

OCCUPATIONAL HEALTH AND SAFETY IN WORKPLACE: CONCEPTS, RISKS, AND PREVENTIVE MANAGEMENT APPROACHES

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Abstract

Occupational Health and Safety (OHS) is a multidisciplinary field concerned with the prevention of work-related injuries, diseases, and fatalities while promoting the physical, mental, and social well-being of workers. With rapid industrialization, technological advancement, and evolving work environments, occupational hazards have become more complex, necessitating systematic and evidence-based approaches to workplace safety and health. This review article provides a comprehensive overview of the principles of occupational health and safety, major categories of occupational hazards, health outcomes associated with unsafe working conditions, and established preventive and control strategies. Additionally, the role of legislation, safety management systems, ergonomics, and organizational culture in enhancing workplace safety is discussed. Emerging challenges such as psychosocial risks, remote work, automation, and climate-related occupational hazards are also highlighted. The review concludes by emphasizing the importance of integrated OHS frameworks, worker participation, and continuous improvement to achieve sustainable and safe workplaces.

Keywords: Occupational health, Workplace safety, Occupational hazards, Ergonomics, Safety management systems, Worker well-being

Introduction

Occupational Health and Safety (OHS) play a vital role in safeguarding workers from health risks and accidents arising from their work environment. The concept of protecting workers' health dates back to ancient civilizations, but OHS has evolved significantly in response to industrial growth, globalization, and technological innovation. According to international labor estimates, millions of workers suffer from occupational injuries and diseases annually, resulting in substantial human suffering and economic losses. These incidents not only affect workers and their families but also reduce productivity, increase healthcare costs, and negatively impact organizational reputation.

The primary objective of OHS is to anticipate, recognize, evaluate, and control workplace hazards that may cause harm to workers. Modern OHS goes beyond accident prevention and includes the promotion of overall worker well-being, encompassing physical, mental, and social dimensions of health. The scope of occupational health and safety has expanded to address emerging risks such as psychosocial stress, musculoskeletal disorders, exposure to new chemicals, and risks associated with digital and remote work environments. This article aims to synthesize existing knowledge on occupational health and safety by examining its fundamental principles, types of occupational hazards, health impacts, preventive strategies, and future trends. By providing a holistic understanding of OHS, this review seeks to highlight its importance in achieving sustainable development and decent work conditions [1].

Concept and Scope of Occupational Health and Safety

Occupational Health and Safety refer to the policies, procedures, and practices designed to protect workers from hazards encountered in the workplace. It encompasses occupational health, which focuses on preventing work-related illnesses, and occupational safety, which aims to prevent injuries and accidents. The World Health Organization defines occupational health as the promotion and maintenance of the highest degree of physical, mental, and social well-being of workers in all occupations.

The scope of OHS includes hazard identification, risk assessment, health surveillance, accident investigation, and the implementation of preventive measures. It also involves ensuring compliance with legal requirements, providing training and education, and fostering a safety culture within organizations. OHS applies to all sectors, including manufacturing, construction, healthcare, agriculture, mining, and service industries, as well as emerging forms of work such as gig and platform-based employment.

Occupational hazards are sources or situations with the potential to cause harm to workers. These hazards are generally classified into physical, chemical, biological, ergonomic, and psychosocial categories. Physical hazards include environmental factors that can cause injury or illness without direct contact. Common physical hazards are noise, vibration, extreme temperatures, radiation, poor lighting, and electrical hazards. Prolonged exposure to excessive noise can lead to noise-induced hearing loss, while vibration exposure may cause hand-arm vibration syndrome. Heat stress and cold stress can impair worker performance and increase the risk of accidents [2,3].

Materials and Methods

This study This review adopted a structured narrative review methodology to synthesize current evidence on occupational health and safety (OHS) concepts, workplace risks, and preventive management approaches across diverse occupational settings. The materials and methods were designed to ensure transparency, reproducibility, and comprehensive coverage of relevant literature, and A narrative review approach was selected to allow an in-depth exploration of theoretical frameworks, hazard classifications, and management strategies in occupational health and safety. This design was

considered appropriate due to the multidisciplinary nature of OHS, encompassing ergonomics, industrial hygiene, occupational medicine, safety engineering, and organizational management. The study followed established guidelines for narrative reviews, including systematic literature identification, screening, and thematic synthesis. A comprehensive literature search was conducted across multiple electronic databases, including PubMed, Scopus, Web of Science, Google Scholar, and ScienceDirect. Grey literature was also consulted to capture guidelines and policy documents from recognized international organizations such as the World Health Organization (WHO), International Labour Organization (ILO), Occupational Safety and Health Administration (OSHA), and national occupational health agencies [4-6].

Search terms were developed using a combination of keywords and Boolean operators to maximize retrieval of relevant studies. Core search terms included occupational health, occupational safety, workplace hazards, risk assessment, ergonomics, industrial safety, preventive strategies, safety management systems, and workplace health promotion. Variations and synonyms of these terms were applied, and reference lists of selected articles were manually screened to identify additional relevant publications.

Studies were included if they met the following criteria: (1) published in peer-reviewed journals or authoritative organizational reports; (2) written in English; (3) focused on occupational health and safety concepts, hazard identification, risk assessment, or preventive and management strategies; and (4) involved workplace settings such as industrial, healthcare, construction, transportation, agricultural, or office environments. Both qualitative and quantitative studies, including observational studies, intervention studies, systematic reviews, and policy analyses, were considered.

Data extraction was performed using a standardized data extraction framework. Key information extracted included author details, year of publication, study design, occupational sector, types of hazards addressed (physical, chemical, biological, ergonomic, psychosocial), risk assessment methods, and preventive or management interventions. Extracted data were organized thematically. A thematic synthesis approach was employed to categorize findings into major domains: foundational concepts of occupational health and safety, classification of workplace risks, risk assessment and control measures, and preventive management approaches. Preventive strategies were further analyzed using the hierarchy of controls framework,

including elimination, substitution, engineering controls, administrative controls, and personal protective equipment.

Results

The Occupational Health and Safety (OHS) has been widely studied across disciplines including public health, industrial engineering, ergonomics, psychology, and organizational management. The existing literature emphasizes that effective OHS practices are essential for preventing occupational injuries and diseases, improving worker well-being, and enhancing organizational productivity. Over time, research has evolved from a narrow focus on accident prevention to a more comprehensive approach that integrates physical, psychological, and social aspects of work [7].

Historical Development of Occupational Health and Safety

Early studies on occupational health primarily focused on industrial hazards associated with manufacturing and mining sectors. Classical research highlighted the relationship between hazardous working conditions and occupational diseases such as pneumoconiosis, lead poisoning, and hearing loss. The introduction of occupational safety legislation in many countries marked a significant shift toward formalizing workplace safety responsibilities. Scholars have noted that regulatory frameworks played a crucial role in reducing fatal injuries and improving working conditions, particularly in high-risk industries.

As industrial processes advanced, research attention expanded to include systematic hazard identification and risk assessment methods. The development of safety management theories emphasized the role of organizational responsibility rather than individual worker error. This shift laid the foundation for modern OHS frameworks that prioritize prevention through system design and management commitment.

Occupational Hazards and Health Outcomes

A substantial body of literature has examined the association between occupational hazards and adverse health outcomes. Studies consistently report that physical hazards such as noise, vibration, and extreme temperatures contribute to long-term health conditions, including hearing impairment and cardiovascular disorders. Chemical exposure research has demonstrated strong links between workplace chemicals and respiratory diseases, skin disorders, and

occupational cancers, particularly in industrial and agricultural settings.

Biological hazards have been extensively studied in healthcare and laboratory environments, especially following global infectious disease outbreaks. Research highlights the increased risk of occupational infections among healthcare workers and emphasizes the importance of infection control measures. In recent decades, ergonomic hazards have gained prominence, with numerous studies identifying musculoskeletal disorders as one of the leading causes of work-related disability worldwide. Poor workstation design, repetitive movements, and manual material handling are consistently reported as significant contributors to these disorders (Figure 1) [8].



Figure 1: Comprehensive Personal Protective Equipment (PPE) for Industrial Environments.

Discussion

Occupational health and safety (OHS) remains a critical component of workforce well-being and organizational sustainability across all employment sectors. The findings synthesized in this review highlight that OHS is not limited to the prevention of accidents and injuries but encompasses a broad spectrum of physical, chemical, biological, ergonomic, and psychosocial risks that collectively influence worker health, productivity, and quality of life. The discussion integrates these findings within the context of existing theoretical frameworks, regulatory expectations, and evolving workplace dynamics.

One of the central themes emerging from this review is the persistent prevalence of workplace hazards despite advances in technology and regulatory oversight. Physical hazards such as noise, vibration, extreme

Conclusion

Occupational Health and Safety is a critical component of sustainable development and decent work. Protecting workers from occupational hazards not only prevents injuries and diseases but also enhances productivity, job satisfaction, and organizational resilience. This review highlights the multifaceted nature of OHS, encompassing hazard identification, risk management, ergonomics, legislation, and emerging challenges. Effective OHS requires strong leadership commitment, worker involvement, and continuous improvement. As work environments continue to evolve, prioritizing occupational health and safety will remain essential for ensuring the well-being of workers and the long-term success of organizations.

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