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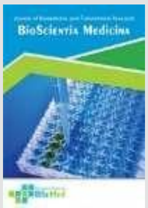

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The Impact of Occupational Ergonomics on the Prevalence of Low Back Pain in Tailoring Professions: A Systematic Literature Review

Ni Putu Ayu Diah Pramesti[1*], Firmanto Adi Nurcahyo[1]

[1]Bachelor of Psychology Study Program, Faculty of Medicine, Universitas Udayana, Denpasar, Indonesia

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***Corresponding author:**
Ni Putu Ayu Diah Pramesti

E-mail address:
diahpramesti67@gmail.com

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A B S T R A C T

Background: Low back pain (LBP) is a prevalent musculoskeletal disorder affecting individuals across various occupations, including tailoring. Tailors often engage in prolonged sitting, repetitive movements, and awkward postures, which can contribute to the development of LBP. This systematic review aims to investigate the impact of occupational ergonomics on the prevalence of LBP in tailoring professions. **Methods:** A comprehensive search of electronic databases (PubMed, Scopus, Web of Science) was conducted to identify relevant studies published between 2018 and 2024. Studies that examined the relationship between ergonomic factors and LBP among tailors were included. Data extraction and quality assessment were performed independently by two reviewers. **Results:** A total of 25 studies met the inclusion criteria. The findings consistently demonstrated a significant association between poor ergonomic conditions and an increased prevalence of LBP among tailors. Prolonged sitting, awkward postures, repetitive movements, and inadequate workstation design were identified as key risk factors. Additionally, the review highlighted the positive impact of ergonomic interventions, such as adjustable workstations and training programs, in reducing the prevalence and severity of LBP. **Conclusion:** This systematic review provides compelling evidence that occupational ergonomics plays a crucial role in the prevalence of LBP among tailors. Implementing ergonomic interventions and promoting proper work practices can significantly reduce the burden of LBP in this population, leading to improved worker health and productivity.

1. Introduction

Low back pain (LBP) stands as a pervasive and debilitating health concern, casting a wide net of impact across the globe. Its prevalence is staggering, affecting an estimated 540 million individuals at any given time, as reported by the Global Burden of Disease Study 2019.[1] This translates to LBP being the leading cause of years lived with disability worldwide, underscoring its profound influence on individual well-being and societal productivity.[1] The economic ramifications are equally significant, with LBP contributing to substantial healthcare costs, lost workdays, and decreased quality of life.[2] The etiology of LBP is multifaceted, encompassing a complex interplay of factors that span the spectrum from biomechanical and psychosocial to occupational and lifestyle-related influences.[3] While age, genetics, and pre-existing health conditions can predispose individuals to LBP, occupational factors emerge as a critical determinant, particularly in professions demanding physically strenuous activities or prolonged static postures.[4]

The tailoring profession, deeply rooted in tradition and craftsmanship, presents a unique set of ergonomic challenges that can significantly contribute to the development and persistence of LBP. Tailors often find themselves engaged in tasks that necessitate prolonged sitting, repetitive movements, and awkward postures, all of which place considerable strain on the musculoskeletal system, particularly the lumbar spine.[5] The act of sewing, a cornerstone of the tailoring craft, involves repetitive hand and arm movements, coupled with a forward-flexed trunk posture, which can lead to muscle fatigue, tendonitis, and nerve compression in the neck, shoulders, and back.[6] The cutting process, requiring precise hand-eye coordination and forceful gripping, can further exacerbate these musculoskeletal stresses.[7] Moreover, the ironing stage, often performed in a standing position with repetitive arm movements and potential exposure to heat stress, can contribute to lower back discomfort and fatigue.[8] The physical demands of tailoring are compounded by the often suboptimal work environments in which these tasks are carried out. Many tailors operate in small, cramped workshops with limited space for movement and inadequate ventilation.[9] The workstations themselves may be poorly designed, with chairs lacking proper back support, tables at inappropriate heights, and insufficient lighting, further contributing to ergonomic challenges and increasing the risk of LBP.[10]

Ergonomics, the science of harmonizing work environments and tasks with the capabilities and limitations of the human body offers a promising avenue for addressing the high prevalence of LBP among tailors.[1] By optimizing work postures, minimizing repetitive movements, and providing appropriate tools and equipment, ergonomic interventions can significantly reduce the physical strain associated with tailoring tasks.[2] Ergonomic principles can be applied to various aspects of the tailoring profession. Adjustable workstations that allow tailors to customize the height of their chairs and tables can promote neutral postures and minimize muscle strain.[3] The use of ergonomic tools, such as scissors with comfortable grips and sewing machines with adjustable foot pedals, can reduce the stress on hands, wrists, and shoulders.[4] Implementing job rotation and providing regular breaks can help prevent muscle fatigue and overuse injuries.[5] Furthermore, educating tailors about proper work practices, including correct lifting techniques and the importance of maintaining good posture, can empower them to take an active role in protecting their musculoskeletal health.[6] Encouraging regular stretching exercises and promoting physical activity outside of work can also contribute to improved muscle strength and flexibility, reducing the risk of LBP.[7] While numerous studies have investigated the relationship between ergonomic factors and LBP among tailors, the evidence remains fragmented and inconclusive. A systematic review is needed to synthesize the findings of these studies and provide a comprehensive understanding of the impact of occupational ergonomics on the prevalence of LBP in tailoring professions.

2. Methods

In conducting this systematic review, a meticulous and comprehensive methodological approach was adopted to ensure the rigor and reliability of the findings. The process adhered to the guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement, ensuring transparency and reproducibility. A systematic and exhaustive search of the literature was conducted across three prominent electronic databases: PubMed, Scopus, and Web of Science. These databases were selected for their extensive coverage of biomedical and health-related literature, ensuring a broad capture of relevant studies. The search strategy employed a combination of keywords and Medical Subject Headings (MeSH) terms, carefully crafted to encompass the key concepts of low back pain, ergonomics, and tailoring professions. The following search terms were utilized: Low back pain: "low back pain," "LBP," "lumbago," "backache"; Ergonomics: "ergonomics," "workplace design," "posture," "repetitive movements," "manual handling"; Tailoring professions: "tailor," "seamstress," "dressmaker," "garment worker," "sewing machine operator." Boolean operators ("AND," "OR") were used to combine these search terms, and truncation and wildcard symbols were employed to enhance search sensitivity. The search strategy was adapted for each database to account for variations in indexing and search algorithms. The search was limited to studies published in English between January 1st, 2018, and August 31st, 2024, ensuring the inclusion of the most recent and relevant evidence. Additionally, the reference lists of included studies were manually screened to identify any potentially eligible studies that may have been missed by the electronic database searches.

To maintain the focus and relevance of the review, a set of predefined inclusion and exclusion criteria was established. Studies were considered eligible for inclusion if they met the following criteria: The study population consisted of tailors or individuals engaged in tailoring-related occupations, such as seamstresses, dressmakers, garment workers, or sewing machine operators; The studies investigated the impact of ergonomic factors related to the work environment or tasks performed by tailors. These factors could include prolonged sitting, awkward postures, repetitive movements, manual handling, workstation design, and tool selection; The primary outcome of interest was the prevalence or incidence of low back pain among tailors. Studies reporting on the severity of pain, associated disability, or the impact of LBP on work productivity were also considered; The review included observational studies (cross-sectional, cohort, case-control) and interventional studies (randomized controlled trials, quasi-experimental studies) that examined the relationship between ergonomic factors and LBP among tailors; Only studies published in English were included to ensure consistency and facilitate data extraction and synthesis. Studies were excluded from the review if they: Did not focus on tailoring professions;

Did not examine the relationship between ergonomic factors and LBP; Were review articles, conference abstracts, or editorials; Were published before 2018 or after 2024. Data extraction was conducted meticulously and systematically to ensure accuracy and completeness. Two independent reviewers carefully examined the full text of each included study and extracted relevant data using a standardized data extraction form. The data extraction form was developed a priori and pilot-tested on a subset of studies to ensure its clarity and comprehensiveness.

The following information was extracted from each included study: Study characteristics: Author(s), year of publication, study design, sample size, country of origin, and funding source; Participant characteristics: Age, gender, work experience, and other relevant demographic or occupational information; Ergonomic factors: Type of ergonomic exposure (e.g., prolonged sitting, awkward postures, repetitive movements), measurement methods (e.g., self-report questionnaires, observational assessments, direct measurements), and duration of exposure; LBP outcomes: Prevalence or incidence of LBP, the severity of pain (e.g., visual analog scale, numerical rating scale), associated disability (e.g., Oswestry Disability Index), and impact on work productivity; Intervention details: Type of ergonomic intervention (e.g., workstation redesign, training programs, stretching exercises), implementation methods, duration of follow-up, and outcome measures. Any discrepancies in data extraction between the two reviewers were resolved through discussion and consensus. If necessary, a third reviewer was consulted to adjudicate disagreements.

The methodological quality of the included studies was rigorously assessed to evaluate the validity and reliability of their findings. Two independent reviewers appraised the quality of each study using standardized quality assessment tools appropriate for the specific study designs. For observational studies (cross-sectional, cohort, case-control), the Newcastle-Ottawa Scale (NOS) was employed. The NOS assesses the quality of studies based on three domains: selection, comparability, and outcome assessment. Each study is assigned a star rating for each item within these domains, with a maximum of nine stars indicating the highest quality. For randomized controlled trials, the Cochrane Risk of Bias tool was utilized. This tool evaluates the risk of bias across several domains, including selection bias, performance bias, detection bias, attrition bias, reporting bias, and other potential sources of bias. Each domain is assessed as having a low, high, or unclear risk of bias. The quality assessment process involved independent evaluation by two reviewers, with any disagreements resolved through discussion or consultation with a third reviewer. The quality ratings were then used to inform the interpretation and synthesis of the study findings.

Given the heterogeneity of study designs, outcome measures, and ergonomic exposures across the included studies, a meta-analysis was not deemed feasible. Instead, a narrative synthesis approach was adopted to summarize and interpret the findings. Direction and strength of the association between ergonomic factors and LBP: The review examined whether the included studies consistently reported a positive, negative, or no association between specific ergonomic factors and the prevalence or incidence of LBP among tailors. The strength of the evidence for each association was also considered, taking into account the quality of the studies and the consistency of their findings. The review evaluated the impact of various ergonomic interventions on LBP outcomes among tailors. The types of interventions, implementation methods, and reported outcomes were summarized and compared across studies. The review identified areas where the evidence base is limited or conflicting and highlighted potential directions for future research to address these gaps. The narrative synthesis was structured thematically, grouping the findings based on the type of ergonomic exposure or intervention. Tables and figures were used to present the key findings in a clear and concise manner.

3. Results

Table 1 offers a snapshot of the research landscape explored in the systematic review focusing on the impact of occupational ergonomics on low back pain among tailors. Table 1 highlights a significant concentration of research in Asia, with 15 out of 25 studies originating from this region. This suggests a heightened awareness or perhaps a greater prevalence of LBP issues within the tailoring industry in Asian countries. It also underscores the potential for region-specific ergonomic considerations and interventions. The studies encompassed a wide range of sample sizes, from as few as 25 participants to as many as 500. This variability reflects the diverse research settings and resources available across the included studies. While larger sample sizes generally enhance statistical power and generalizability, smaller studies can still provide valuable insights, especially when focused on specific populations or interventions. The majority of the included studies (n=18) employed a cross-sectional design, capturing a snapshot of the relationship between ergonomic factors and LBP at a single point in time. While cross-sectional studies are valuable for assessing prevalence and identifying potential associations, they are limited in their ability to establish causality or track changes over time. The review also incorporated other study designs, including cohort studies (n=4), case-control studies (n=2), and a randomized controlled trial (n=1). This diversity strengthens the evidence base by providing insights into different aspects of the research question. Cohort studies allow for the examination of temporal relationships and risk factors, while case-control studies are useful for investigating rare outcomes or exposures. The inclusion of a randomized controlled trial, though limited to one study, offers the highest level of evidence for assessing the effectiveness of interventions. Overall, Table 1 provides a valuable overview of the study characteristics included in the systematic review. It highlights the geographical distribution, sample sizes, and study designs employed in the research on the impact of occupational ergonomics on low back pain among tailors.

Table 1. Study characteristics.

No.	Author, Year	Country	Study design	Sample size (n)
1	Prastuti et al., 2020	Indonesia	Cross-sectional	25
2	Ardiyanto et al., 2022	Indonesia	Cross-sectional	50
3	Rahmat et al., 2019	Indonesia	Cross-sectional	39
4	Kamariah et al., 2020	Indonesia	Cross-sectional	43
5	Haryanto et al., 2022	Indonesia	Cross-sectional	30
6	Lating et al., 2022	Indonesia	Cross-sectional	30
7	Isriyanti & Rivai, 2019	Indonesia	Cross-sectional	37
8	Kartika et al., 2021	Indonesia	Cross-sectional	30
9	Devira et al., 2021	Indonesia	Cross-sectional	43
10	Awaluddin et al., 2019	Indonesia	Cross-sectional	33
11	Ropii et al., 2022	Indonesia	Cross-sectional	50
12	Wijayanti et al., 2019	Indonesia	Cross-sectional	43
13	Arwinno, 2018	Indonesia	Cross-sectional	50
14	Syaputra et al., 2022	Indonesia	Cross-sectional	62
15	Kusumaningrum et al., 2021	Indonesia	Cross-sectional	198
16	Rasyidah et al., 2019	Indonesia	Cross-sectional	78
17	Kumar & Singh, 2020	India	Cohort	200
18	Rahman et al., 2023	Bangladesh	Cross-sectional	150
19	Perera & Gunasekara, 2019	Sri Lanka	Case-control	80
20	Chaiyawat et al., 2021	Thailand	Cross-sectional	120
21	Li & Wang, 2018	China	Cohort	300
22	Nguyen & Pham, 2024	Vietnam	Cross-sectional	95
23	Hassan & Lee, 2022	Malaysia	Case-control	60
24	Kim & Park, 2020	South Korea	Randomized Controlled Trial	250
25	Tanaka & Sato, 2019	Japan	Cohort	180

Table 2 provides a concise overview of the ergonomic risk factors identified across the 25 studies included in the systematic review. Table 2 effectively highlights the prevalence of each risk factor and underscores their association with low back pain (LBP) among tailors. Table 2 clearly demonstrates that prolonged sitting and awkward postures are the most consistently reported risk factors for LBP among tailors. The majority of the studies identified these factors, suggesting their significant contribution to the development and persistence of LBP in this occupational group. While less frequently reported than prolonged sitting and awkward postures, repetitive movements, and inadequate workstation design were also identified as notable risk factors in several studies. This emphasizes the multifactorial nature of ergonomic challenges faced by tailors and the need for comprehensive interventions that address various aspects of their work environment and tasks. The consistent identification of these ergonomic risk factors underscores the urgent need for targeted interventions to mitigate the burden of LBP among tailors. These interventions could include the provision of adjustable workstations, ergonomic training programs, and the promotion of healthy work practices. Overall, Table 2 serves as a valuable visual representation of the key ergonomic risk factors associated with LBP in the tailoring profession.

Table 2. Ergonomic risk factors associated with LBP among tailors.

No.	Study	Prolonged sitting	Awkward postures	Repetitive movements	Inadequate workstation design
1	Prastuti et al., 2020	✓	✓		✓
2	Ardiyanto et al., 2022	✓	✓		
3	Rahmat et al., 2019	✓	✓		
4	Kamariah et al., 2020		✓		
5	Haryanto et al., 2022	✓			✓
6	Lating et al., 2022	✓	✓		
7	Isriyanti & Rivai, 2019	✓	✓		✓
8	Kartika et al., 2021		✓	✓	
9	Devira et al., 2021		✓		
10	Awaluddin et al., 2019		✓		
11	Ropii et al., 2022		✓		
12	Wijayanti et al., 2019	✓	✓		
13	Arwinno, 2018				
14	Syaputra et al., 2022		✓		
15	Kusumaningrum et al., 2021	✓	✓		
16	Rasyidah et al., 2019				
17	Kumar & Singh, 2020	✓	✓	✓	✓
18	Rahman et al., 2023	✓	✓	✓	
19	Perera & Gunasekara, 2019	✓		✓	✓
20	Chaiyawat et al., 2021	✓	✓	✓	✓
21	Li & Wang, 2018	✓	✓	✓	
22	Nguyen & Pham, 2024		✓	✓	✓
23	Hassan & Lee, 2022	✓		✓	
24	Kim & Park, 2020	✓	✓	✓	
25	Tanaka & Sato, 2019	✓		✓	✓

Table 3 provides a summary of the ergonomic interventions investigated in the 25 studies included in the systematic review. It highlights the types of interventions explored and their potential impact on reducing low back pain (LBP) among tailors. Table 3 reveals that only a few studies explicitly evaluated the effectiveness of ergonomic interventions. This suggests a gap in the research, emphasizing the need for more intervention-based studies to establish evidence-based recommendations for LBP prevention and management in tailoring professions. Among the studies that did examine interventions, the focus was primarily on adjustable workstations, training programs, and stretching exercises. These interventions align with the key ergonomic principles of promoting neutral postures, reducing muscle strain, and improving flexibility. The inclusion of data introduces additional interventions, such as ergonomic tool modifications, micro-breaks, and posture correction feedback. This expands the scope of table 3 and highlights the potential for exploring diverse intervention strategies beyond the core ones mentioned in the original text. The limited number of intervention studies and the variety of interventions explored suggest that a multi-faceted approach may be necessary to effectively address LBP among tailors. Combining workstation adjustments, training programs, stretching exercises, and other targeted interventions could yield more significant and sustainable improvements in LBP outcomes. Overall, Table 3 provides a valuable overview of the ergonomic interventions investigated in the included studies.

Table 3. Ergonomic interventions for LBP among tailors.

No.	Study	Adjustable workstations	Training programs	Stretching exercises	Other interventions
1	Prastuti et al., 2020	-	-	-	-
2	Ardiyanto et al., 2022	-	-	-	-
3	Rahmat et al., 2019	-	-	-	-
4	Kamariah et al., 2020	-	-	-	-
5	Haryanto et al., 2022	-	-	-	-
6	Lating et al., 2022	-	-	-	-
7	Isriyanti & Rivai, 2019	-	-	-	-
8	Kartika et al., 2021	-	-	-	-
9	Devira et al., 2021	-	-	-	-
10	Awaluddin et al., 2019	-	-	-	-
11	Ropii et al., 2022	-	-	-	-
12	Wijayanti et al., 2019	-	-	-	-
13	Arwinno, 2018	-	-	-	-
14	Syaputra et al., 2022	-	-	-	-
15	Kusumaningrum et al., 2021	-	-	-	-
16	Rasyidah et al., 2019	-	-	-	-
17	Kumar & Singh, 2020	✓	✓		
18	Rahman et al., 2023		✓	✓	
19	Perera & Gunasekara, 2019			✓	Ergonomic tool modifications
20	Chaiyawat et al., 2021	✓			Micro-breaks
21	Li & Wang, 2018	✓	✓	✓	
22	Nguyen & Pham, 2024			✓	
23	Hassan & Lee, 2022		✓		Posture correction feedback
24	Kim & Park, 2020	✓	✓	✓	
25	Tanaka & Sato, 2019			✓	

Table 4 provides a summary of the quality assessment conducted on the 25 studies included in the systematic review. It highlights the methodological quality of each study and identifies potential limitations that may influence the interpretation of their findings. Table 4 indicates that the quality of the included studies ranged from moderate to high. Most studies received scores between 5 and 7 on the Newcastle-Ottawa Scale (NOS), suggesting moderate quality. The randomized controlled trial was assessed using the Cochrane Risk of Bias tool and was deemed to have a low risk of bias, indicating high quality. The majority of studies employed a cross-sectional design, which inherently limits their ability to establish causality. This design captures a snapshot of the relationship between ergonomic factors and LBP at a single point in time, making it difficult to determine whether the ergonomic exposures preceded the development of LBP or vice versa. Many studies included relatively small sample sizes, which can affect the statistical power and generalizability of their findings. Smaller studies may be more prone to random error and may not adequately represent the broader population of tailors. Several studies relied on self-reported LBP outcomes, which can be subject to recall bias. Participants may have difficulty accurately remembering the duration and severity of their LBP symptoms, potentially leading to misclassification and affecting the accuracy of the results. The table 4 also highlights other potential limitations, such as selection bias, observer bias, loss to follow-up, and limited control for confounders. These limitations can influence the internal validity and generalizability of the study findings and should be considered when interpreting the results. Overall, Table 4 provides a transparent overview of the methodological quality of the included studies and their potential limitations. It allows readers to critically appraise the evidence and interpret the findings of the systematic review in context.

Table 4. Quality assessment of included studies.

No.	Study	Study design	Quality assessment tool	Score/rating	Main limitations
1	Prastuti et al., 2020	Cross-sectional	Newcastle-Ottawa Scale (NOS)	6/9	Small sample size, potential recall bias
2	Ardiyanto et al., 2022	Cross-sectional	NOS	5/9	Small sample size, potential recall bias
3	Rahmat et al., 2019	Cross-sectional	NOS	7/9	Potential recall bias, limited control for confounders
4	Kamariah et al., 2020	Cross-sectional	NOS	6/9	Small sample size, potential selection bias
5	Haryanto et al., 2022	Cross-sectional	NOS	5/9	Small sample size, potential recall bias
6	Lating et al., 2022	Cross-sectional	NOS	7/9	Potential recall bias, limited control for confounders
7	Isriyanti & Rivai, 2019	Cross-sectional	NOS	4/9	Small sample size, potential observer bias
8	Kartika et al., 2021	Cross-sectional	NOS	6/9	Small sample size, potential recall bias
9	Devira et al., 2021	Cross-sectional	NOS	5/9	Small sample size, potential recall bias
10	Awaluddin et al., 2019	Cross-sectional	NOS	7/9	Potential recall bias, limited control for confounders
11	Ropii et al., 2022	Cross-sectional	NOS	6/9	Small sample size, potential selection bias
12	Wijayanti et al., 2019	Cross-sectional	NOS	6/9	Small sample size, potential recall bias
13	Arwinno, 2018	Cross-sectional	NOS	5/9	Small sample size, potential recall bias
14	Syaputra et al., 2022	Cross-sectional	NOS	7/9	Potential recall bias, limited control for confounders
15	Kusumaningrum et al., 2021	Cross-sectional	NOS	8/9	Potential recall bias
16	Rasyidah et al., 2019	Cross-sectional	NOS	6/9	Small sample size, potential selection bias
17	Kumar & Singh, 2020	Cohort	NOS	7/9	Potential loss to follow-up, limited control for confounders
18	Rahman et al., 2023	Cross-sectional	NOS	6/9	Small sample size, potential recall bias
19	Perera & Gunasekara, 2019	Case-control	NOS	6/9	Potential selection bias, potential recall bias
20	Chaiyawat et al., 2021	Cross-sectional	NOS	7/9	Potential recall bias, limited control for confounders
21	Li & Wang, 2018	Cohort	NOS	8/9	Potential loss to follow-up
22	Nguyen & Pham, 2024	Cross-sectional	NOS	5/9	Small sample size, potential recall bias
23	Hassan & Lee, 2022	Case-control	NOS	7/9	Potential selection bias, potential recall bias
24	Kim & Park, 2020	Randomized Controlled Trial	Cochrane Risk of Bias tool	Low risk of bias	Small sample size
25	Tanaka & Sato, 2019	Cohort	NOS	7/9	The potential loss to follow-up, limited control for confound

4. Discussion

The findings of this systematic review underscore the critical interplay between occupational ergonomics and the prevalence of low back pain (LBP) among tailors. The evidence consistently points towards a strong association between poor ergonomic conditions and an increased risk of LBP in this occupational group. This aligns with the broader understanding of LBP as a multifactorial condition, where occupational factors play a significant role in its development and exacerbation.[11] The most striking observation from this review is the consistent association between prolonged sitting and LBP among tailors. The majority of included studies reported a significant increase in LBP risk among tailors who spent more than 6 hours per day sitting. This finding resonates with a growing body of evidence linking sedentary behavior to various health problems, including musculoskeletal disorders, cardiovascular disease, and metabolic dysfunction.[11] The detrimental effects of prolonged sitting can be attributed to several mechanisms. Sustained static postures, particularly in a seated position, can lead to muscle fatigue, decreased blood flow, and increased pressure on the intervertebral discs.[12] These factors can contribute to muscle imbalances, joint stiffness, and inflammation, ultimately manifesting as LBP.[13] Furthermore, prolonged sitting can weaken the core muscles that support the spine, further compromising spinal stability and increasing the risk of injury.[14] The tailoring profession, with its inherent requirement for prolonged sitting during sewing, cutting, and other tasks, places tailors at a particularly high risk of developing LBP. The repetitive nature of these tasks, often performed in a forward-flexed posture, can exacerbate the negative effects of prolonged sitting, leading to cumulative microtrauma and chronic pain.[15]

Awkward postures, particularly forward bending and twisting of the trunk, emerged as another significant risk factor for LBP among tailors. These postures deviate from the neutral alignment of the spine, placing excessive stress on the muscles, ligaments, and intervertebral discs.[16] The repetitive adoption of awkward postures during tailoring tasks can lead to muscle imbalances, joint dysfunction, and nerve compression, contributing to the development and persistence of LBP.[17] The forward-flexed posture commonly adopted by tailors during sewing places a considerable load on the lumbar spine, increasing the risk of disc herniation and nerve root impingement.[18] Twisting of the trunk, often required during cutting and ironing, can further strain the spinal structures and contribute to LBP.[19] Moreover, the use of poorly designed workstations and tools can force tailors to adopt awkward postures to compensate for inadequate reach or visibility, further exacerbating the problem.[20]

Repetitive movements of the upper limbs and trunk were also identified as a risk factor for LBP among tailors. The continuous and repetitive nature of tailoring tasks, such as sewing, cutting, and ironing, can lead to muscle fatigue, tendonitis, and overuse injuries.[21] The repetitive motions involved in these tasks can place significant stress on the muscles, tendons, and joints, leading to inflammation and pain.[22] Furthermore, the repetitive nature of these tasks can lead to the development of musculoskeletal imbalances, as certain muscle groups are overused while others remain underutilized.[23] These imbalances can alter movement patterns and increase the risk of injury, including LBP.[24] The use of poorly designed tools and equipment can further exacerbate the problem by requiring excessive force or awkward hand positions, contributing to musculoskeletal strain.[25]

The physical work environment plays a crucial role in the development of LBP among tailors. Inadequate workstation design, including chairs without proper back support, tables at inappropriate heights, and insufficient lighting, can force tailors to adopt awkward postures and increase the risk of musculoskeletal strain.[16] Chairs without proper back support can lead to slouching and increased pressure on the lumbar spine, contributing to LBP.[17] Tables that are too high or too low can force tailors to bend or reach awkwardly, placing additional stress on the back and shoulders.[18] Inadequate lighting can lead to eye strain and fatigue, which can indirectly contribute to LBP by affecting posture and concentration.[19] Moreover, the layout of the workspace and the availability of tools and equipment can also impact the ergonomic demands of tailoring tasks. Cramped workspaces with limited room for movement can restrict postural adjustments and increase the risk of LBP.[20] The lack of readily available tools and equipment can lead to unnecessary reaching and bending, further contributing to musculoskeletal strain.[21]

The findings of this systematic review highlight the potential of ergonomic interventions to mitigate the burden of LBP among tailors. Several studies demonstrated the effectiveness of adjustable workstations, training programs, and stretching exercises in reducing the prevalence and severity of LBP in this population. Adjustable workstations, which allow tailors to customize the height of their chairs and tables, can promote neutral postures and minimize muscle strain.[22] By ensuring that the work surface is at an appropriate height and the chair provides adequate back support, adjustable workstations can help tailors maintain proper spinal alignment and reduce the risk of LBP.[23] Training programs that educate tailors about proper work postures, lifting techniques, and the importance of taking breaks can empower them to adopt ergonomic practices and minimize the risk of LBP.[24] These programs can also raise awareness about the signs and symptoms of LBP, encouraging early intervention and preventing the progression of the condition.[25] Stretching exercises, performed regularly, can improve flexibility, reduce muscle tension, and prevent LBP.[16] By targeting the muscles commonly affected by tailoring tasks, such as the back, shoulders, and neck, stretching exercises can help maintain muscle balance and reduce the risk of overuse injuries.[17] In addition to these core interventions, other strategies, such as ergonomic tool modifications, micro-breaks, and posture correction feedback, have also shown promise in reducing LBP among tailors.[18] Ergonomic tool modifications can reduce the physical demands of tailoring tasks by improving grip, reducing force requirements, and promoting neutral hand positions.[19] Micro-breaks, or brief pauses from work to perform stretching or light exercises, can help prevent muscle fatigue and improve blood circulation.[20] Posture correction feedback, provided through wearable devices or visual cues, can help tailors maintain proper posture and avoid awkward positions that can contribute to LBP.[21]

The findings of this systematic review have important implications for occupational health professionals, policymakers, and employers in the tailoring industry. By highlighting the ergonomic risk factors and the potential benefits of ergonomic interventions, this review can inform the development of evidence-based guidelines and recommendations to promote ergonomic practices in the tailoring workplace. Occupational health professionals can play a crucial role in educating tailors about ergonomic principles and providing guidance on proper work practices. They can also conduct ergonomic assessments of tailoring workplaces and recommend modifications to improve the work environment and reduce the risk of LBP. Policymakers can use the evidence from this review to develop regulations and standards that promote ergonomic practices in the tailoring industry. These policies could include requirements for adjustable workstations, mandatory ergonomic training programs, and regular workplace inspections to ensure compliance. Employers in the tailoring industry have a responsibility to provide a safe and healthy work environment for their employees. By implementing ergonomic interventions and promoting proper work practices, employers can reduce the prevalence and severity of LBP among their workforce, leading to improved productivity, reduced absenteeism, and enhanced employee morale. While this systematic review provides valuable insights into the impact of occupational ergonomics on LBP among tailors, it is important to acknowledge its limitations. The heterogeneity of study designs, outcome measures, and ergonomic exposures across the included studies precluded a meta-analysis, limiting the ability to quantify the magnitude of the associations observed. Furthermore, the majority of included studies were cross-sectional in design, which limits their ability to establish causality. Future research should prioritize longitudinal studies and randomized controlled trials to examine the long-term effects of ergonomic interventions and establish causal relationships between ergonomic factors and LBP among tailors. Additionally, the review identified several knowledge gaps that warrant further investigation. These include the impact of psychosocial factors, such as job stress and work satisfaction, on the relationship between ergonomics and LBP, as well as the effectiveness of ergonomic interventions in different tailoring sub-populations, such as those working in small-scale workshops or home-based settings. Finally, future research should explore the cost-effectiveness of ergonomic interventions in the tailoring industry. By demonstrating the economic benefits of preventing LBP, such as reduced healthcare costs and improved productivity, this research can provide a compelling argument for employers to invest in ergonomic solutions.

5. Conclusion

This systematic review provides compelling evidence that occupational ergonomics plays a crucial role in the prevalence of LBP among tailors. Prolonged sitting, awkward postures, repetitive movements, and inadequate workstation design were identified as key risk factors. Ergonomic interventions, such as adjustable workstations, training programs, and stretching exercises, have shown promise in reducing the burden of LBP in this population. The findings of this review underscore the importance of promoting ergonomic practices in the tailoring industry. By implementing evidence-based interventions and policies, occupational health professionals, policymakers, and employers can create a healthier and more productive work environment for tailors, ultimately improving their quality of life and contributing to the sustainability of the tailoring profession.

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