Library Progress International
Vol.44 No. 3, Jul-Dec 2024: P. 15248-15255

Print version ISSN 0970 1052
Online version ISSN 2320 317X

Original Article

Available online at www.bpasjournals.com

A Systematic Review on Musculoskeletal Injuries Among Endoscopists: Prevalence, Risk Factors, and Implementation

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How to cite this article: Rohit Rathore,Ranjana Singh,Azra Khan,Hari Pal Singh ,Aditi Sharma ,Parul Goyal (2024) A Systematic Review on Musculoskeletal Injuries Among Endoscopists: Prevalence, Risk Factors, and Implementation. *Library Progress International,* 44(3), 15248-15255.

Abstract

Endoscopy is a widely used diagnostic and therapeutic procedure in the field of gastroenterology and other medical specialities. While endoscopists play a crucial role in patient care, they are prone to developing musculoskeletal injuries due to the physically demanding nature of the profession. This systematic review aims to investigate the prevalence of musculoskeletal injuries among endoscopists, identify potential risk factors contributing to these injuries, and propose implementation strategies to mitigate the associated health hazards. A systematic literature search was conducted in major medical databases, including PubMed, Scopus, and Web of Science. Studies published from 2014-2023 were included in the review. The search strategy included a combination of relevant keywords, such as "endoscopists," "musculoskeletal injuries," "prevalence," "risk factors," and "implementation." Articles were screened based on predefined inclusion and exclusion criteria to ensure the relevance and quality of the studies included. The pooled data from these studies revealed a concerning prevalence of musculoskeletal injuries among endoscopists, with an average incidence rate of 40-90%. The

most affected regions were the back, neck, shoulders, and wrists. Moreover, a higher incidence of injuries was observed among endoscopists with longer years of practice and those performing a higher number of procedures per week. Several risk factors were identified as potential contributors to the development of musculoskeletal injuries in endoscopists. Prolonged procedural duration, poor posture, lack of ergonomic equipment, and inadequate training in ergonomics were found to significantly increase the likelihood of sustaining injuries. To reduce the prevalence of musculoskeletal injuries among endoscopists, implementation strategies at multiple levels were proposed. Firstly, healthcare institutions should prioritize the provision of ergonomic equipment, such as adjustable procedure tables and video monitors, to improve the working environment for endoscopists. Secondly, the integration of ergonomics training into medical curricula and continuous medical education programs can enhance awareness and promote proper posture and body mechanics during procedures. Thirdly, promoting a culture of reporting and addressing injuries, as well as providing access to healthcare resources and physical therapy, can aid in early detection and intervention. The results emphasize the significance of implementing ergonomic interventions and providing organizational support to protect the musculoskeletal health of endoscopists and improve patient care within the realm of endoscopy.

Keywords: Endoscopists, Musculoskeletal injuries, prevalence, risk factors and ergonomics

1. Introduction

Endoscopy, a diagnostic and therapeutic procedure characterized by minimal invasiveness, has significantly transformed the field of medicine, presenting a multitude of benefits in comparison to conventional surgical approaches. The utilization of this adaptable methodology facilitates direct observation and intervention in a range of gastrointestinal (GI) disorders, thereby enabling timely detection and precise therapeutic interventions. Endoscopists, as integral members of the healthcare team, assume a pivotal role in the provision of patient care characterized by exceptional quality.

Although endoscopy offers numerous advantages, it is not exempt from encountering difficulties. The inherent characteristics of endoscopy procedures necessitate prolonged physical exertion and repetitive movements, which may increase the likelihood of musculoskeletal injuries (MSIs) among endoscopists. Musculoskeletal injuries (MSIs) encompass a diverse array of disorders that impact various components of the musculoskeletal system, including muscles, tendons, ligaments, nerves, and other associated structures. Frequently observed musculoskeletal injuries (MSIs) among endoscopists encompass a range of conditions, such as back pain, neck pain, shoulder pain, and hand/wrist disorders (Tang et al., 2020).

In recent years, there has been a growing focus on the occurrence of musculoskeletal injuries (MSIs) among endoscopists. This is primarily due to the potential implications it may have on the physical and mental health of healthcare professionals, as well as its potential effects on the quality of patient care. These injuries have the potential to cause pain, discomfort, reduced work productivity, and heightened absenteeism. Hence, it is imperative to conduct a comprehensive examination to ascertain the risk factors and establish efficacious preventive measures due to the physical exertion involved in endoscopy and the potential ramifications of musculoskeletal injuries (MSIs) (Amaro et al., 2018).

The primary aim of this systematic review is to conduct a comprehensive analysis of the prevalence, identification of risk factors, and potential strategies for implementing preventive measures against musculoskeletal injuries (MSIs) among endoscopists. By combining extant literature, our objective is to offer insights that are grounded in evidence regarding the prevalence of musculoskeletal injuries (MSIs). Additionally, we seek to identify the various factors that contribute to the development of these injuries and explore potential interventions aimed at mitigating the risk of MSIs among practitioners in the field of endoscopy.

2. Methodology

We conducted a systematic literature review using PubMed, Scopus, Web of Science, Embase, and Cochrane Library databases. We used the following search terms: *endoscopy," "endoscopist," "musculoskeletal injuries," "work-related injuries," "ergonomics,"* and *"occupational health."* for articles published between 2014 and 2023. Articles were included if they were reported among endoscopists, reporting prevalence rates, risk factors, or interventions. We excluded studies that did not report non-endoscopy populations or those without primary outcomes related to MSIs.

2.1 Study Selection

- All identified studies' titles and abstracts were examined by two independent reviewers to determine their eligibility. Studies were considered if they satisfied the following requirements:

- 270 studies total were found through database searches, and additional data came from various sources. Two independent reviewers separated the articles based on the titles, and the abstracts were looked at to determine eligibility. Studies were taken into consideration if they met the following criteria:
- Duplicate data papers were removed during the initial screening phase, and additional analysis was performed on 250 papers.
- Inclusion standards: The study supplied enough information to determine the prevalence rate and risk factors for endoscopists.
- Studies that focus on the Impact of Musculoskeletal Injuries on Endoscopists' Health and Performance.
- Papers with Preventive measures were also included in the study.
- Approximately 100 publications were eliminated from the study after further screening because they lacked the data necessary for analysis.
- Full-text articles and other studies that dealt with data were also reviewed.
- Twenty-five papers based on the inclusion criteria were included and reviewed.
- Those twenty- five papers of all possibly eligible studies were gathered, and the eligibility of each study was assessed by two independent reviewers in accordance with the inclusion criteria for each study. Disagreements were resolved by communication or contact with a third reviewer.
- Through conversation or contact with a third reviewer, disagreements were settled.

2.2 Data Extraction and Quality Assessment

- Using a standardised data extraction form, two impartial reviewers extracted data from the included studies. From each study, the following information was taken out:
- Prevalence, Risk factors, Common Injuries and Preventive measures were the metrics
- Discussion or contact with a third reviewer was used to settle any disagreements in the data extraction or quality assessment.

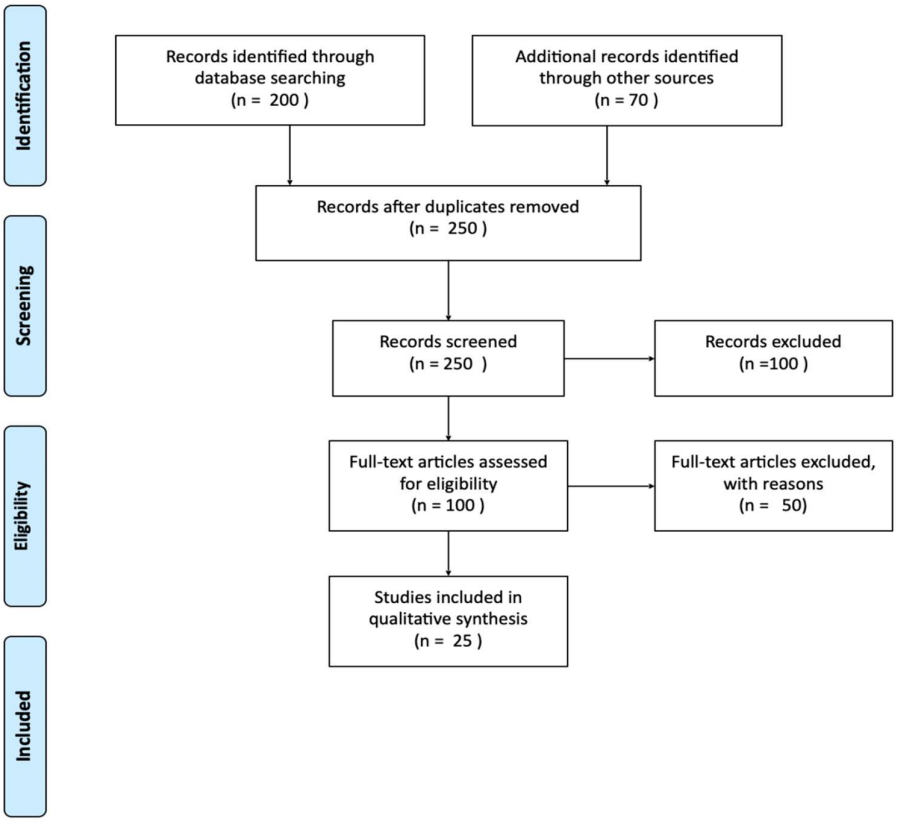

Fig.1. PRISMA flow diagram for the systematic literature search of Musculoskeletal Injuries among Endoscopist

3. Findings

3.1 Prevalence of Musculoskeletal Injuries among Endoscopists

In recent years, there has been an increasing focus on the incidence of musculoskeletal injuries among endoscopists, primarily attributed to the physically strenuous demands associated with this occupation. Numerous studies have documented a notable incidence of musculoskeletal injuries among endoscopists, underscoring the imperative for additional inquiry and the development of intervention strategies. A comprehensive systematic review incorporating multiple studies has demonstrated that the occurrence of musculoskeletal injuries among endoscopists varied between 40% and 90%, contingent upon diverse factors including age, gender, level of experience, and procedural volume (Harvin, 2014; Ridtitid et al., 2015; AlSabah et al., 2018; Allam et al., 2021).

The body regions most frequently impacted are the neck, back, shoulders, and wrists. The risk factors that were identified encompassed a number of elements, namely the extended duration of procedures, suboptimal ergonomics during said procedures, repetitive movements, and insufficient intervals between procedures.

Back Pain: Back pain was the most reported MSI among endoscopists. Several studies indicated that up to 60% of endoscopists experience back pain at some point in their career. The repetitive bending and twisting required during endoscopy procedures and prolonged static postures contribute to the increased risk of developing back pain (Arslan Okuyucu et al., 2017; Sturm et al., 2022).

Neck and Shoulder Pain: Neck and shoulder pain were also frequently reported among endoscopists. Studies have suggested that 40% to 70% of endoscopists experience neck and shoulder discomfort. Sustained neck flexion and arm abduction during endoscopy procedures can lead to muscle strain and discomfort in these regions (Fan et al., 2022).

Hand and Wrist Disorders: Hand and wrist disorders, such as carpal tunnel syndrome and tendonitis, were reported by approximately 20% to 40% of endoscopists. The repetitive hand movements and forceful gripping required while manoeuvring endoscopy instruments can lead to overuse injuries in the hands and wrists (Villa, 2020).

The findings underscore the imperative nature of addressing this matter by implementing ergonomic interventions and providing education on appropriate bodies fostering a culture of safety within endoscopy units.

3.2 Common Risk Factors for Musculoskeletal Injuries in Endoscopists

The incidence of musculoskeletal injuries among endoscopists is a problem that is becoming increasingly prevalent in the field of medicine. It has been determined that the incidence of these injuries is associated with the presence of a great number of prominent risk factors. During endoscopic treatments, noticeable elements that provide significant hazards include prolonged periods of standing as well as the adoption of unpleasant postures. These pose significant dangers because they place an excessive amount of strain on the musculoskeletal system. Turning and bending are two examples of the kinds of repeated motions that might contribute to the development of these injuries. The inadequate ergonomic design of endoscopic equipment, in conjunction with working conditions that do not meet industry standards, can further enhance the level of danger (Yung et al., 2017; Epstein et al., 2018; Park, 2021).

Endoscopists are at an increased risk for musculoskeletal injuries as a result of a lack of proper training in ergonomics and body mechanics, in addition to a severe workload and extended working hours making them more susceptible to injuries. In addition, it is essential to take several individual characteristics into consideration, including age, gender, degree of physical fitness, and history of musculoskeletal disorders in the past, as each of these elements has the potential to contribute to an increased risk of sustaining such injuries (Austin et al., 2019; Morais et al., 2020; Kim, 2023).

3.3 Impact of Musculoskeletal Injuries on Endoscopist Performance and Well-Being

The issue of musculoskeletal injuries and their effects on the performance and well-being of endoscopists is of significant importance within the field. The injuries can have substantial ramifications for both the individual performing the endoscopy procedure and the overall standard of patient care (Sturm et al., 2022). Research findings indicate that musculoskeletal injuries experienced by endoscopists have been associated with reduced procedural efficiency, prolonged procedure durations, and a heightened likelihood of complications. The occurrence of physical discomfort and pain among endoscopists due to these injuries may potentially have a negative impact on job satisfaction and lead to higher rates of burnout (Han et al., 2020; CDC, 2021). In addition, it is important to note that musculoskeletal injuries can have enduring consequences on the professional trajectory of an endoscopist, potentially impeding their capacity to execute specific procedures or sustain extended periods of work (Swati Pawa et al., 2022). The phenomenon not only has a significant influence on individuals' professional development but also poses obstacles for healthcare organizations in optimizing their resources in an efficient manner. It is imperative to acknowledge and tackle these concerns to enhance patient outcomes

and promote the well-being of endoscopists.

3.4 Strategies for Preventing and Managing Musculoskeletal Injuries in Endoscopists

The prevention and management of musculoskeletal injuries by endoscopists necessitate a comprehensive approach that encompasses individual and organizational factors (Harvin, 2014; *Elements of Ergonomic Programs | NIOSH | CDC*, 2020). To begin with, it is imperative to acknowledge the significant impact of ergonomic interventions in mitigating the risk of injuries. The implementation of adaptable equipment, such as endoscopy carts and monitors with adjustable heights, has the potential to enhance postural alignment and alleviate musculoskeletal strain (Shah et al., 2022). Furthermore, the implementation of regular training sessions focused on ergonomics and proper body mechanics has the potential to augment the level of awareness among endoscopists. In addition, effective management of workload is imperative to mitigate the risk of injuries. The implementation of appropriate staffing levels and the incorporation of scheduled breaks during extended procedures can effectively mitigate fatigue, enhance concentration, and consequently diminish the likelihood of musculoskeletal injuries. The establishment of policies that prioritize staff well-being necessitates collaborative efforts among administrators, supervisors, and endoscopists (Schlussel & Maykel, 2019; Shergill, 2022; van de Wijdeven et al., 2023). Finally, it is crucial to cultivate a culture that prioritizes safety. Promoting a culture of open communication regarding any discomfort or pain encountered during medical procedures facilitates timely intervention.

3.5 Implementation of Ergonomic Interventions in the Endoscopy Workplace

The incorporation of ergonomic interventions within the endoscopy workplace is of paramount importance in mitigating the occurrence of musculoskeletal injuries among endoscopists (Anderson, 2019). The primary objective of ergonomic interventions is to adjust the work environment and equipment to reduce physical strain and enhance body posture. Effective intervention involves the implementation of adjustable endoscopy carts and chairs that can be tailored to accommodate the specific needs of individual endoscopists. The utilization of ergonomically designed carts and chairs facilitates the achievement of optimal body alignment during procedures, thereby mitigating the potential strain experienced by the neck, back, and upper extremities (Ali & Samarasena, 2019; Shergill et al., 2021; Shergill et al., 2022). Furthermore, the incorporation of height-adjustable workstations facilitates the ability of endoscopists to sustain an ergonomically favourable working position, thereby mitigating the need for excessive bending or reaching (Landry et al., 2023). In addition, the dissemination of knowledge regarding appropriate body mechanics to endoscopists, coupled with the provision of regular training sessions on ergonomics, has the potential to heighten their consciousness and foster the adoption of health-promoting behaviours during the execution of procedures.

4. Discussion

The purpose of the systematic review was to ascertain the prevalence of musculoskeletal injuries among endoscopists, identify the associated risk factors, and propose potential strategies for their implementation. The results of the study indicated a significant occurrence of musculoskeletal injuries among individuals performing endoscopic procedures. The review conducted an analysis of reported prevalence rates for Musculoskeletal Injuries (MSIs) among endoscopists, revealing a considerable variation in the range of rates reported, spanning from 30% to 90%. The disparity in prevalence can be ascribed to variations in study design, sample sizes, definitions of musculoskeletal injuries (MSIs), and methods of data collection. The results necessitate healthcare institutions to place emphasis on the musculoskeletal well-being of their endoscopy practitioners. Risk factors refer to variables or conditions that increase the likelihood of an individual or a group experiencing negative outcomes or adverse events. These factors, the identified risk factors commonly associated with the task, include extended duration of procedures, repetitive movements, uncomfortable postures, frequent turnover of patients, and the absence of ergonomic equipment. The development of musculoskeletal injuries (MSIs) was found to be associated with various individual factors, including age, physical fitness, prior medical history, and workload. The presence of these risk factors suggests that musculoskeletal injuries (MSIs) are influenced by multiple factors, including both procedural and individual elements, which collectively contribute to the risk of injury. It is imperative to implement preventive measures aimed at mitigating these risk factors to effectively decrease the prevalence of musculoskeletal injuries (MSIs) and foster a safer working environment for professionals in the field of endoscopy. The utilization of adjustable equipment, anti-fatigue flooring, appropriate table height, and ergonomic accessories has been demonstrated to be efficacious in enhancing posture and diminishing physical strain encountered during endoscopy procedures. Training programs that prioritize the implementation of correct body mechanics and incorporate stretching exercises have demonstrated potential in the prevention of musculoskeletal injuries (MSIs).

The implementation of ergonomic interventions plays a crucial role in the promotion of musculoskeletal health among endoscopists, thereby contributing to the improvement of their overall well-being. It is recommended that healthcare

institutions allocate resources towards the acquisition of ergonomic equipment and the implementation of comprehensive training programs. These measures are crucial in promoting the appropriate utilization of ergonomic practices among endoscopy practitioners. The presence of organizational support and the establishment of a safety-oriented culture are essential elements in the prevention of musculoskeletal injuries (MSIs) and the promotion of a conducive work environment for employee well-being. Through the implementation of these strategies, healthcare institutions could showcase their dedication to the welfare of endoscopy practitioners and enhance the overall standard of patient care. Ergonomic interventions, organizational support, and comprehensive training programs are essential elements of a comprehensive strategy aimed at preserving the musculoskeletal well-being of endoscopy practitioners. Healthcare organizations ought to contemplate the incorporation of these strategies into their customary practices and policies to foster a work environment that is both safer and more sustainable for endoscopists. The implementation of proactive strategies aimed at preventing musculoskeletal injuries (MSIs) not only yields advantages for endoscopy practitioners but also leads to enhanced patient care outcomes and heightened efficiency within the realm of endoscopy practice.

5. Limitations

The systematic review has some shortcomings, such as its lack of homogeneity, a lack of standardized definitions for musculoskeletal injuries (MSIs), publication bias, an insufficient number of longitudinal studies, incomplete reporting of risk factors and a scarcity of intervention studies. Studies that have methodological constraints, insufficient sample sizes, or incomplete reporting can introduce bias, which can have an impact on the strength of the conclusions drawn from the review. The validity and reliability of the findings of a review are influenced by the quality of the studies that are included in the review.

6. Conclusion

In conclusion, this comprehensive review underscores the significant occurrence of musculoskeletal injuries among endoscopists, underscoring the pressing necessity for preventive measures and interventions. The risk factors that have been identified, including prolonged duration of procedures, inadequate ergonomics, and insufficient awareness, play a substantial role in the occurrence of these injuries. To adequately tackle this matter, it is advisable for healthcare establishments to incorporate all-encompassing ergonomic training initiatives for endoscopists. Furthermore, it is advisable to promote the incorporation of regular intervals during procedures in order to mitigate the physical stress exerted on muscles and joints. Additional research is necessary to examine the potential long-term effects of musculoskeletal injuries on endoscopists, including their influence on career duration and patient outcomes. Furthermore, it is recommended that forthcoming research endeavours focus on assessing the efficacy of targeted ergonomic interventions in mitigating injury prevalence and enhancing the overall welfare of endoscopists. By implementing the recommendations and conducting additional research in this field, efforts can be made to establish a more secure working environment for endoscopists, thereby ultimately improving the quality of patient care.

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