mutiara medika
Jurnal Kedokteran dan Kesehatan
Vol 24 No 1 Page 39-47, January 2024

Mutiara Medika: Jurnal Kedokteran dan Kesehatan
http://journal.umy.ac.id/index.php/mm

Working Posture and Low Back Pain among Female Home Convection Workers: A Cross-Sectional Study

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DATE OF ARTICLE:
Received: 28 May 2023
Reviewed: 20 Oct 2023
Revised: 03 Jan 2024
Accepted: 12 Jan 2024

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DOI:
10.18196/mmjkk.v24i1.20337

TYPE OF ARTICLE:
Research

Abstract: Low back pain (LBP) is a significant contributor to global musculoskeletal disorders, often associated with uncomfortable working postures prevalent among home convection workers. This study investigates the correlation between work posture and LBP incidence in 36 female home convection workers aged 20-55, selected through total sampling. This study employed an analytical observational design with a cross-sectional approach. Conducted from March 31 to June 17, 2023, in Sragen, the study utilized RULA with an ordinal scale for posture analysis and the Modified ODI questionnaire, also employing an ordinal scale for LBP measurement. Results revealed 52.78% with low-risk and 47.22% with high-risk postures. Most LBP cases were mild (35 individuals). Kendall's tau correlation test showed no significant relationship between work posture and LBP incidence (p-value = 0.175, $p > 0.05$). This research concluded that there was no significant relationship between work posture and the incidence of LBP among female home construction workers. However, no significant correlation was found; 47.22% faced a high risk of other musculoskeletal disorders, highlighting the need for immediate posture changes among these workers.

Keywords: low back pain; working posture; home convection worker

INTRODUCTION

Low Back Pain (LBP) is one of the Musculoskeletal Disorders (MSDs) that workers often complain about.[1] According to the World Health Organization (WHO), in 2022, LBP will be the main contributor to cases of musculoskeletal complaints in the world. Low back pain is a complaint of pain in the lower back area, which can cause problems with the muscles, nerves, spine, or other structures in the lower back area.[2] Low back pain can be caused by unnatural positions such as sitting, bending, squatting, or lifting for a long time.[3] Static positions can cause pressure on certain parts of the body, causing pain in those parts.[4]

According to the Ministry of Health, in 2022, at least 60-80% of the world's population will experience at least one attack of LBP. In 2019, there were 568.4 million cases of LBP in the world, with a prevalence of 6,972.5 cases per 100,000 population.[5] According to the 2018 Indonesian Basic Health Research (Riskesdas) report, the prevalence rate of musculoskeletal disorders in Indonesia is as high as 11.9% diagnosed by health workers and 24.7% based on symptoms or diagnosis. The exact number of LBP cases in Indonesia is not yet known, but it is estimated that the prevalence of cases is 7.6% to 37%.[6]

Low back pain can be caused by unnatural sitting posture or awkward posture for a long time.[2] Unnatural postures are often found in industrial workers, including the convection industry.[7] A convection company is an industry that produces ready-made clothing such as jackets, t-shirts, uniforms, trousers, hats, and so on.[8] In a convection company, there are several divisions, including sewing, cutting, finishing, and helper departments. Convection employees' work activities include sewing, cutting, and making patterns.[7] Working posture when sewing tends to be monotonous and repetitive.[9] Sewing activities generally involve a bent sitting position with the head down.[10] Bad posture, such as sitting hunched over or excessive extension of the spine, can add a large mechanical load to the lower back. It causes increased pressure on the intervertebral discs, causing complaints of LBP.[11]

Based on the results of research conducted by Bontrup et al. (2019), it was stated that there is a relationship between static sitting positions and the incidence of chronic LBP in call centre company employees in Germany.[12] The same results were obtained in research by Novianah et al. (2014), namely that there is a significant influence between the sitting working position and complaints of LBP among pedicab drivers in the Tangerang area.[4] Meanwhile, research conducted by Patrianingrum et al. (2015) stated that there was no significant relationship between static work postures and LBP complaints in the anesthesiology and intensive therapy work environment at Dr. Hospital. Hasan Sadikin Bandung.[13] Results of research conducted by Cahyani et al. (2020) also stated that there is no significant relationship between the risk of work posture and LBP in library employees.[14]

Research related to the relationship between work posture and the incidence of LBP in tailors was conducted by Syaputra et al. (2022), with the results showing that there is a relationship between work posture and LBP complaints.[15] The instruments used in this research were the Rapid Entire Body Assessment (REBA) to assess the risk of work posture and the Nordic Body Map (NBM) questionnaire to measure LBP complaints. Researchers are interested in research using different measuring instruments. Work posture was assessed using the Rapid Upper Limb Assessment (RULA), which is an assessment used to assess work posture in jobs that are dominated by upper limb movements.[16] Meanwhile, the incidence of LBP was measured using the Modified Oswestry Low Back Pain Disability questionnaire. A specific index (ODI) measures the level of LBP complaints.

Based on previous research, there are several contradictory results, and there are differences in measuring instruments, so researchers are interested in examining the relationship between work posture and the incidence of low back pain among female home convection workers. This research can be used to improve work posture and reduce the incidence of low back pain so as to improve the work quality of home construction workers.

MATERIAL AND METHOD

This research adopts a quantitative approach, specifically employing an analytical observational design where the researcher observes specific phenomena to understand the underlying reasons and mechanisms. The research design is cross-sectional, involving the collection of variable data at a single point in time. The study was conducted from March 31 to June 17, 2023, at three home-based convections in Sragen. The population for this study comprised all employees working in the sewing and finishing departments of these three convections, with the inclusion criteria being age <55 years and no history of lower back pain complaints before working in home convections. The research utilized a total sampling technique, and the total population included 37 female employees, with 26 from the sewing department and 11 from the finishing department, within the age range of 20-55 years.

The independent variable in this study was the work posture of convection employees, which was analyzed using the Rapid Upper Limb Assessment (RULA). The RULA is used to evaluate work posture in workers with a sedentary working position and is dominated by the movement of the upper body parts such as shoulders, hands, elbows, arms, neck, and back.[16] The research scale of the RULA measuring instrument is categorical ordinal, namely, the results of the assessment in the form of scores categorized into low, medium, high, and very high risk. Collecting work posture data begins with documenting the employee's posture while working and then measuring angles using the angle meter application. The results of the angle measurements are then analyzed using RULA. Examples of work posture analysis with RULA can be seen in Figures 1 and 2.

The dependent variable in this study was the incidence of low back pain, which was measured using the Indonesian version of the Modified Oswestry Low Back Pain Disability Index (ODI) questionnaire. Research conducted by Wahyuddin (2016) states that the Indonesian version of the ODI Questionnaire is valid and reliable for use.[18] The ODI Questionnaire assesses the level of LBP felt by respondents in carrying out daily activities. The questionnaire contains 10 questions with 6 answer choices for each question. Answer choices have an assessment score of 0 to 5. Greater assessment scores indicate an increase in LBP complaints felt by the respondent. The relationship between the two variables was analyzed using the non-parametric Kendall's tau correlation test. Additional analysis to determine the relationship between work posture and work experience is conducted using Fisher's test. This research has passed the ethical feasibility test at RSUD dr. Moewardi Surakarta with certificate number 414 / III / HREC / 2023.

Figure 1. Angle Measurement

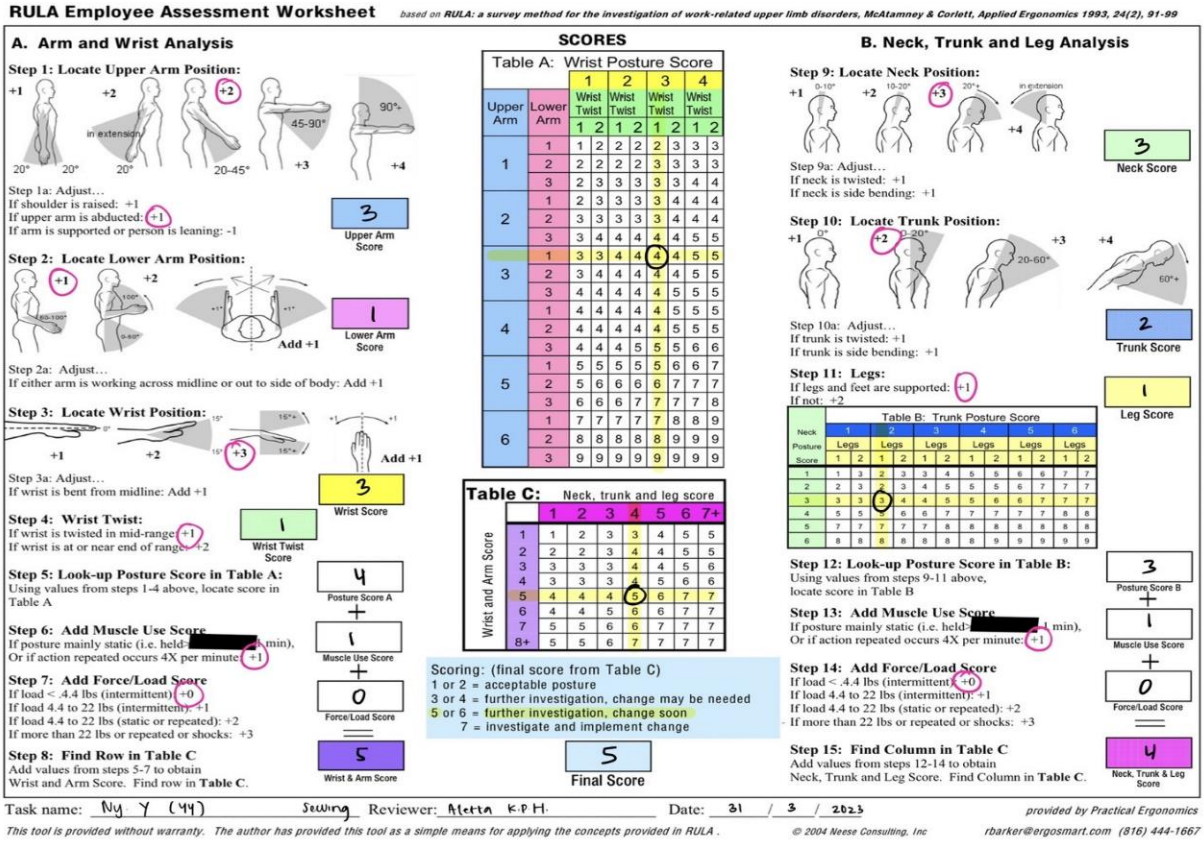

Figure 2. Work Posture Assessment with RULA

RESULT

The research population consisted of 37 individuals, comprising 26 employees from the sewing department and 11 employees from the finishing department. One employee was excluded from the study

due to a pre-existing history of lower back complaints before joining the convection. Consequently, the final number of research samples remained at 36 employees.

The majority of research respondents were in the 41-55 years age category. The largest number of respondents were sewing department employees, with a total of 25 people, which is 14 more than finishing department employees. The majority of respondents' work experience was ≥5 years, with a total of 23 people. Detailed characteristics of respondents can be seen in Table 1.

Table 1. Subject Characteristics

Characteristic	Frequency	Percentage
Age (Year)		
20-30	7	19.44%
31-40	7	19.44%
41-55	22	61.12%
Work Section		
Sewing	25	69.44%
Finishing	11	30.56%
Work Experience		
<5 years	13	36.11%
≥5 years	23	63.89%

Based on the RULA analysis of work posture, none of the employees exhibited low-risk or very high-risk work postures. However, the number of individuals with medium-risk and high-risk work postures was nearly identical, with 19 individuals categorized as medium risk and 17 as high risk. Among respondents with medium-risk work postures, 13 were from the sewing department (36.11%), and 6 were from the finishing department (16.67%). On the other hand, high-risk work postures were observed in 12 employees from the sewing department (33.33%) and 5 from the finishing department (13.89%). Detailed assessment results based on work sections can be observed in Figure 3.

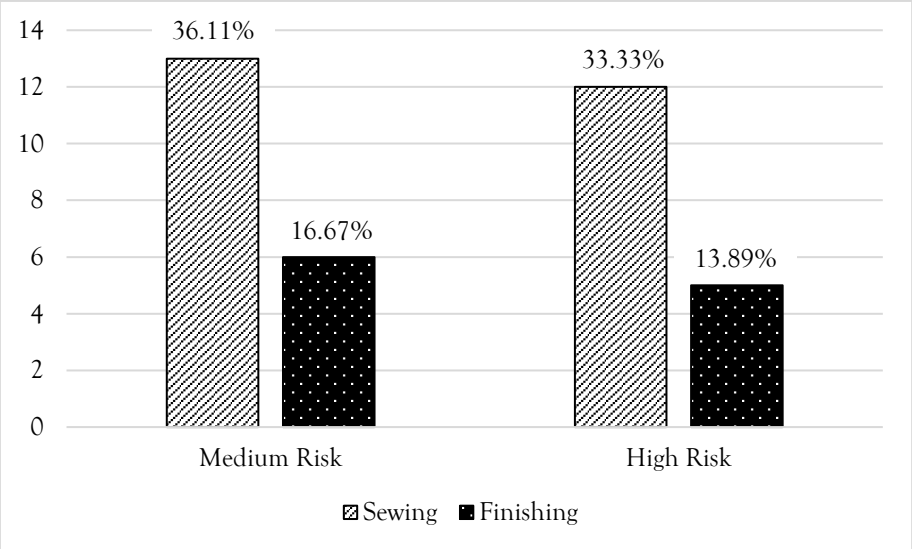

Figure 3. Work Posture based on Work Section

According to Table 2, the results indicate that the majority of respondents with medium-risk work postures had work experience of ≥5 years, comprising 12 individuals out of a total of 19. Similarly, respondents with high-risk work postures were predominantly those with ≥5 years of service, totaling 11 individuals out of 17. Further analysis regarding moderate and high-risk work postures in relation to work experience was conducted. Bivariate analysis using the Fisher's test yielded a p-value = 1.000, indicating no significant relationship between moderate and high-risk work postures and work experience.

Table 2. The RULA Score based on Work Experience

RULA	<5 Years	≥5 Years	Total
Medium Risk	7	12	19
High Risk	6	11	17
Total	13	23	36

The results from the ODI questionnaire revealed that nearly all respondents fell into the mild disability category, totaling 34 individuals. Meanwhile, the number of respondents with moderate and severe disabilities was consistent at 1 person each. Notably, none of the respondents reported very severe disabilities preventing them from carrying out activities.

In the 41-55 age category, most respondents reported mild disability, with 20 individuals out of a total of 22. The number of respondents in this age category experiencing moderate and severe disabilities was 1 person each. Additionally, all respondents in the 20-30 and 31-40 age categories reported mild disability due to low back pain, each totaling 7 individuals.

Among sewing department employees, the majority reported mild disability, with 23 out of 25 employees (94.44%). Similarly, an equal number of sewing department employees experienced moderate and severe disabilities, each accounting for 1 person. Conversely, all 11 finishing department employees (30.55%) reported mild disabilities due to low back pain. Further details on the assessment of low back pain incidence based on work sections can be found in Figure 4.

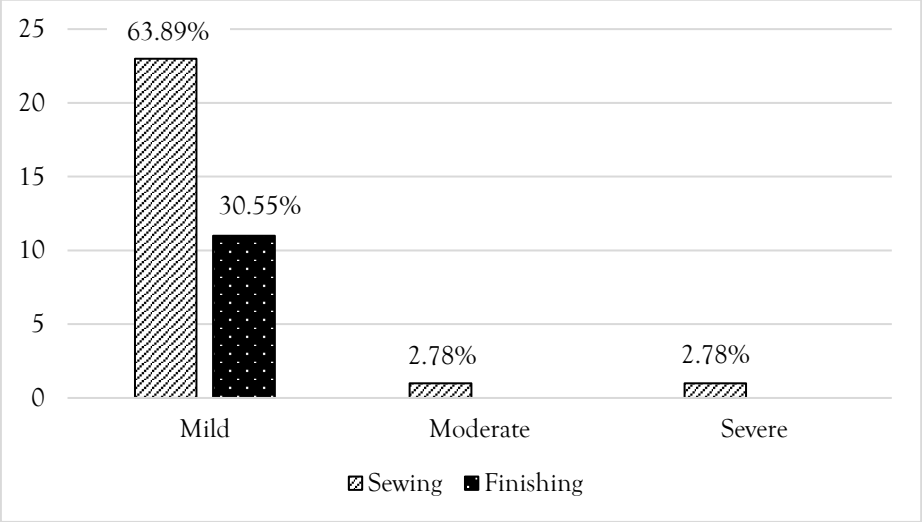

Figure 4. Low Back Pain based on Work Section

Respondents exhibiting mild disabilities were predominantly from the category of work experience ≥5 years, totaling 22 individuals out of 34 respondents. Meanwhile, among the 13 respondents with <5 years of service, 12 individuals experienced mild disability, while 1 person reported moderate disability due to low back pain.

Based on the results of bivariate analysis using Kendall's Tau correlation test, it was determined that the relationship between work posture and the incidence of low back pain yielded a p-value = 0.175. This result indicated that there was no significant relationship between work posture and the incidence of low back pain.

DISCUSSION

The results of the bivariate analysis in this study showed that work posture and the incidence of low back pain did not have a significant relationship with a p-value of >0.05 (p = 0.175), indicating it is not in accordance with the hypothesis of this study. The results of this research are in line with research conducted by Cahyani et al. in 2020 with 22 Jember University library employees as respondents. Research by Cahyani et al. showed a p-value = 0.916, indicating there was no significant relationship between the risk of work posture and the level of low back pain complaints. The working posture of library employees is similar to that of convection employees, namely, a sitting position that is held for a long time. Meanwhile, the difference with

this research lies in the research measuring instruments. The work posture risk measurement tool in Cahyani et al.'s research used the Modified Quick Exposure Check (QEC) while LBP was measured using the LBP screening sheet.[14]

In another research conducted by Kusumaningrum et al. in 2021, 198 medical students also showed the same results. The research results of Kusumaningrum et al. stated that there is no relationship between sitting posture and complaints of low back pain with a p-value = 0.413. Kusumaningrum et al.'s research sample is students who have a sitting posture for a certain time during learning. It is the same as convection employees who have a working posture of sitting for a long time, thereby increasing the risk of LBP. Kusumaningrum et al.'s research instrument in measuring work posture and LBP utilized a questionnaire. The questionnaire did not specifically analyze the risk of posture and the level of low back pain complaints.[2]

Different results were obtained in research conducted by Devira et al. in 2021. Research by Devira et al. conducted on tailors in Nagari Simpang Kapuak, Limapuluh Kota Regency, obtained a p-value = 0.006, indicating there is a significant relationship between work posture and the incidence of low back pain. Devira et al.'s research sample is an individual tailoring business, which is a home industry. These businesses tend to pay less attention to ergonomics and employment principles. In the research area of Devira et al., consumer demand for tailors is relatively high. Tailors only prioritize production targets and wages without prioritizing work health and safety. Based on research data from Devira et al. (2021), as many as 67.4% of seamstresses work for >8 hours a day, which increases the risk of LBP.[19]

Complaints of low back pain can be caused by unnatural sitting posture or awkward posture held for a long time.[2] Unnatural postures such as sitting hunched over and excessive extension of the spine can cause increased mechanical load in the lower back area. It can cause increased pressure on the intervertebral discs, which will manifest as complaints of low back pain.[11] However, in this study, the results were not significant between working posture and the incidence of LBP. It can be caused by several factors, namely the workload of home convection and the multifactorial causes of LBP. This research was conducted on employees in the sewing and finishing department of home convection. Home convections tend to have lighter workloads and job demands compared to garment companies. In-home convection, work tends to be done based on consumer demand, and the number of products made is not as large as a garment company. It allows workers to have shorter working hours and more rest time. By resting, the muscles will relax, thereby reducing the risk of low back pain.[11]

Unnatural posture is not the only factor causing low back pain and does not by itself cause complaints of low back pain. Sedentary sitting positions carried out for more than half the working day and accompanied by whole body vibration (WBV), and unnatural positions can increase the risk of low back pain 4 times higher.[13] In addition, The cause of low back pain is multifactorial namely it can be caused by disorders of the muscles, bones, and nervous system. Gender, age, psychological factors, work duration, work period, and work area design can also influence low back pain.[20] In this study, the respondent's working position was not accompanied by whole body vibration and sitting duration; respondents did not stay longer than half a working day. It allows respondents to have a lower risk of LBP.

Research by Syaputra et al. (2022), who analyzed individual factors with the incidence of low back pain, found that work duration was the factor with the highest level of significance, namely with a p-value = 0.00.[15] Excessive work duration is one of the factors triggers for low back pain. The recommended duration to achieve work efficiency is around 6-8 hours a day. Working for long periods without rest or stretching can cause disorders in the body, one of which is disorders of the musculoskeletal system. Sitting for long periods can cause stiffness in the spine and increased pressure on the intervertebral discs. This triggers work fatigue, work-related illnesses, and work accidents, which can cause a decrease in work productivity.[21] The work duration of respondents in this study ranges from 6 to 8 hours with a rest period of 1 hour. This duration is included in the recommended duration to achieve work effectiveness, thereby reducing the risk of complaints while working.

Another factor that influences the incidence of low back pain is the work period. The risk of low back pain increases in someone with a working period of >5 years.[22] An increase in the working period causes the load on the muscles and spine to increase over a long time. The longer the working period is, the more the intervertebral disc cavity will experience permanent narrowing so that the spine will experience degeneration.[23,24] In this study, almost all respondents with a working period of ≥5 years experienced mild disability. The results of the Fisher's test found that there is no significance between the risk of work posture and work experience. It is attributed to the fact that work-in-home convections tend to be seasonal, or it is only performed when there is demand from consumers. This flexibility allows convection workers to have more rest time, thereby reducing the risk of low back pain (LBP).[11] Apart from that, in daily life, a person does

not hold a sedentary working position for a long time. Complaints of low back pain are usually felt at the beginning of work and will disappear when resting. This condition causes a person to consider pain as a normal thing, so the longer the work period is, the more pain will be considered a normal thing.[25]

The prevalence of low back pain occurs more often in females than males. It is caused by the interaction between biological, psychological, and social factors. In addition, females have a higher pain sensitivity, so musculoskeletal complaints are more frequently reported by females than males. Other factors such as pregnancy, birth history, psychological conditions when raising children, and increased body weight during perimenopause also influence the incidence of low back pain in females.[26] As people get older, the process of narrowing of the intervertebral discs occurs more quickly in females than males. It is influenced by a decrease in estrogen levels in females who have gone through menopause.[27] In this study, all respondents were female. The majority of female respondents experienced mild disability due to LBP. It can be caused by work demands, which tend to be low. Thus, when working, the back muscles tend to be more relaxed.[11]

The incidence of low back pain is generally reported by patients in the age range of 25-65 years. LBP complaints usually appear around the age of 35 years.[28] Low back pain can occur in all age groups, but the prevalence increases at the age of 60, namely >60%.[29] At the age of 60 years, resilience and muscle strength will decrease, thereby increasing the risk of muscle complaints.[28] Low back pain can also occur among teenagers aged 20-24 years who have an active social life.[30] In this study, the results showed that the majority of respondents in the 41-55-year age category experienced mild disability due to LBP. It can be caused by collecting data on the incidence of LBP using a questionnaire where each person has a different pain intensity, so it is subjective. Apart from that, a study states that the pain threshold will increase with age.[31] Age and gender also do not by themselves affect the intensity of low back pain because the degenerative process does not always correlate with the level of pain experienced by a person.[27]

The prevalence of high-risk working postures in this study is 47.22%, with only a difference of 2 individuals having a moderate-risk working posture. Further investigation is required for those with a moderate-risk working posture, as there may be a need for posture adjustments. On the other hand, immediate changes are essential for those with a high-risk working posture. Without modifications, these working postures can lead to various musculoskeletal disorders.[32] It indicates that ergonomic principles have not been fully considered in the garment industry companies studied. This prevalence can serve as a reference for the government to establish stricter policies regarding the implementation of ergonomics in health and occupational safety. Consequently, garment industry companies can pay more attention to the occupational health of their employees. It can begin by designing the work environment in accordance with ergonomic principles, such as providing chairs with backrests, adjusting the height of chairs and desks to prevent workers from hunching over, and incorporating regular muscle stretching sessions lasting 5-10 minutes during work breaks.[33]

The limitation of this research lies in the fact that the diagnosis of low back pain relies solely on a questionnaire, making the results subjective. Additionally, the causes of low back pain are multifactorial, not solely attributed to unnatural postures. However, this study can serve as a reference for improving work posture in accordance with ergonomic principles. Further research is recommended to diagnose lower back pain through physical examinations to attain more objective results and to conduct additional investigations into other risk factors contributing to lower back pain. Suggestions for home convection could include implementing ergonomic principles in the workspace, monitoring working conditions, and conducting evaluations through health surveys for workers.

CONCLUSION

There is no significant relationship between work posture and the incidence of low back pain among female home convection workers. However, 47.22% of workers face a high risk of experiencing other musculoskeletal disorders, necessitating an immediate posture change.

ACKNOWLEDGEMENT

The author would like to express gratitude to all individuals and entities involved in the research and preparation of this manuscript. Special thanks to home convection workers for participating as research

respondents. The author extends appreciation to all parties, who, due to limitations, cannot be mentioned individually, for their invaluable support in this research.

CONFLICT OF INTEREST

The authors report no potential conflicts of interest.

REFERENCES

1. Putri RO, Jayanti S, Kurniawan B. Hubungan Postur Kerja dan Durasi Kerja Dengan Keluhan Nyeri Otot pada Pekerja Pabrik Tahu X Di Kota Semarang. Jurnal Kesehatan Masyarakat (Undip). 2021;9(6):733–40. http://dx.doi.org/10.14710/jkm.v9i6.31300
2. Kusumaningrum D, Samara D, Widyatama HG, Parwanto MLE, Rahmayanti D, Widyasyifa SA. Postur Tubuh dan Waktu Duduk dengan Keluhan Nyeri Punggung Bawah (LBP). fulltext PDF. 2021;10(1):74–81. http://dx.doi.org/10.35816/jiskh.v10i1.513
3. Aseng A, Sekeon S. Hubungan Posisi Kerja Dengan Keluhan Nyeri Punggung Bawah Pada Petani Di Indonesia: Sistematis Review. Kesmas. 2021;10(4):60–4.
4. Novianah N, Triyono A, Sumadi. Hubungan Posisi Kerja Duduk Dengan Keluhan Nyeri Punggung Bawah Pada Tukang Becak Di Wilayah Kelurahan Larangan Indah Ciledug-Tangerang. J Inohim. 2014;2(1):59–66.
5. Chen S, Chen M, Wu X, Lin S, Tao C, Cao H, et al. Global, regional and national burden of low back pain 1990–2019: A systematic analysis of the Global Burden of Disease study 2019. J Orthop Translat. 2022;32:49–58. http://dx.doi.org/10.1016/j.jot.2021.07.005
6. Kumbea NP, Asrifuddin A, Sumampouw OJ. Keluhan Nyeri Punggung Bawah Pada Nelayan. Indones J Public Heal Community Med. 2021;2(1):21–6.
7. Ramayanti AD, Koesyanto H. Faktor-Faktor yang Berhubungan dengan Keluhan Musculoskeletal Disorders pada Pekerja Konveksi. Indones J Public Heal Nutr. 2021;1(1):472–8. http://journal.unnes.ac.id/sju/index.php/IJPHN
8. Lucky S. Analisis Swot Pengembangan Industri Konveksi Perusahaan Kogaya Dalam Menghadapi Barang Import dari China. Jurnal Ekonomi Manajemen Sistem Informasi. 2020;1(6):532–42. http://dx.doi.org/10.31933/jemsi.v1i6.167
9. Putranto TH, Djajakusli R, Wahyuni A. Hubungan Postur Tubuh Menjahit dengan Keluhan Low Back Pain (LBP) pada Penjahit di Pasar Sentral Kota Makassar. 2014;1–11.
10. Kamariah K, Arifin A, Setiadi G. Posisi Kerja Dengan Keluhan Nyeri Punggung Bawah Pada Penjahit Pakaian. j kesehat lingkung. 2020;17(1):5–10. http://dx.doi.org/10.31964/jkl.v17i1.178
11. Dong Y, Jin X, Wang J, Maimaiti N, He L, Wang F, et al. Study on the associations of individual and work-related factors with low back pain among manufacturing workers based on logistic regression and structural equation model. Int J Environ Res Public Health. 2021;18(4):1525. http://dx.doi.org/10.3390/ijerph18041525
12. Bontrup C, Taylor WR, Fliesser M, Visscher R, Green T, Wippert PM, et al. Low back pain and its relationship with sitting behaviour among sedentary office workers. Appl Ergon. 2019;81(102894):102894. http://dx.doi.org/10.1016/j.apergo.2019.102894
13. Patrianingrum M, Oktaliansah E, Surahman E. Prevalensi dan Faktor Risiko Nyeri Punggung Bawah di Lingkungan Kerja Anestesiologi Rumah Sakit Dr. Hasan Sadikin Bandung. J Anestesi Perioper. 2015;3(1):47–56. http://dx.doi.org/10.15851/jap.v3n1.379
14. Cahyani DE, Hasan M, Rumastika NS. The relationship duration of sitting and work posture risk with LBP in library staff university of Jember. J Agromedicine Med Sci. 2020;6(3):124. http://dx.doi.org/10.19184/ams.v6i3.9840
15. Syaputra H, Nyorong M, Utami TN. Hubungan Faktor Individu Dan Postur Kerja Dengan Keluhan Low Back Pain Penjahit Kecamatan Medan Baru. mj. 2022;2(1):19–29. http://dx.doi.org/10.51771/mj.v2i1.254
16. Tiogana V, Hartono N. Analisis Postur Kerja dengan Menggunakan REBA dan RULA di PT X. Journal of Integrated System. 2020;3(1):9–25.http://dx.doi.org/10.28932/jis.v3i1.2463
17. Anggreni D. Buku Ajar Metodologi Penelitian Kesehatan. Kartiningrum ED, editor. Mojokerto: STIKes Majapahit Mojokerto; 2022. 105 p.

18. Wahyuddin, SST MS. Adaptasi Lintas Budaya Modifikasi Kuesioner Disabilitas Untuk Nyeri Punggung Bawah (Modified Oswestry Low Back Pain Disability Questionnaire/Odi) Versi Indonesia. Esa Unggul Univ. 2016;1–23.
19. Muslim B, Devira S, Seno BA, Darwel D, Erdinur E. Hubungan Durasi Kerja dan Postur Tubuh dengan Keluhan Low Back Pain (Lbp) Penjahit di Nagari Simpang Kapuak Kabupaten Lima Puluh Kota. jsm. 2021;16(2):138–46. http://dx.doi.org/10.33761/jsm.v16i2.488
20. Ye S, Jing Q, Wei C, Lu J. Risk factors of non-specific neck pain and low back pain in computer-using office workers in China: a cross-sectional study. BMJ Open. 2017;7(4):e014914. http://dx.doi.org/10.1136/bmjopen-2016-014914
21. Handayani TP, Febriyanto K. Hubungan Durasi Kerja dengan Keluhan Low Back Pain Pada Operator Alat Berat. Borneo Student Res. 2022;3(2):1979–85.
22. Yacob, M.L. D, Kolibu FK, Punuh MI. Hubungan antara Masa Kerja dan Beban Kerja dengan Keluhan Low Back Pain pada Perawat Rawat Inap RS Bhayangkara Tingkat III Mnado. J Kesmas. 2015;4.
23. Agustin A, Puji LKR, Andriati R. Hubungan Durasi Kerja, Masa Kerja dan Postur Kerja Terhadap Keluhan Low Back Pain pada Bagian Staff Di Kantor X, Jakarta Selatan. Journal of Health Research Science. 2023;3(1):13–22. http://dx.doi.org/10.34305/jhrs.v2i02.506
24. Suryadi I, Rachmawati S. Work posture relations with low back pain complaint on partners part of pt "x" manufacture of tobacco products. J Vocat Health Stud. 2020;3(3):126. http://dx.doi.org/10.20473/jvhs.v3.i3.2020.126-130
25. Astuti I, Rosady DS, Romadhona N, Achmad S, Kusmiati M. Nyeri Punggung Bawah serta Kebiasaan Merokok, Indeks Massa Tubuh, Masa Kerja, dan Beban Kerja pada Pengumpul Sampah. Jurnal Integrasi Kesehatan & Sains. 2019;1(1):74–8. http://dx.doi.org/10.29313/jiks.v1i1.4326
26. Wáng YXJ, Wáng JQ, Káplár Z. Increased low back pain prevalence in females than in males after menopause age: evidences based on synthetic literature review. Quant Imaging Med Surg. 2016;6(2):199–206. http://dx.doi.org/10.21037/qims.2016.04.06
27. Koszela K, Woldańska-Okońska M. Age and sex in back pain intensity—retrospective study of conservatory vs. Surgical discopathy treatment. Life (Basel). 2022;12(11):1808. http://dx.doi.org/10.3390/life12111808
28. Saputra A. Sikap Kerja, Masa Kerja, dan Usia terhadap Keluhan Low Back Pain pada Pengrajin Batik. Higeia J Public Heal Res Dev. 2020;1(3):625–34.
29. Rachmawati S, Suryadi I, Pitanola RD. Low back pain: Based on Age, Working Period and Work Posture. J Kesehat Masy. 2022;17(2):287–92. http://dx.doi.org/10.15294/kemas.v17i2.26313
30. Pandjukang AP, Hutasoit RM, Damanik EMB. Hubungan Usia Dan Jenis Kelamin Pada Penderita Nyeri Punggung Bawah (Low Back Pain) Dengan Komorbid Diabetes Melitus Di Rsud. Cendana Med J. 2020;19(1):9–15. https://ejurnal.undana.ac.id/CMJ/article/view/3332
31. Lautenbacher S, Peters JH, Heesen M, Scheel J, Kunz M. Age changes in pain perception: A systematic-review and meta-analysis of age effects on pain and tolerance thresholds. Neurosci Biobehav Rev. 2017;75:104–13. http://dx.doi.org/10.1016/j.neubiorev.2017.01.039
32. Gómez-Galán M, Callejón-Ferre ÁJ, Pérez-Alonso J, Díaz-Pérez M, Carrillo-Castrillo JA. Musculoskeletal risks: RULA bibliometric review. Int J Environ Res Public Health. 2020;17(12):4354. http://dx.doi.org/10.3390/ijerph17124354
33. Yassierli, Wijayanto T, Hardiningtyas D, Dianita O, Muslim K, Kusmasari W. Panduan Ergonomi "Working From Home." Perhimpunan Ergonomi Indonesia. 2020. 1–19 p.