position among the office worker, D Space Repository. 2019. Available in URL: http://library.crp-bangladesh.org:8080
14. Andersson GB. Epidemiology of low back pain. Acta Orthop Scand Suppl. 1998 Jun;281:28-31. Abailable in URL: https://www.tandfonline.com/doi/pdf/10
15. Hoy D, March L, Brooks P, Blyth F, Woolf A, Bain C, Williams G, Smith E, Vos T, Barendregt J, Murray C, Burstein R, Buchbinder R. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis. 2014 Jun;73 (6):968-74.Abailable in URL: https://ard.bmj.com/content/73/6/968
16. Steenstra IA, Verbeek JH, Heymans MW, Bongers PM. Prognostic factors for duration of sick leave in patients sick listed with acute low back pain: a systematic review of the literature. Occup Environ Med. 2005 Dec;62 (12):851-60. Available in URL: https://oem.bmj.com/content/62/12/85
17. Kent PM, Keating JL. The epidemiology of low back pain in primary care. Chiropr Osteopat. 2005 Jul 26; 13:13. Available in URL: https://chiromt.biomedcentral.com/articles/10.1186
18. Thelin A, Holmberg S, Thelin N. Functioning in neck and low back pain from a 12-year perspective: a prospective population-based study. J Rehabil Med. 2008 Jul;40(7):555-61. Available in URL:https://doi.org/10.2340/16501977-020
19. Hoy D, March L, Brooks P, Blyth F, Woolf A, Bain C, Williams G, Smith E, Vos T, Barendregt J, Murray C, Burstein R, Buchbinder R. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis. 2014 Jun;73(6):968-74. Available in URL: https://pubmed.ncbi.nlm.nih.gov/24665116/
20. Buckle PW, Devereux JJ. The nature of work-related neck and upper limb musculoskeletal disorders. Appl Ergon. 2002 May; 33(3):207-17. Available in URL: https://doi.org/10.1016/s0003-6870(02)00014
21. Frymoyer JW, Cats-Baril WL. An overview of the incidences and costs of low back pain. Orthop Clin North Am. 1991 Apr;22(2):263-71. Available in URL: https://pubmed.ncbi.nlm.nih.gov/1826550
22. Guo HR, Tanaka S, Cameron LL, Seligman PJ, Behrens VJ, Ger J, Wild DK, Putz-Anderson V. Back pain among workers in the United States: national estimates and workers at high risk. Am J Ind Med. 1995 Nov;28(5):591-602. Available in URL: https://doi.org/10.1002/ajim.4700280504
23. Lu JL. Risk factors for low back pain among Filipino manufacturing workers and their anthropometric measurements. Appl Occup Environ Hyg. 2003 Mar;18(3):170-6. Available in URL: https://doi.org/10.1080/10473220301349
24. Maniadakis N, Gray A. The economic burden of back pain in the UK. Pain. 2000 Jan;84 (1):95-103. Available in URL: https://doi.org/10.1016/S0304-3959(99)00187
25. Webster BS, Snook S. The cost of compensable low back pain. J Occup Med. 1990;32:13–16. Available in URL: https://doi.org/10.1097/00043764-199001000
26. Lee P, Helewa A, Goldsmith CH, Smythe HA, Stitt LW. Low back pain: prevalence and risk factors in an industrial setting. J Rheumatol. 2001 Feb;28(2):346-5. Available in URL: https://pubmed.ncbi.nlm.nih.gov/11246674
27. Hartvigsen J, Leboeuf-Yde C, Lings S, Corder EH. Is sitting-while-at-work associated with low back pain? A systematic, critical literature review. Scand J Public Health. 2000 Sep;28(3):230-9. Available in URL: https://scholar.google.com/scholar_lookup
28. Murphy PL, Volinn E. Is occupational low back pain on the rise? Spine (Phila Pa 1976). 1999 Apr 1;24(7):691-7. Available in URL: https://doi.org/10.1097/00007632-199904010-00015
29. Li G, Haslegrave CM. Seated work postures for manual, visual and combined tasks. Ergonomics. 1999 Aug;42(8):1060-86. Available in URL: https://doi.org/10.1080/00140139918
30. Lis AM, Black KM, Korn H, Nordin M. Association between sitting and occupational LBP. Eur Spine J. 2007 Feb;16(2):283-98. Avaiable in URL: https://api.taylorfrancis.com/content/book
31. Dainoff MJ (1999) Ergonomics of seating and chairs. In: Salvendy C (ed) Handbook of human factors and ergonomics, chap. 97. CRC Press, Boca Raton. URL: https://kuliahdianmardi.files.wordpress.com/2016/03/
32. Ryde GC, Brown HE, Gilson ND, Brown WJ. Are we chained to our desks? Describing desk-based sitting using a novel measure of occupational sitting. J Phys Act Health. 2014 Sep;11(7):1318-23. Avaiable in URL: https://doi.org/10.1123/jpah.2012-0480
33. Hadgraft NT, Healy GN, Owen N, Winkler EA, Lynch BM, Sethi P, Eakin EG, Moodie M, LaMontagne AD, Wiesner G, Willenberg L, Dunstan DW. Office workers' objectively assessed total and prolonged sitting time: Individual-level correlates and worksite variations. Prev Med Rep. 2016 Jun 15;4:184-91. Available in URL: https://doi.org/10.1016/j.pmedr.2016.06.011
34. Clemes SA, O'Connell SE, Edwardson CL. Office workers' objectively measured sedentary behavior and physical activity during and outside working hours. J Occup Environ Med. 2014 Mar;56(3):298-303. Available in URL: https://pubmed.ncbi.nlm.nih.gov/24603203/
35. Moreira-Silva I, Santos R, Abreu S, Mota J. The effect of a physical activity program on decreasing physical disability indicated by musculoskeletal pain and related symptoms among workers: a pilot study. Int J Occup Saf Ergon. 2014;20 (1):55-64. Available in URL https://doi.org/10.1080/10803548.2014.11077028
36. Moreira-Silva I, Teixeira PM, Santos R, Abreu S, Moreira C, Mota J. The Effects of Workplace Physical Activity Programs on Musculoskeletal Pain: A Systematic Review and Meta-Analysis. Workplace Health Saf. 2016 May;64(5):210-22. Available in URL: https://doi.org/10.1177/216507991662968
37. Chu AH, Koh D, Moy FM, Müller-Riemenschneider F. Do workplace physical activity interventions improve mental health outcomes? Occup Med (Lond). 2014 Jun;64(4):235-45. Available in URL: https://doi.org/10.1093/occmed/kqu04
38. Pronk NP, Martinson B, Kessler RC, Beck AL, Simon GE, Wang P. The association between work performance and physical activity, cardiorespiratory fitness, and obesity. J Occup Environ Med. 2004 Jan;46(1):19-25. Available in URL: https://pubmed.ncbi.nlm.nih.gov/14724474/
39. Ryde, G.C., Atkinson, P., Stead, M. et al. Physical activity in paid work time for desk-based employees: a qualitative study of employers' and employees' perspectives. BMC Public Health 20, 460 (2020). https://doi.org/10.1186/s12889-020-08580-1
40. Kayihan G. Relationship between daily physical activity level and low back pain in young, female desk-job workers. Int J Occup Med Environ Health. 2014 Oct; 27(5):863-70. Available in URL: https://pubmed.ncbi.nlm.nih.gov/25261333/
41. Filza F. Dhoni A G, Siti M, Yunia H. Physical Activity and Low Back Pain in Medical Student. Ahmad Dahlan Medical Journal.2021;2 (2). Available in URL: http://journal2.uad.ac.id/index.php

42. Sinkule E, A review of the possible effects of physical activity on low-back pain, 201 4 Master Essay, University of Pittsburgh. Available in URL: http://d-scholarship.pitt.edu/23841/
43. Wafa B; Khouloud I; Sanaa A; Samar R; Amal A H; Pascale S. Prevalence and Risk Factors of Low Back Pain among Office Workers in Lebanon. International Journal of Occupational Hygiene.2015;7:45-52. Available in URL:https://ijoh.tums.ac.ir
44. Carolin B, William R. T, Michael F, Rosa V, Tamara G,Pia-M W, Roland Z. Low back pain and its relationship with sitting behaviour among sedentary office workers. Elsevier. 2019;81: 102894. Available in URL: https://doi.org/10.1016/j.apergo.2019.102894