
Analysis of Work Posture Disorders using the *Nordic Body Map* Method for Employees of the Kutai Kartanegara Population and Civil Registration Agency

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Abstract: Office workers often experience posture disorders due to work activities that require sitting or standing for several hours a day. Bad work posture, such as working in a sitting or standing position or a combination of sitting and standing for a long period of time, can result in complaints of pain in one of the body parts. The *Nordic Body Map* is an examination and measurement to identify painful body parts when using facilities or doing work. Objective: This study aims to determine the analysis of working posture disorders using the *Nordic Body Map* method for Kutai Kartanegara Population and Civil Registration Agency employees. Method: This qualitative descriptive research used the cross-sectional study method with a population of Kutai Kartanegara Population and Civil Registration Agency is 62 employees. Results: Based on the results of the *Nordic Body Map*, it was found that the highest types of complaints were the back and waist, with a total of 62 respondents at a low complaint level, which means no corrective action is needed. Conclusion: There is a disturbance in work posture with the *Nordic Body Map* method for Kutai Kartanegara Population and Civil Registration Agency employees. Some of the factors that cause work posture disorders are: 1) Age: 30 years is more common with work posture disorders. 2) Gender: women are more at risk for work posture disorders than men. 3) Body mass index: excessive body mass index will tend to increase pressure on body posture, resulting in fatigue, which causes injury in the form of posture disorders. 4) Years of service: employees with a tenure of 10 years' experience complaints of posture disorders more quickly.

INTRODUCTION

Work posture is a process of adjustment between the anatomy of the body and the conditions of work, such as patterns of attitude when working. Work attitudes that are often carried out while working are, for example, a sitting work attitude, a standing work attitude, and a sitting work attitude standing (Aryani & Puspitasari, 2021). Incorrect work posture can cause injuries such as posture disorders in muscles, nerves, tendons, bones, and joints due to work-related activities. In anticipation of reducing injuries, it is necessary to analyze work posture disorders. (Hidjrawan & Sobari, 2018). The International Labor Organization (ILO) states that 2.78 million workers die each year from work-related accidents and diseases (2.4 million of them are disease-related) and another 374 million suffer from non-risk diseases, according to WHO data on global occupational diseases, which reached 2.7% regarding death and disability (International Labor Organization, 2019). Based on a study by the Ministry of Health of all workers in Indonesia, it was found that 40.5% of workers had health problems related to work (Mayasari & Saftarina, 2016). Based on the 2013 health report in 26 provinces of Indonesia, there were 2,998,766 cases of common diseases among workers, and the number of cases of work-related illnesses reached 428,844 (Andriyono et al., 2021). Employees are individuals who work in an organization, government, or private company, such as offices, production, health care, and others (Sari, 2017). Office employees often experience posture disorders due to work activities that require sitting or standing several hours a day. This can affect posture and cause pain, fatigue, and other health problems (Tjahayuningtyas, 2019). Kinesiological factors such as posture at



work and awkward postures, as well as individual factors such as age, gender, body mass index, and work mass, can affect the posture of office employees and cause posture disorders (Aljonak & Tejamaya, 2022). All movements that a person makes while working are referred to as working postures or work attitudes. Ergonomics is the art and science of applying and controlling work positions to reduce the possibility of accidents at work, as well as studying work postures specifically (Sidiq et al., 2022). The application of ergonomics is necessary to avoid risks resulting from non-ergonomic activities or work that can cause accidents, discomfort, high costs, and illnesses due to increased work, causing a decrease in one's work power, work productivity, and work efficiency (Dewi, 2020). Based on the results of observations carried out on March 13, 2023, on Kutai Kartanegara Population and Civil Registration Agency employees, there were 12 employees who were successfully interviewed directly, namely regarding the employee's working hours, approximately a total of 8 hours a day with 1 hour of rest duration. It was found that many workers experience work posture disorders in the neck, shoulders, lower back, and hips. In these conditions, employees feel 3–4 hours while working. This happened because of the duration of working hours, the static working conditions in front of the computer, and the lack of health services to reduce complaints of these posture disorders. The *Nordic Body Map* is an examination and measurement to identify limbs that hurt when using facilities or doing work. The assessment categorizes complaints into 4 types: no pain, moderate pain, pain, and very pain (Mulyadi et al., 2020). This method uses a body map as a visual representation of the location and intensity of pain or discomfort in the body. The results of this analysis can assist in determining actions that can be taken to overcome work posture disorders. The Department of Population and Civil Registration, is a government office located in Kutai Kartanegara that has the task of carrying out population administration affairs in the field of population and civil registration. The Kutai Kartanegara Population and Civil Registration Agency is divided into several areas of service to the community, which require employees to work at the computer. Kutai Kartanegara Population and Civil Registration Agency employees do a lot of work in awkward, repetitive, and long postures. Seeing the exposure to the risk of work posture in Kutai Kartanegara Population and Civil Registration Agency employees, the researchers are interested in conducting research on the analysis of work posture disorders using the *Nordic Body Map* method on Kutai Kartanegara Population and Civil Registration Agency employees.

METHODS

This qualitative descriptive research uses the cross-sectional study method. Carried out at the Kutai Kartanegara Population and Civil Registration Agency office from April to June 2023, involving 62 respondents. The research was carried out by filling out questionnaires and interviews; the respondents in this study were employees of the Kutai Kartanegara Population and Civil Registration Agency.

RESULT AND DISCUSSION

The characteristics in this study were derived from data obtained from questionnaires submitted to respondents, namely Kutai Kartanegara Population and Civil Registration Agency employees who were divided into four service departments and who had given permission to conduct research. The questionnaires distributed were 62, and all the questionnaires distributed were returned by respondents and fulfilled the specified conditions. Based on the *Nordic Body Map* complaint type questionnaire for Kutai Kartanegara Population and Civil Registration Agency employees, it was found that the highest level of pain complaints were found in 30 (48.4%) types of back complaints, and the highest level of pain complaints were found in 24 types of back complaints (38.7%) respondents. According to a statement (Rozana & Adiatmika, 2016), this can occur due to non-ergonomic work positions, namely sitting in the same position or not changing for quite a long time, and there are differences in working conditions in the form of tables and chairs between employees, which is a trigger for increasing back complaints and low back complaints. This is also proven based on research conducted (Simanjuntak & Susanto, 2022) on "Work Posture Analysis to Determine the Level of Work Risk Using the Rosa Method (Case Study: Pt Pertamina Ep Head



Office)." The results of the recapitulation of the *Nordic Body Map* questionnaire on 27 samples show areas that respondents complained about: the back and waist. In related research conducted by Ade Geovania Azwar (2020) who conducted work posture analysis research using the *Nordic Body Map* and NASA-TLX methods, the highest results were obtained for Nordic, namely the back, waist, and hips. In this research, the risk level of the *Nordic Body Map* was also measured for employees of the Kutai Kartanegara Population and Civil Registration Agency.

Table 1. *Nordic Body Map* Risk Level Distribution

Risk Level		Frekuensi	%
28 – 49	Low	36	58.1
50 – 70	Moderate	20	32.3
71 – 90	High	4	6.5
92 – 112	Very High	2	3.2
Total		62	100

Source : Primary data, 2023

The table shows that at the low risk level, there are 36 (58.1%) respondents, which means that no corrective action is needed. This is because some employees still implement healthy behaviors to reduce the risk of injury and maintain the condition of their posture by stretching on the sidelines. working hours to avoid excessive illness. There were 20 (32.3%) respondents with a moderate risk level, which means that action may be needed in the future. This is because some employees still work with unergonomic posture conditions due to a lack of knowledge about work health and safety, which causes posture disorders. There were 4 (6.5%) respondents with a high risk level, which means immediate action is needed due to an unbalanced workload physically and mentally, causing stress and an increased risk of posture disorders and other health problems. The risk level is very high; there are 2 (3.2%) respondents, which means that comprehensive action is needed as soon as possible because there are certain health conditions in employees that can affect posture disorders. The highest results in this study at the low risk level were 36 (58.1%) respondents; this low risk level shows that no corrective action is needed. However, it is important for employees who are at risk of posture disorders to take steps to prevent more severe posture disorders from occurring. From this research, several factors can be identified that cause work posture disorders in 62 respondents who work as employees of the Kutai Kartanegara Population and Civil Registration Agency, namely age, gender, body mass index, and length of service.

Table 2. *Nordic Body Map* Age and Risk Level Table Distribution

Nordic Body Map Risk Level for Kutai Kartanegara Disdukcapil Employees		Age of Disdukcapil Kutai Kartanegara Employees				Total	
		≥30 Years		≤30 Years			
		(n)	%	(n)	%	(n)	%
		28 – 49	Low	28	75.7	9	24.3
50 – 70	Moderate	15	78.9	4	21.1	19	100
71 – 90	High	2	50.0	2	50.0	4	100
92 – 122	Very High	2	100.0	0	0	2	100
Total		47	75.8	15	24.2	62	100

Source : Primary data, 2023

From Table 2, the relationship between age and the level of risk of work posture disorders can be seen. The table shows that at the age of 30 years, there were 2 (50.0%) respondents in the high risk level category and 2 (100%) respondents at the very high risk level, compared to those aged 30 years who were only found in the high risk level category, namely 2 (50%).



These results state, the older the employee, the greater the risk of impaired work posture. This is in line with research conducted (Sholeha & Sunaryo, 2022) on research respondents aged 36–43 years with a high level of complaints of posture disorders. Work is more often experienced at the age of 35–50 years because, in this age range, the strength and endurance of posture decrease, so complaints about working posture disorders are more common.

Table 3. Table Distribution of Gender and Risk Level *Nordic Body Map*

<i>Nordic Body Map</i> Risk Level for Kutai Kartanegara Disdukcapil Employees		Gender of Disdukcapil Kutai Kartanegara Employee				Total	
		Man		Women			
		(n)	%	(n)	%	(n)	%
28 – 49	Low	20	19.7	17	17.3	37	100
50 – 70	Moderate	11	57.9	8	42.1	19	100
71 – 90	High	1	25.0	3	75.0	4	100
92 – 122	Very High	1	50.0	1	50.0	2	100
Total		33	53.2	29	46.8	62	100

Source : Primary data, 2023

From Table 3, the relationship between gender and the level of risk of work posture disorders can be seen. The table shows that in the male gender, the high risk category has 1 (25%) respondent and the very high risk level has 1 (50%) respondent, compared to the female gender, where the high risk category has 3 (75%) respondents and the very high risk level has 1 (50%) respondents.

These results state, based on gender, women are more at risk of work posture disorders. In this study, the results showed a high and very high risk level with female sex; there were 4 respondents compared to 2 male respondents. This is because women have lower muscle abilities than men, which occurs due to hormonal influences on women (Mawadi & Rechmalia, 2016).

<i>Nordic Body Map</i> Risk Level for Kutai Kartanegara Disdukcapil Employees		Body Mass Index of Disdukcapil Kutai Kartanegara Employess										Total	
		≤18,5 Disadvantages of Weight		18,5 – 22,9 Healthy		23 – 24,9 Excess Weight		25 – 29,9 Obesity 1		≥30 Obesity 2			
		(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%
28 – 49	Low	3	8.1	22	59.5	6	16.2	6	16.2	0	0.0	37	100
50 – 70	Moderate	0	0.0	8	42.1	4	21.1	6	31.6	1	5.3	19	100
71 – 90	High	0	0.0	0	0.0	0	0.0	1	25.0	3	75.0	4	100
92 – 122	Very High	0	0.0	0	0.0	1	50.0	0	0.0	1	50.0	2	100
Total		3	4.8	30	48.4	11	17.7	13	21.0	5	8.1	62	100

Tabel 4. Distribusi Table Indeks Massa Tubuh dan Tingkat Resiko *Nordic Body Map*

Source : Primary data, 2023

From Table 4, the relationship between body mass index and the level of risk of work posture disorders can be seen. The table shows that at BMI 23-24.9, the very high risk category has 1 (50%) respondent; at BMI 25-29.9, the high risk category has 1 (25%) respondent; at BMI 30, the high risk category



has 3 (75%) respondents; and the category of very high risk has 1 (50%) respondents. These results state that the higher the employee's body mass index, the more the posture disorder will affect them. In line with research (Minna Rika, 2022), which states that one of the factors causing the risk of posture disorders is body mass index, A person tends to experience an increased risk of posture disorders if their body mass index is also higher, and if complaints are simply ignored, it will have a serious impact in the form of material loss or permanent disability for workers. According to research (Purnawijaya & Aidatmika, 2017), the higher a person's body mass index, the more he will tend to experience increased pressure on his body posture, which will cause fatigue and, in the most serious cases, can cause injury in the form of posture disorders.

Table 5. Table Distribution of Working Period and *Nordic Body Map*

Tingkat Resiko <i>Nordic Body Map</i> Pada Pegawai Disdukcapil Kutai Kartanegara		Working Period of Kutai Kartanegara Disdukcapil Employees				Total	
		≥10 Years		≤10 Years			
		(n)	%	(n)	%	(n)	%
28 – 49	Low	22	59.5	15	40.5	37	100
50 – 70	Moderate	14	73.8	5	26.3	19	100
71 – 90	High	4	100.0	0	0.0	4	100
92 – 122	Very High	2	100.0	0	0.0	2	100
Total		42	67.7	20	32.3	62	100

Source : Primary data, 2023

Based on the table above that there is a relationship between length of service and the level of risk of work posture disorders. The table shows that in the category of work experience 10 years, there were 4 (100%) respondents in the high-risk category and 2 (100%) respondents in the very-high-risk category. These results state that the longer an employee works, the more influence it will have on posture disorders. Research (Wildasari & Nurcahyo, 2023) states that workers with a long service period (≥ 5 years) have a risk of complaints of posture disorders that is 7,333 times greater than workers with a medium work period (< 5 years). There were 20 respondents (47.6%) who experienced complaints of posture disorders, while workers who did not experience complaints of posture disorders were 5 respondents (11.9%). The working period can accelerate the occurrence of complaints of posture disorders. Employees who have worked for quite a long time and whose work requires a lot of repetition of the same movements are more at risk of developing complaints of posture disorders because they more often experience pressure on parts that experience continuous movement (Wildasari & Nurcahyo, 2023).

CONCLUSION

Work posture is a process of adjustment between the anatomy of the body and the conditions of work, such as patterns of attitude when working. Bad work posture, for example, doing work in a sitting or standing position or a combination of sitting and standing movements carried out for a long time, can result in complaints of pain in one of the body parts. Analysis of work posture disorders in employees can be carried out using the *Nordic Body Map* (NBM), which is an ergonomic checklist questionnaire that is most often used as an examination and measurement to determine the location and intensity level of posture disorders in individuals when carrying out work activities. Based on the results of the analysis carried out in this research, it can be seen that work posture disturbances occurred using the *Nordic Body Map* method for Kutai Kartanegara Population and Civil Registration Agency employees. Some of the factors that cause work posture disorders are: 1) Age: 30 years is more common with work posture disorders. 2) Gender: women are more at risk for work posture disorders than men. 3) Body mass index: excessive body mass index will tend to increase pressure on body posture, resulting in fatigue, which causes injury in the form of



posture disorders. 4) Years of service: employees with a tenure of 10 years' experience complaints of posture disorders more quickly.

AUTHOR CONTRIBUTION

Gina Amara Putri is the principal researcher, selecting topics, writing papers, and collecting data. Ashifa Quamila as supervisor and reviewer of study documents.

CONFLICT OF INTEREST

The author declares there is no conflict of interest in writing this.

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