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# Ergonomics and mental workload with office syndrome symptoms at Health Vocational College X

*Ergonomi dan Beban Kerja Mental dengan Keluhan Office Syndrome pada Perguruan Tinggi Vokasi X*

**Fasya Fatarani Nadhira[1*], Ardini Saptaningsih Raksanagara[1], Sri Yusnita Irda Sari[1], Radite Nusasenjaya[2], Ridwansyah[2], Neneng Yetty Hanurawaty[3]**
[1]Kesehatan Masyarakat, Fakultas Kedokteran, Universitas Padjadjaran, Bandung, Indonesia
[2]Fakultas Kedokteran, President University, Kabupaten Bekasi, Indonesia
[3]Sanitasi Lingkungan, Politeknik Kesehatan Kementerian Kesehatan Bandung, Cimahi, Indonesia
*Email: fasyanadhira52@gmail.com

## ABSTRACT

***Background:*** *Office Syndrome refers to musculoskeletal complaints caused by static work postures, prolonged work duration, and non-ergonomic work facilities. Previous studies have shown that poor posture, inadequate workstation design, prolonged computer use, and high mental workload contribute to musculoskeletal disorders (MSDs). However, studies examining the combined influence of ergonomic factors and mental workload among lecturers and educational staff at health vocational colleges remain limited.*
***Objective:*** *Analyze the influence of ergonomic factors and mental workload on the incidence of Office Syndrome in lecturers and educational staff at health vocational colleges.*
***Methods:*** *The study used a quantitative cross-sectional approach with 88 respondents purposively. Data were collected using an ergonomic questionnaire, NASA-TLX, and Office Syndrome questionnaire. Validity test shows that r count>r table (0.361) and Cronbach's Alpha reliability test>0.7.*
***Results:*** *The Somers' test showed a significant relationship between ergonomics and Office Syndrome (p=0.032) as well as mental workload and Office Syndrome (p= 0.007). Ordinal logistic regression analysis shows that ergonomics (p=0.030) and mental workload (p=0.019) have a significant effect on the level of office syndrome.*
***Conclusion:*** *Ergonomic factors and mental workload have a significant effect on office syndrome complaints. Interventions are needed in the form of improving the ergonomic work environment and managing mental workload to reduce the risk of physical complaints in the higher education environment.*

***Keywords:*** *ergonomics, mental workload, office syndrome*

## ABSTRAK

**Latar Belakang:** *Office Syndrome* merupakan kumpulan keluhan muskuloskeletal yang disebabkan oleh postur kerja statis, durasi kerja yang lama, dan penggunaan fasilitas kerja yang tidak ergonomis. Penelitian sebelumnya menunjukkan bahwa postur kerja yang buruk, desain *workstation* yang tidak ergonomis, penggunaan komputer berkepanjangan, serta beban kerja mental yang tinggi berkontribusi terhadap gangguan muskuloskeletal (MSDs). Namun, penelitian yang mengkaji pengaruh ergonomi dan beban kerja mental secara bersamaan pada dosen dan tenaga kependidikan di perguruan tinggi kesehatan masih terbatas.
**Tujuan:** Menganalisis pengaruh faktor ergonomi dan beban kerja mental terhadap kejadian *Office Syndrome* pada dosen dan tenaga kependidikan .


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**Metode:** Penelitian menggunakan pendekatan kuantitatif potong lintang pada 88 responden secara *purposive*. Data dikumpulkan menggunakan kuesioner ergonomi, NASA-TLX, dan kuesioner *Office Syndrome*. Uji validitas menunjukkan r hitung > r tabel (0,361) dan uji reliabilitas *Cronbach's Alpha* > 0,7.
**Hasil:** Hasil uji Somers'd menunjukkan hubungan signifikan ergonomi dan *Office Syndrome* (p= 0,032) serta beban kerja mental dan *Office Syndrome* (p= 0,007). Analisis regresi logistik ordinal menunjukkan ergonomi (p= 0,030), beban kerja mental (p= 0,019) berpengaruh signifikan terhadap tingkat *Office Syndrome.*
**Kesimpulan:** Faktor ergonomi dan beban kerja mental berpengaruh secara signifikan terhadap keluhan *office syndrome*. Perlu dilakukan intervensi berupa perbaikan lingkungan kerja ergonomis serta pengelolaan beban kerja mental untuk menurunkan risiko keluhan fisik lingkungan pendidikan tinggi.

**Kata kunci**: beban kerja mental, ergonomi, *office syndrome*

## INTRODUCTION

Occupational Safety and Health (K3) is an important effort in protecting the workforce by managing risks in the work environment, thereby creating safe, comfortable, and productive working conditions. Based on Government Regulation Number 50 of 2012 concerning the Implementation of the Occupational Safety and Health Management System (SMK3), K3 aims to ensure the safety and health of workers through the prevention of workplace accidents and diseases arising from work activities. The implementation of K3 is not only relevant in the industrial sector, but also in the education sector, especially for educators and education personnel who have health risks due to static work postures and high mental workloads.[1.2]

Ignoring Occupational Safety and Health (OSH) aspects can lead to work accidents (KK) and occupational diseases (PAK), which have serious impacts on workers and institutions. Based on OSH Profile Data, the International Labor Organization (ILO) in 2008 released data that globally there are approximately 430 million cases of KK and PAK each year, with 270 million cases (62.8%) being work accidents and 160 million cases (37.2%) being work-related diseases. As a result, approximately 2.78 million workers die each year, and 40% of these occur among young workers. Economically, losses due to KK and PAK are estimated to reach 3.94%–4% of a country's Gross Domestic Product (GDP). Medical costs in the United States due to KK and PAK are estimated to reach $67 billion, with indirect costs approaching $183 billion.[1–4]

Indonesia already has regulations and sufficient human resources to implement Occupational Safety and Health (K3). However, work-related cases continue to increase. Based on data from the Social Security Administration for Employment (BPJS Ketenagakerjaan), the number of workers benefiting from the Work Accident Insurance (JKK) program from 2019 to 2022 reached 210,789 people (with 4,007 deaths), 221,740 people (3,410 deaths), and 234,370 people (6,552 deaths). Compensation costs incurred from 2019 to 2021 were Rp 1.58 trillion, Rp 1.56 trillion, and Rp 1.79 trillion, respectively.[3.4]

One occupational disease that is gaining increasing attention is Office Syndrome, a group of musculoskeletal disorders often experienced by employees who spend long periods working in fixed or static postures. Common symptoms include back pain, neck stiffness, shoulder tension, wrist problems, and depression and stress. This condition can have long-term effects that can impair health and reduce productivity.[5]

One organization whose employees frequently neglect occupational safety and health is educational institutions. In this modern era, employees in the education sector, particularly lecturers and administrative staff, increasingly require the use of technology and computer devices in various daily activities. Universities, as educational institutions



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with diverse academic and administrative activities, have caused many lecturers and administrative staff to spend considerable time in front of computers and other devices related to their work. This has the potential to cause various health problems, one of which is office syndrome.

Ergonomic factors are one of the main causes of office syndrome. Ergonomics encompasses the arrangement of the work environment and equipment to support good posture, such as the arrangement of chairs, desks, and lighting. An ergonomically poor workplace causes employees to maintain unnatural postures for prolonged periods, which increases the risk of physical disorders. Research conducted by Pramono et al. (2022) on ergonomic risk assessment in office work environments found that ergonomic factors play a role in the occurrence of work-related musculoskeletal disorders.[6]

Workload also plays a role in exacerbating these complaints, both physically and mentally. Mental workload is related to the individual's experience of feeling that the tasks they face demand more than their mental capabilities, leading to feelings of stress and psychological exhaustion. High workloads often cause employees to push their bodies beyond safe limits, leading to mental and physical exhaustion, forcing employees to work in suboptimal conditions, and increasing the risk of muscle strain. Research by Heidarimoghdam R, et al. found that mental workload impacts musculoskeletal disorder complaints.[7–10]

Health Vocational College X Bandung Campus B has 8 Study Programs with 4 departments with a ratio of lecturers to students of 1:36, while based on the provisions of the Accreditation Form of the Association of Independent Accreditation Institutions for Indonesian Health Higher Education (LAM-PTKes) the ideal ratio is a maximum of 1:21. The average credit load of lecturers at Campus B is around 23 to 30 credits per lecturer, while the requirements set for lecturer LKD are a maximum of 16 credits, this shows that the workload of lecturers at Health Vocational College X Bandung Campus B is very high when viewed from the ratio of lecturers to students and the workload of lecturers each semester.

Many studies have been conducted on Office Syndrome caused by ergonomic factors and mental workload among workers in the industrial, medical, and administrative sectors. However, most of these studies have focused on non-academic workers and analyzed ergonomic factors and mental workload separately. To date, studies that simultaneously examine the influence of ergonomics and mental workload on Office Syndrome complaints among lecturers and educational staff at health vocational colleges are still very limited. This is even though the characteristics of work in this group involve prolonged static sitting, intensive computer use, and high cognitive demands. Therefore, this study aims to fill this knowledge gap by simultaneously analyzing ergonomic factors and mental workload on the incidence of Office Syndrome. This is expected to provide scientific contributions in the form of specific empirical evidence in the context of health vocational colleges and serve as a basis for formulating ergonomic intervention strategies and mental workload management to improve employee health and productivity. This research analyzes the influence of ergonomic factors and mental workload on office syndrome in lecturers and educational staff at the X Health Vocational College.

## METHODS

### Study design

The study was conducted at the Vocational College of Health X Campus B, Cimahi City, in May 2025 using a cross-sectional observational design with an analytical approach, based on primary data. The subjects of this study included lecturers and educational staff at the Vocational College of Health X Bandung Campus B, which


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consists of 8 Study Programs, including: Medical Laboratory Technology Study Program with Diploma III and Applied Bachelor levels, Diploma III Sanitation Study Program, Applied Bachelor Environmental Sanitation Study Program, Diploma III Nutrition Study Program, Applied Bachelor Nutrition & Dietetics Study Program along with Dietetician Profession, and Applied Bachelor Health Promotion Study Program.

### Data source and sampling prosedure

Sampling in this study was not done randomly (non-probability sampling) with criteria determined by the researcher (purposive sampling). These criteria include the respondent's status as an active lecturer or administrative education staff at Health Vocational College X. Based on the calculation results with Slovin's calculation, the minimum number of respondents that must be taken is 79 people from a total population of 99 people. The number of respondents successfully collected was 88 people, and all of them met the inclusion criteria, namely lecturers and education staff at Health Vocational College X who were willing to be respondents and had work activities using computers. The exclusion criteria in this study included education staff outside the administrative field and respondents with incomplete questionnaire data. Thus, all respondents analyzed were considered eligible and representative of the study population.

### Variable of the study

In this study, several potential confounding factors were considered, including gender, smoking habits, and age. These variables were collected through a respondent characteristics questionnaire and used as control variables in the analysis to minimize bias in the relationship between ergonomics, mental workload, and Office Syndrome complaints.

### Instrument and measurement

Measurements were conducted using three instruments, namely the ergonomics questionnaire, NASA-TLX, and the Office Syndrome questionnaire. The ergonomics questionnaire consists of 16 items that measure aspects of work posture, use of work facilities, and rest habits, with an example of the question "how high is your monitor position?" with multiple choice in the form of pictures. The Office Syndrome questionnaire consists of 15 items that assess musculoskeletal complaints in certain body parts, such as the neck, shoulders, back, and wrists, with an example of the question "Do you experience pain or stiffness in the neck?" in multiple-choice form. Mental workload was measured using NASA-TLX, which includes 6 dimensions, namely mental demand, physical demand, temporal demand, performance, effort, and frustration level, with an example of the statement "How much effort do you expend to complete the work?".

All instruments were first tested for validity and reliability through a pilot study on 30 respondents with similar characteristics to the research sample. The results of the validity test using Pearson correlation showed that all items in the three instruments had a calculated r value greater than the table r (0.361), so all items were declared valid. The reliability test using Cronbach's Alpha showed an $\alpha$ value > 0.7 for each instrument, indicating good internal consistency. Instruments that had been declared valid and reliable were then used in the main research data collection.

### Data Collection

Data collection in this research was carried out using primary data and secondary data. Primary data was obtained directly from respondents by filling out questionnaires consisting of an ergonomics questionnaire, a mental workload questionnaire using the NASA Task Load Index, and an office syndrome questionnaire. An ergonomics questionnaire is used to assess respondents' working conditions based on aspects of use of monitors, work chairs, keyboards, mice, assistive devices, sitting posture, resting



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habits, as well as lighting and room temperature. The NASA-TLX questionnaire is used to measure the level of mental workload through six dimensions, namely mental demands, physical demands, temporal demands, own performance, effort, and frustration. Meanwhile, the office syndrome questionnaire was used to identify physical complaints experienced by respondents while working.

Data collection was carried out after respondents received an explanation of the research objectives and expressed their agreement to become research respondents (informed consent). Respondents then filled out the entire questionnaire independently according to the conditions they felt at work. Apart from primary data, this research also uses secondary data in the form of institutional profiles, the number of lecturers and education staff, as well as other supporting data obtained from Health Vocational College X.

### Ethical consideration

The entire research process has obtained ethical approval with the number No.03/KEPK/EC/VII/2025.

### Data analysis

Statistical analysis was conducted in stages, starting with univariate analysis to describe the distribution of respondent characteristics, ergonomics level, mental workload, and Office Syndrome complaints. Next, bivariate analysis was conducted using the Somers'd test to assess the relationship between independent and dependent variables. To determine the simultaneous influence and determine the most dominant factor on the level of Office Syndrome, a multivariate analysis was conducted using ordinal logistic regression by including ergonomics variables, mental workload, and relevant control variables. The significance level was set at $p < 0.05$.

## RESULTS

The respondents in this study were employees from four departments at the X Health Vocational Campus in the Cimahi City area, who were selected using a sampling technique to obtain a total of 88 educational and administrative staff.

**Table 1. Characteristics of Respondents of Lecturers and Education Personnel at Health Vocational Campus X in Cimahi City**

| Characteristics | n | % |
|---|---|---|
| Gender | | |
| Male | 48 | 54.5% |
| Female | 40 | 45.5% |
| Age | | |
| 20-29 | 4 | 4.5% |
| 30-39 | 23 | 26.1% |
| 40-49 | 25 | 28.45% |
| 50-59 | 23 | 26.1% |
| 60-69 | 13 | 14.8% |
| Length of working | | |
| <5 Years | 10 | 11.4% |
| 5-10 Years | 13 | 14.8% |
| >10 Years | 65 | 73.9% |
| Major | | |
| Environmental Health | 27 | 30.7% |
| Nutrition | 13 | 14.8% |
| Medical Laboratory Technology | 23 | 26.1% |
| Health Promotion | 25 | 28.4% |
| Occupation | | |
| Lecturer | 63 | 71.6% |


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| Characteristics | n | % |
|---|---|---|
| Administration | 25 | 28.4% |
| Smoking Habit | | |
| Smoker | 22 | 25.0% |
| Non-smoker | 66 | 75.0% |

Table 1 shows that the majority of the 88 respondents were male. The respondents with the largest age range were in the 40–49 years age group, amounting to 25 people, with the youngest respondent being 28 years old and the oldest respondent being 63 years old. The respondents' work period range was 2–40 years, with a short work period of 2 years and a long work period of 40 years. The employment status of most respondents was lecturer, amounting to 63 people, while the rest were education staff, amounting to 25 people. A total of 22 of the 88 respondents had a smoking habit. Univariate analysis of the independent variables, namely Ergonomics (X1) and Mental Workload (X2), and the dependent variable, namely Office Syndrome (Y). The frequency distribution of the three variables can be seen in Table 2.

**Table 2. Frequency Distribution of Ergonomics (X1) and Mental Workload (X2) as well as Office Syndrome (Y)**

| Variables | Category | Lecturers n (%) | Educational Personnel n (%) | Total n (%) |
|---|---|---|---|---|
| Ergonomics | Not Ergonomic | 14 (15.91%) | 4 (4.55%0 | 18 (20.5%) |
| | Less Ergonomic | 36 (40.91%) | 15 (17.05%) | 51 (58%) |
| | Ergonomic | 13 (14.77%) | 6 (6.82%) | 19 (21.6%) |
| Mental Workload | Light | 5 (5.68%) | 1 (1.14%) | 6 (6.8%) |
| | Moderate | 17 (19.32%) | 5 (5.68%) | 22 (25%) |
| | Heavy | 41 (46.59%) | 19 (21.59%) | 60 (68.2%) |
| Office Syndrome | Mild | 17 (19.32%) | 2 (2.27%) | 19 (21.6%) |
| | Moderate | 41 (46.59%) | 19 (21.59%) | 60 (68.2%) |
| | Severe | 5 (5.68%) | 4 (4.55%) | 9 (10.2%) |

Table 2 shows that in terms of ergonomics, the majority of respondents were in the less ergonomic category, namely 51 people. The mental workload variable shows that the majority of respondents experienced a heavy mental workload category, namely 60 people, and the majority of respondents experienced office syndrome in the moderate category, namely 60 people.

**Table 3. Frequency Distribution of Ergonomic Variables**

| Indicator | Question | Average Score | Category |
|---|---|---|---|
| Monitor Height | Monitor position height | 1.50 | Not good |
| Office Chair | Foot position when working with a computer | 1.70 | Good |
| | Foot height when working with a computer | 1.51 | Not good |
| | The height of the chair can be adjusted | 1.57 | Not good |
| | The chair's armrests and backrest are height-adjustable. | 1.48 | Not good |
| | A chair that has a backrest and has lower back support. | 1.38 | Not good |


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| Indicator | Question | Average Score | Category |
|---|---|---|---|
| Keyboard | Position when typing with a keyboard (side view) | 1.56 | Not good |
| | Position when typing with a keyboard (top view) | 1.52 | Not good |
| Mouse | Elbow position when using a mouse | 1.47 | Not good |
| | Wrist position when using a mouse | 1.67 | Not good |
| AIDS | Telephone use while working (hearing aid availability) | 1.50 | Not good |
| | Availability of assistive devices (mouse, wrist pad, adjustable laptop or monitor stand, and foot rest) | 1.23 | Not good |
| Sitting Posture | Sitting posture while working | 1.43 | Not good |
| Rest | Look away regularly every 20 minutes when using the computer. | 1.30 | Not good |
| | Take 5-10 minute breaks and stretch regularly while working. | 1.24 | Not good |
| Temperature and Lighting | Temperature and lighting in the workplace support comfort | 1.52 | Not good |

Table 3 shows that the analysis results using all ergonomic variable indicators indicate that the general level of application of ergonomic principles in the respondents' work environment is still considered poor. Six of the seven indicator groups assessed are in the "Poor" category. The item with the lowest score was the rest indicator, with an average score of 1.27, indicating that the majority of respondents do not have the habit of taking regular breaks, such as looking away and stretching while working, a practice that needs to be improved.

Another indicator with the lowest score is assistive devices, with a score of 1.36, indicating the minimal availability of work aids such as wrist pads, adjustable monitor stands, and footrests. The work chair indicator also occupies a low position with a score of 1.57, indicating that many respondents still use chairs that do not support ergonomic work postures, such as the lack of height adjustment or an appropriate backrest. Respondents' perceptions of the level of Mental Workload (X2) they experience, this study uses six dimensions of the NASA-TLX method, namely mental demands, time demands, physical demands, performance, effort, and frustration levels. Each dimension produces a product value from the results of multiplying the weights and ratings of each dimension by respondents. The results of the distribution of product values in each dimension can be seen in Table 4.

**Table 4. Frequency Distribution of Mental Workload Variable Product Values**

| Dimensions | Average Score Value | Category |
|---|---|---|
| Mental Demand | 219.52 | Not good |
| Physical Demand | 82.99 | Good |
| Temporal Demand | 211.64 | Not good |
| Own Performance | 262.51 | Not good |
| Effort | 235.25 | Not good |
| Frustration | 181.05 | Not good |
| Total | 198.83 | Not good |

Table 4 shows that overall, the average score of respondents' mental workload was categorized as "Poor" with a total score of 198.83. Five of the six dimensions measured showed results in the unfavorable category, namely: Mental Demand, Temporal


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Demand, Own Performance, Effort, and Frustration. The dimensions with the highest scores were Own Performance (262.51) and Effort (235.25), which indicates that respondents felt burdened in achieving expected work performance and had to exert high effort in completing their work. These two dimensions are of primary concern because they indicate the highest level of mental workload. Only one dimension was included in the "Good" category, namely Physical Demand, with a score of 82.99. Table 5 presents the distribution of frequencies, percentages, and average scores for each office syndrome indicator experienced by respondents.

**Table 5. Frequency Distribution of Variables Office Syndrome**

| Indicator | Statement | Average Score Value | Category |
|---|---|---|---|
| Pain and Physical Discomfort | Neck Pain | 1.13 | Not good |
| | Back Pain | 1.22 | Not good |
| | Shoulder Pain | 0.98 | Good |
| | Headache | 1.22 | Not good |
| Muscle Fatigue and Tension | Muscle Tension | 1.40 | Not good |
| | Muscle Fatigue | 1.47 | Not good |
| Visual Fatigue | Tired Eyes | 1.63 | Not good |
| | Blurred Vision | 1.16 | Not good |
| Tingling or Numbness | Tingling Hands/fingers | 1.42 | Not good |
| | Numb Feet | 1.15 | Not good |
| Decrease in Productivity | Difficulty Concentrating | 1.45 | Not good |
| | Decreased Work Efficiency | 1.33 | Not good |
| Sleep Disorders | Difficulty Sleeping | 1.22 | Not good |
| Stress and Mental Tension | Increased Stress | 1.31 | Not good |
| | Easy to get angry | 1.63 | Not good |

Table 5 shows the Office Syndrome variable indicators, which consist of seven main indicators, namely: physical pain and discomfort, fatigue and muscle tension, visual fatigue, tingling or numbness, decreased productivity, sleep disturbances, and mental stress and tension. The results show that all indicators fall into the "Poor" category.

The highest score was found in the muscle fatigue indicator with an average score of 1.43, followed by decreased productivity of 1.39, and visual fatigue of 1.33. The indicator with the lowest score was physical pain, with an average score of 1.13. All score categories indicate that most respondents experienced various physical and psychological complaints related to their work activities. These data reflect respondents' perceptions of the symptoms of Office Syndrome they experienced based on their current work conditions. These results serve as the basis for further analysis in the discussion in Chapter V regarding the factors contributing to this condition. The results of the bivariate analysis, the correlation of Ergonomics (X1) and Mental Workload (X2) with Office Syndrome (Y), are presented in Table 6 below.

**Table 6. Ergonomics Variables (X1) and Mental Workload (X2) with Office Syndrome *(Y)***

| | | *Office Syndrome* | | | | |
|---|---|---|---|---|---|---|
| | | Light | Currently | Heavy | Somers'd | *p-value* |
| Ergonomics | Not Ergonomic | 0 | 14 | 4 | -0.185 | 0.032 |
| | Less Ergonomic | 14 | 34 | 3 | | |
| | Ergonomic | 5 | 12 | 2 | | |
| Mental Workload | Light | 4 | 2 | 0 | 0.270 | 0.007 |
| | Moderate | 5 | 17 | 0 | | |
| | Heavy | 10 | 41 | 9 | | |


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Table 6 shows the Somers'd coefficient value of ergonomics (X1) with Office Syndrome (Y) of -0.185 with a significance value of p = 0.032, indicating that there is a negative and significant relationship (p <0.05) between the level of ergonomics and office syndrome. The negative direction indicates that the better the ergonomics (the more ergonomic), the level of office syndrome tends to decrease. These results support the assumption that less ergonomic work positions increase the risk of muscle tension and musculoskeletal disorders in workers.

The Somers'd value of Mental Workload (X2) with Office Syndrome (Y) is 0.270 with p = 0.007, which means there is a positive and significant relationship (p <0.05) between mental workload and office syndrome. This indicates that office syndrome increases with a high perceived mental workload. This is in accordance with the theory that high mental workload can trigger physiological stress and increase the risk of muscle tension and other physical complaints. The following table presents the relationship between confounding variables and office syndrome.

**Table 7. Confounding Variables with Office Syndrome**

| Variables | Category | Office Syndrome | | | | p-value |
|---|---|---|---|---|---|---|
| | | Light | Currently | Heavy | | |
| Age | 20-29 | 2 (10.5%) | 1 (1.70%) | 1 (11.1%) | Summer = -0.036 | 0.723 |
| | 30-39 | 4 (21.1%) | 17 (28.3%) | 2 (22.2%) | | |
| | 40-49 | 4 (21.1%) | 18 (30.0%) | 3 (33.3%) | | |
| | 50-59 | 5 (26.3%) | 3 (28.3%) | 1 (11.1%) | | |
| | 60-69 | 4 (21.1%) | 25 (11.7%) | 2 (22.2%) | | |
| Gender | Male | 8 (42.1%) | 35 (58.3%) | 5 (55.6%) | r=1.537 | 0.464 |
| | Female | 11 (57.9%) | 25 (41.7%) | 4 (44.4%) | | |
| Smoking Habit | Smoker | 7 (36.8%) | 12 (20.0%) | 3 (33.3%) | r=2.554 | 0.279 |
| | Non-smoker | 12 (63.2%) | 48 (80.0%) | 6 (66.7%) | | |

Table 7 shows no significant relationship between age and the incidence of office syndrome (p = 0.723), although the negative Somers'd value indicates an inverse relationship. Severe office syndrome is more common in men (55.6%) than in women (44.4%), but the Chi-Square test shows p = 0.464 (> 0.05). Similarly, the proportion of severe office syndrome is higher in non-smoking respondents (66.7%) than in smokers (33.3%), but not significantly (p = 0.279). Thus, smoking habits, gender, and age are not significantly related to the incidence of office syndrome in respondents. Ordinal logistic regression testing was used to analyze the relationship between Ergonomics (X1) and Mental Workload (X2) with the level of office syndrome (Y), which is an ordinal scale variable (categories: mild, moderate, and severe). This analysis is appropriate because the dependent variable has three sequential levels and is ordinal in nature.

**Table 8. Parameter Estimates Ergonomics and Mental Workload with Office Syndrome**

| Variables | Category | Estimate | Std. Error | Wald | Sig. |
|---|---|---|---|---|---|
| Ergonomics | Not Ergonomic | 1,675 | 0.777 | 4,644 | 0.031 |
| | Less Ergonomic | -0.035 | 0.607 | 0.003 | 0.955 |
| Mental Workload | Light | -2,237 | -,951 | 5,534 | 0.019 |
| | Moderate | -0.871 | 0.547 | 2,533 | 0.112 |
| Office Syndrome Threshold | OS = 1 | -1,566 | 0.565 | 7,667 | 0.006 |
| | OS = 2 | 2,491 | 0.649 | 14,737 | 0.0001 |
| Total Respondents | | 88 | 100% | | |

Table 8 shows the results of the ordinal logistic regression analysis, obtained information regarding the relationship between ergonomic variables, mental workload, and office syndrome threshold with the incidence rate of office syndrome in respondents. The


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Vol 18 No 1, Mei 2026
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ergonomic variables show that the non-ergonomic category has an estimated coefficient value of 1.675 with a significance value of 0.031 ($p < 0.05$). The mental workload variable, light category, shows an estimated value of -2.237 with a significance value of 0.019 ($p < 0.05$).

**Table 9. Ergonomic Parameter Estimates and Mental Workload Simultaneously with Office Syndrome**

| Category | *Estimate* | *Std. Error* | *Wald* | *Sig.* |
|---|---|---|---|---|
| Office Syndrome  Mild & Moderate | -1,631 | 0.663 | 6,060 | 0.014 |
| Office Syndrome Moderate & Severe | 2,442 | 0.729 | 11,232 | 0.001 |
| Not Ergonomic & Moderate Workload | 0.405 | 1,235 | 0.108 | 0.743 |
| Not Ergonomic & Heavy Workload | 1,737 | 0.909 | 3,650 | 0.056 |
| Less Ergonomic & Mild Workload | -2,337 | 1,090 | 4,601 | 0.032 |
| Less Ergonomic & Moderate Workload | -0.786 | 0.907 | 0.752 | 0.386 |
| Less Ergonomic & Heavy Workload | -0.171 | 0.750 | 0.052 | 0.819 |
| Ergonomic & Medium Workload | -1,028 | 1,058 | 0.943 | 0.332 |

Table 9 shows the results of the ordinal logistic regression analysis with the combined variables of ergonomics and mental workload, that the Less Ergonomic and Light Mental Workload categories show a significant value of $p = 0.032$ ($p < 0.005$) and an estimated value of -2.337.

## DISCUSSION

Table 2 shows that 60 (68.2%) respondents experienced moderate office syndrome symptoms, and 9 (10.2%) respondents experienced severe office syndrome symptoms. The results showed that the majority of respondents rated the overall ergonomic conditions of the work area, including rest, as "Poor." This indicates that most respondents have not implemented the habit of taking regular breaks or looking away while working. This analysis is important to determine which ergonomic aspects contribute most to the emergence of complaints, so that prevention efforts and ergonomic interventions can be focused more precisely and effectively.

This practice contradicts Dan MacLeod's workplace ergonomics recommendations regarding the need for micro-breaks to prevent muscle and eye strain. The recommended strategy is the "20-20-20" method, which suggests that every 20 minutes of staring at a computer screen, employees should look away for 20 seconds to reduce eye fatigue.[11]

This condition has the potential to increase the risk of musculoskeletal complaints, which is in line with Table 6, which shows that less ergonomic conditions cause moderate category office syndrome symptoms in respondents, where this finding is consistent with previous research, which confirms the importance of applying ergonomic principles to reduce complaints that are still "less good", especially in the muscles and skeleton.[12–14]

Respondents' mental workload also tended to be high, particularly in the dimensions of own performance (262.51) and effort (235.25), indicating excessive performance demands and work effort. This indicates that respondents felt pressure to achieve targeted work performance and had to exert significant effort in completing their tasks. These two dimensions were of primary concern because they reflected the highest levels of mental workload experienced by respondents. This finding aligns with the theory proposed by Octaviaji MR in his research, which states that mental workload is influenced by task characteristics, time demands, and job difficulty. When this pressure exceeds an individual's cognitive and emotional capabilities, it can lead to stress, mental fatigue, and even decreased work performance.[15]This can have an impact on the occurrence of office syndrome complaints, which are in accordance with the findings in Table 6, where heavy mental workloads cause office syndrome complaints in respondents in the moderate category.



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Vol 18 No 1, Mei 2026
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The office syndrome variable indicates that the majority of respondents experienced physical complaints, such as muscle fatigue, visual fatigue, and decreased productivity. These complaints are closely related to prolonged static activity, computer use, and non-ergonomic working postures.

Bivariate analysis showed a significant relationship between ergonomics and Office Syndrome ($p = 0.032$) with a coefficient of -0.185, indicating a negative relationship, meaning the more unergonomic the working conditions, the higher the level of Office Syndrome experienced. Unergonomic working positions, such as unbalanced static sitting postures, inappropriate placement of monitors and work devices, and lack of support for the back and extremities, can lead to increased biomechanical loads on muscles and joints. This condition triggers prolonged muscle tension, impaired blood flow, and accumulated muscle fatigue, thereby increasing the risk of musculoskeletal complaints typical of Office Syndrome.[11]

In addition, there is a significant relationship between mental workload and Office Syndrome ($p = 0.007$) with a coefficient of 0.270 indicating a positive relationship, meaning the higher the respondent's mental workload, the greater the perceived level of Office Syndrome. High mental workload, characterized by cognitive demands, time pressure, and the need for intense concentration, can increase sympathetic nervous system activation, causing a reflex increase in muscle tension, particularly in the neck, shoulders, and back. Persistent psychological tension also has the potential to worsen pain perception and slow muscle recovery, thereby exacerbating Office Syndrome symptoms.[16,17]

This finding is in line with previous research, which confirmed that non-ergonomic working postures, long sitting durations, and psychosocial stress are important factors in the occurrence of musculoskeletal disorders in office workers. [12–14]

In contrast, the variables of smoking habits, gender, and age did not show a significant association with the incidence of Office Syndrome ($p > 0.05$). This result is inconsistent with several previous studies that reported an association between demographic factors and smoking habits with musculoskeletal complaints. This difference in findings is likely due to the relatively homogeneous characteristics of the study respondents, particularly in terms of age range and type of work, which limited variation in exposure to risk factors. Furthermore, the low proportion of respondents who had a smoking habit in this study limited the variation in exposure and reduced statistical power to detect a relationship. Another factor that could potentially influence the results is the dominant exposure to ergonomic factors and mental workload in respondents' work activities, which have a more direct contribution to the emergence of Office Syndrome complaints than personal factors such as age, gender, and smoking habits. Thus, in the context of office work in a health vocational college environment, occupational factors appear to play a greater role than individual factors in determining the incidence of Office Syndrome.

Multivariate analysis shows that ergonomics and mental workload simultaneously significantly influence the incidence of Office Syndrome. A mild mental workload acts as a protective factor, while non-ergonomic working conditions increase the risk of moderate to severe Office Syndrome complaints. High levels of Office Syndrome have the potential to impact decreased work productivity, increased fatigue, impaired concentration, and decreased quality of academic and administrative tasks. In the long term, this condition can also increase the risk of absenteeism and burnout among lecturers and educational staff, thereby affecting overall institutional performance.

The findings of this study have practical implications for the implementation of the Occupational Safety and Health Management System (SMK3) in the education sector, particularly in controlling ergonomic and psychosocial risks. Technically, the


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Vol 18 No 1, Mei 2026
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implementation of ergonomic work positions includes adjusting the height of the chair and work desk so that the knee and elbow flexion angle is ±90°, the back position is supported by the chair back, the feet are fully on the floor, and the monitor is placed at or slightly below the eye line with a distance of ±50–70 cm. In addition, the use of a keyboard and mouse that are at elbow height and the implementation of active rest (microbreak) every ±20 minutes after staring at the computer are needed to reduce muscle tension.[11,16,18–23]

By incorporating ergonomics and mental workload aspects as part of the SMK3 policy in higher education environments, educational institutions can systematically prevent Office Syndrome, improve occupational comfort and health, and support the productivity and quality of human resource performance sustainably.

This study has several limitations. Data collection faced challenges with respondent access due to the implementation of the Work From Anywhere (WFA) system, resulting in longer questionnaire distribution and collection times. The use of self-report instruments has the potential to introduce subjective biases, such as social desirability bias and respondent misperceptions, which can affect data accuracy. Furthermore, the instrument's validity and reliability were tested using a classical approach (SPSS) and did not utilize the Rasch Model, which offers a higher level of measurement precision. The cross-sectional design limits the study's ability to explain causal relationships between variables. This study also did not include other factors potentially influencing Office Syndrome, such as work duration, social support, and exercise habits, due to limitations in scope, time, resources, and the number of respondents. Therefore, further research is recommended to use a longitudinal design, more objective measurement methods, and include additional variables to obtain a more comprehensive picture.

## CONCLUSION

This study concludes that ergonomic factors and mental workload play a significant role in the occurrence of Office Syndrome among lecturers and educational staff at Health Vocational College X, with mental workload being the more dominant factor. These findings have managerial implications for institutions to integrate ergonomic and psychosocial risk control into occupational safety and health policies, particularly through the implementation of the Occupational Safety and Health Management System (SMK3) in educational environments. Strategically, institutions are advised to arrange ergonomic workstations, implement active rest (microbreak) policies, and manage workload and cognitive demands proportionally. Further research is recommended to use a longitudinal or experimental design, involve a wider population, and add other variables such as work duration, physical activity, and organizational support to gain a more comprehensive understanding of Office Syndrome.

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