

HYGIENIC ASSESSMENT OF RISK FACTORS AFFECTING STUDENTS' HEALTH AND MODERNIZATION OF THE PREVENTIVE SYSTEM IN HIGHER EDUCATIONAL INSTITUTIONS

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Abstract: Students represent a vulnerable population exposed to a combination of environmental, behavioral, ergonomic, and psychosocial risk factors. These determinants significantly influence physical, mental, and social well-being throughout academic training. This article presents a hygienic assessment of major health-related risk factors affecting university students, using epidemiological, analytical, and ergonomic methods. A modern preventive system aligned with international health-promoting university standards is proposed. Findings emphasize the need for integrated approaches combining environmental hygiene, lifestyle modification, digital health management, and educational reforms.

Keywords: student health, hygienic assessment, preventive system, environmental hygiene, ergonomics, public health

1. Introduction

University students experience unique health challenges due to academic workload, lifestyle modifications, social adaptation, and environmental exposures. Numerous studies indicate that students face increased risks of stress-related disorders, visual fatigue, and musculoskeletal strain, sleep disturbances, and reduced physical activity.

The learning environment—including classroom microclimate, lighting, noise, dormitory conditions, and digitalization of education—plays a critical role in shaping overall health. Hygienic assessment is therefore essential to identify harmful exposures and develop evidence-based preventive strategies.

This study aims to evaluate key risk factors affecting student health and propose a modernized preventive system for higher education institutions.

2. Scientific Relevance

The scientific relevance of this study is grounded in the urgent need to address the multifaceted health challenges faced by university students in the contemporary academic environment. In recent years, there has been a marked increase in health problems associated with extensive digital device usage, including eye strain, musculoskeletal discomfort, and disruptions of circadian rhythms, which collectively impair cognitive performance and overall well-being. Concurrently, students are experiencing growing psychosocial pressures stemming from academic demands, heightened competition, social adaptation challenges, and increasing levels of stress and anxiety. These psychosocial stressors have been linked to both physical and mental health deterioration, emphasizing the necessity of a comprehensive approach to student health.

Moreover, numerous international studies, including reports from the World Health Organization, highlight a significant decrease in physical activity levels among students worldwide, contributing to the prevalence of sedentary lifestyle-related conditions such as obesity, cardiovascular risk, and metabolic disturbances. In addition to behavioral factors, environmental conditions in educational institutions often fail to meet established hygienic standards.

Classrooms and dormitories may exhibit inadequate ventilation, suboptimal lighting, elevated noise levels, and poor ergonomic design, all of which negatively affect student health and academic performance.

Despite the recognition of these challenges, there is a notable lack of integrated preventive frameworks that simultaneously address lifestyle behaviors and environmental determinants. Therefore, this research is scientifically relevant because it aims to combine hygienic assessment, epidemiological monitoring, ergonomic evaluation, and psychosocial analysis to construct a comprehensive model of student health. By integrating these diverse perspectives, the study seeks to provide evidence-based recommendations for modernizing preventive strategies in higher educational institutions, ensuring that interventions are holistic, targeted, and aligned with international standards for health-promoting universities.

3. Purpose of the Study

To perform a hygienic assessment of environmental, behavioral, and psychosocial risk factors affecting students' health and develop a modern preventive system for improving well-being in higher educational institutions.

4. Research Objectives

1. To identify key lifestyle-related health risk factors among university students.
2. To assess environmental and ergonomic conditions in educational settings.
3. To analyze psychosocial stressors and mental health determinants.
4. To evaluate the relationship between risk factors and student morbidity indicators.
5. To develop recommendations for improving the preventive health system.

5. Materials and Methods

This study employs a multidisciplinary methodological framework designed to comprehensively assess the various factors influencing student health within higher education institutions. The hygienic assessment component involved systematic measurements of classroom environmental parameters, including temperature, humidity, air ventilation rates, CO₂ concentration levels, illumination, and ambient noise. In addition, the ergonomic suitability of classroom furniture and digital learning environments was evaluated to determine the extent to which the physical setting may contribute to musculoskeletal strain, postural problems, and overall comfort.

Epidemiological methods were utilized to gather detailed health-related information from the student population. Structured surveys were administered to collect data on individual health status, lifestyle habits, and exposure to potential risk factors, while institutional health records were analyzed to assess morbidity patterns and identify prevalent health conditions. This dual approach allowed for the triangulation of self-reported and clinically recorded data, thereby enhancing the reliability and validity of the findings.

Behavioral assessment focused on identifying lifestyle determinants of health, including sleep patterns, dietary habits, physical activity levels, and the extent of daily screen-time exposure. These factors were analyzed to determine their correlation with both physical and mental health outcomes among students.

Finally, statistical analyses were conducted using correlation and multivariate modeling techniques to identify significant predictors of adverse health outcomes and to quantify the

relative contribution of environmental, behavioral, and psychosocial factors. This integrated approach ensures a comprehensive understanding of the complex interactions between lifestyle, environmental exposures, and student health, providing a robust evidence base for the development of targeted preventive interventions.

6. Results

The results of this study demonstrate the multifactorial nature of health risks among university students, highlighting the interplay of environmental, behavioral, and psychosocial factors in shaping overall well-being.

6.1. Environmental Risk Factors

Comprehensive environmental assessments revealed that a significant proportion of classrooms did not meet established hygienic standards. CO₂ concentrations in 65% of the measured classrooms exceeded recommended limits of 1000 ppm, which is associated with cognitive fatigue, reduced concentration, and a decline in academic performance. Illumination levels were found to be below the recommended 300–500 lux in 58% of classrooms, contributing to visual strain, headaches, and eye fatigue among students. Ergonomic evaluation indicated that 72% of desks and chairs were inadequately designed, leading to postural deviations, musculoskeletal discomfort, and increased risk of chronic back and neck problems. Additionally, 47% of classrooms exhibited noise levels above 55 dB during lecture periods, which negatively impacted attention span, memory retention, and task performance. These findings underscore the critical role of the physical learning environment in student health and the necessity for targeted environmental interventions.

6.2. Behavioral Risk Factors

Behavioral assessment through structured surveys revealed concerning lifestyle patterns among students. Approximately 68% of participants reported sleeping less than seven hours per night, with 35% sleeping fewer than six hours, which is below the recommended duration for optimal cognitive function and immune health. Excessive screen-time exposure was prevalent, with 72% of students reporting more than eight hours of daily digital device usage for academic and recreational purposes, contributing to visual fatigue, sedentary behavior, and increased stress levels. Only 24% of students met the WHO's recommended minimum of 150 minutes of moderate physical activity per week, highlighting a significant gap in adherence to healthy activity guidelines. Furthermore, irregular eating patterns were reported by 54% of respondents, with frequent skipping of breakfast and reliance on fast food, which may lead to nutritional deficiencies, metabolic disturbances, and impaired academic performance.

6.3. Psychosocial Stressors

The psychosocial evaluation revealed high levels of stress and anxiety among students. Academic pressure, including exam-related stress, assignment deadlines, and competitive learning environments, was reported by 78% of participants. Social insecurity, including challenges in peer interactions, adaptation to university life, and financial stressors, affected approximately 62% of students. Anxiety specifically related to examinations and performance evaluations was reported by 70% of participants, while 55% indicated difficulties in time management, which exacerbates overall stress and contributes to both mental and physical health complaints. These psychosocial stressors are consistent with global findings linking university life to increased rates of anxiety, depression, and psychosomatic symptoms.

6.4. Combined Impact

Statistical analysis using multivariate regression models demonstrated that behavioral and environmental risk factors jointly accounted for approximately 62% of reported health complaints, while psychosocial stress contributed an additional 22%. Musculoskeletal disorders, particularly lower back and neck pain, were prevalent in 48% of students, while visual system complaints, including eye strain and headaches, were reported by 56%. Interestingly, students exposed to both high environmental risks (poor lighting, high CO₂, noise) and negative lifestyle factors (sleep deprivation, excessive screen time, physical inactivity) were 1.8 times more likely to report health complaints compared to students with fewer risk exposures. These findings confirm the synergistic effect of multiple risk factors on student health and emphasize the necessity of integrated preventive measures targeting environmental, behavioral, and psychosocial domains simultaneously.

9. Conclusion

The findings of this study clearly demonstrate that student health in higher education institutions is significantly influenced by a combination of modifiable hygienic, behavioral, and psychosocial factors. Environmental conditions, including classroom air quality, lighting, noise levels, and ergonomic design, have a direct impact on cognitive performance, visual comfort, and musculoskeletal health. Simultaneously, behavioral patterns such as sleep duration, physical activity, dietary habits, and screen-time exposure play a critical role in determining both physical and mental well-being. Psychosocial stressors, including academic pressure, social adaptation challenges, and time management difficulties, further exacerbate health risks, contributing to increased prevalence of anxiety, fatigue, and psychosomatic complaints.

Addressing these interrelated factors requires a comprehensive, evidence-based approach. Improvements in the learning environment, such as enhanced ventilation, optimal illumination, ergonomic classroom furniture, and noise reduction measures, can substantially reduce environmental health risks. Promotion of healthy lifestyles through structured physical activity programs, nutritional education, and sleep hygiene interventions can mitigate behavioral risk factors. Furthermore, establishing robust psychosocial support systems, including counseling services, stress management workshops, and peer-support networks, is essential for fostering resilience and mental well-being among students.

Taken together, the implementation of a modern, integrated preventive system that combines environmental, behavioral, and psychosocial strategies is essential for safeguarding student health. Such a system aligns with international standards for health-promoting universities and provides a sustainable framework for enhancing academic performance, overall well-being, and long-term health outcomes in the student population. The study underscores the importance of coordinated interventions at institutional, educational, and policy levels, highlighting that proactive, multifaceted strategies are key to creating a supportive and health-conducive learning environment.

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