

Prevalence study of musculoskeletal disorders among bank workers



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ABSTRACT

Background: A formal worker is anyone who works for a business entity that has been registered at a government office. Those who work in the formal sector are identical to office work, with long duration of work, tend to be in a static position, and there are repetitive movements, thereby increasing the potential of musculoskeletal disorders (MSD). This can interfere with work productivity and work outcomes expected of formal sector workers.

Methods: This study was a descriptive-analytic study with a cross-sectional approach with purposive sampling technique. Data was collected in June 2022 using a personal data questionnaire and the Nordic body map (NBM) questionnaire. Descriptive analysis was performed on the data using IBM SPSS 26 software.

Results: Musculoskeletal complaints were found in the upper neck 8.8%, lower neck 6.8%, left shoulder 6.8%, right shoulder 5.4%, back 7.3% and waist 8.3%. Twelve people experienced moderate pain in the waist, 7 people experienced pain in the upper neck, and 2 people experienced very painful feeling in the waist. There were 35 respondents have a low MSD risk level 87.5% and 5 respondents have a moderate MSD risk level 12.5%.

Conclusion: The respondents mostly had complaints around the upper neck, lower neck, left shoulder, right shoulder, back, and waist. There were risks of MSD in formal sector workers of risk of the MSD complaints experienced is predominantly low. The ergonomics approach can be applied to respondents with a higher level of risk.

Keywords: Formal worker, musculoskeletal disorder, nordic body map, posture.

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BACKGROUND

Indonesia is a country whose economic development and growth are determined by the conditions of its formal and informal sector. The formal sector is defined as employment that has permission from the authorities and is registered with a government office. In contrast, the informal sector refers to many small-scale economic activities. The formal sector is run by formal workers and the informal sector is run by informal workers. Formal workers include all workers with the status of laborers/employees/paid workers. Workers in this sector are usually found with higher education and have specific abilities needed by companies.¹ Informal workers are any workers with a status other than formal workers, such as traders and temporary workers.²

Complaints of musculoskeletal or musculoskeletal disorder (MSD) is a collection of symptoms/disorders that occur in muscle tissue, tendons, ligaments, nervous system, blood vessels,

bone structure, and cartilage.³ MSD are caused by three factors, namely work factors (work frequency, work duration, work posture), environmental factors (microclimate, vibration, lighting), and worker factors (age, gender, length of service, body weight, height, exercise habits).⁴ These factors led to several complaints about the musculoskeletal system. Workers often lose their work time to recover due to the complaints they experienced.⁵ Workers' absence certainly disrupts work productivity and expected work results. MSD has been stated as one of the major contributors to disability and reduced work productivity globally.^{6,7} The prevalence of MSD globally is ranging from 14% to 42%. In India, a community-based prevalence of 20% was found in epidemiological studies that have been conducted, and various previous studies found a prevalence for specific occupations of 90%.⁸ In America, according to the United States Bureau of Labor Statistics, the incidence of MSD was found to be 27.7 per 10,000 full-time workers in

2018, and 35.4 in 2011 (U.S. Bureau of Labor Statistics, 2020). America has spent 213 billion US dollars, up to 1.4% of the Gross Domestic Product to treat MSD conditions.⁹ The prevalence of MSD in Indonesia through diagnosis by a doctor is 7.3%, with Aceh as the province with the highest MSD (13.3%) and West Sulawesi the lowest (3.2%).¹⁰ According to the 2018 Bali Basic Health Research Report, the proportion of daily activities limitation due to injury by Regency/City for Buleleng Regency was 9.15%, and 3.60% for the proportion of workplaces where injuries occurred according to the occupation (Civil Servants/Indonesian National Army /State Police of the Republic of Indonesia/ State-Owned Enterprises/Regional-Owned Enterprises).¹¹

Previous study that was conducted in the national Bank Bali, Indonesia. Based on initial observations, there were the potential risk of MSD among the workers because there is a need to be in static positions for a long time, work for long durations, and repetitive movements

such as typing.¹² In general, the activities performed by bankers are collecting funds from the community, channeling funds back to the community, and providing other products and services. This statement is supported by research conducted by Sigar et al., (2019) on bank employees in Manado with significant findings from a correlation between sitting working positions and complaints that occurred ($p=0.000$).¹³

The Nordic body map is a research instrument aimed at assessing musculoskeletal complaints. This questionnaire contains 28 questions regarding the presence or absence of pain in certain parts of the body with certain levels of complaints (no pain, slightly painful, painful, and very painful). Complaints of no pain refer to the absence of any disturbance felt, a little pain refers to the presence of a slight disturbance in a certain part, pain refers to a feeling of discomfort in a certain part of the body, and very painful refers to a high level of discomfort in a certain part of the body.¹⁴ The Indonesian version of this questionnaire has been tested for its validity and reliability. The item validity test results obtained range from 0.501 (min.) to 0.823 (max.) with high reliability 0.726.¹⁵ From the general explanation regarding MSD above, MSD is an event that is quite disturbing and affects work productivity. Therefore, this research was conducted to determine the description of musculoskeletal complaints on formal workers at the banks.

METHODS

This research was a descriptive-analytical study with a cross-sectional approach. The research was conducted in June 2022 on formal workers at a national bank in Bali, Indonesia. The sample was selected using a purposive sampling technique. To see musculoskeletal complaints in the sample, researchers used the nordic body map, which contains 28 questions related to perceived complaints and the complaint level (not painful, somewhat painful, painful, and very painful). Complaints of no pain refer to the absence of any disturbance felt; somewhat painful refers to the presence of a slight disturbance in certain parts; pain refers to discomfort in

certain parts of the body; and very painful refers to high-scale discomfort in certain parts of the body.¹⁴ This questionnaire has item validity test results ranging from 0.501 (min.) to 0.823 (max.) with high reliability 0.726.¹⁵ Another questionnaire was used to obtain personal data regarding age, gender, education level, duration of work per day, and years of service

Research began with obtaining permits to carry out research. The researcher held a short discussion with colleagues who will help in collecting data to equalize perceptions, and then convey the objectives and benefits of the research to the sample. After the sample is explained, the respondent fills out the personal data questionnaire independently. Researchers then took height and weight data, followed by samples filling out the nordic body map questionnaire. The research data obtained was then processed, and univariate analysis was carried out for each variable using IBM SPSS 26 software.

This study has obtained the informed consent from each sample and they were agree to participate to this study.

RESULTS

Based on Table 1, there were 40 respondents, consisting of 23 men and 17 women. A total of 27 people were in the 26-35 year age group. 57.5% of respondents had a bachelor's degree ($n = 23$). The average body weight of the respondents was 68.64 ± 13.52 . The average height of respondents was 166.34 ± 6.63 . The results of the respondents' body mass index (BMI) were grouped according to Asia-Pacific guidelines. A total of 9 people had an overweight BMI, 15 people had an obese BMI, and the rest had a normal BMI. A total of 19 respondents worked more than 8 hours. 14 respondents had worked for more than 10 years. Respondents consisted of AMOL ranks ($n = 9$), cleaning service ranks ($n = 7$), CBM ranks ($n = 7$), security ranks ($n = 5$), SPO ranks ($n = 5$), SME ranks ($n = 4$), and SPB ranks ($n = 3$).

Based on Table 2, there were complaints found in the upper neck 8.8%, lower neck 6.8%, left shoulder 6.8%, right shoulder 5.4%, back 7.3%, and waist 8.3%. 12 people experienced complaints of slight pain in the waist, 7 people experienced complaints of moderate pain in the upper neck, and

2 respondents were found to have very painful complaints in the waist.

Based on Table 3, 35 respondents had a low MSD risk level 87.5%, and the remaining 5 respondents had a moderate MSD risk level 12.5%. Meanwhile, the sample of high and very high MSD risk levels was not found so the percentage was 0%.

DISCUSSION

It is known that there were 40 respondents in the research conducted, with 23 men and 17 women in it. 67.5% of respondents were in the age range of 26–35 years, and the average age of respondents was 32.65 ± 7.38 years. With age, the level of complaints will increase with the first complaint felt at the age of 30 years. Peak muscle strength for men and women is around 25–35 years, and there will be a decline in muscle strength of 15–25% at 50–60 years.¹⁶ In contrast to the previous theory, the results of research by Marcilin in 2020 found that there was no significant correlation between age and MSD complaints p -value = 0.184.¹⁷ This is supported by Djaali's research in 2019 with similar findings p -value > 0.05, indicating that the age factor may not be able to stand alone, resulting in complaints and that there are other factors that may be more dominant.¹⁸

An important domain in the formation of a person's actions (overt behavior) is knowledge or cognition. A person's level of education is believed to influence increasing knowledge about health. In this study, 57.5% of respondents had a bachelor's degree level of education ($n = 23$). The higher a person's level of formal education, the easier it will be to absorb information, including health information, and the individual's awareness of healthy living behavior will also be higher.¹⁹ This statement is supported by research by Indriyani et al. (2022), Respondents were given an ergonomics knowledge questionnaire that had previously been tested for its validity and reliability. Respondents with scores above the median were stated to have good knowledge of ergonomics. A significant correlation was found between ergonomics knowledge and MSD complaints through the results of the *Chi-square test analysis* p -value =

Table 1. Subject characteristics of bank workers with risk levels of musculoskeletal disorder (MSD)

Variable	n	Mean ± SD	Percent (%)	MSD risk level			
				Low	Moderate	High	Very high
Gender							
Male	23		57.5	21	2	0	0
Female	17		42.5	19	3	0	0
Age, years old							
17-25	3		7.5	2	1	0	0
26-35	27	32.65± 7.38	67.5	24	3	0	0
36-45	8		20	8	0	0	0
46-55	2		5	1	1	0	0
Education Level							
High School	13		32.5	12	1	0	0
Diploma	3		7.5	2	1	0	0
Bachelor	23		57.5	20	3	0	0
Master	1		2.5	1	0	0	0
Weight		68.64± 13.52					
Height		166.34± 6.63					
Body Mass Index							
Underweight	0		0	0	0	0	0
Normal	16		40	14	2	0	0
Overweight	9		22.5	8	1	0	0
Obesity	15		37.5	13	2	0	0
Work Duration Per Day							
≤ 8 Hour	21	9.70± 2.03	52.5	20	1	0	0
> 8 Hour	19		57.5	15	4	0	0
Years of Service							
< 6 Year	14		35	12	2	0	0
6-10 Year	12	9.25± 7.30	30	11	1	0	0
> 10 Year	14		35	12	2	0	0
Job position							
OMA	9		22.5	7	2	0	0
Cleaning Service	7		17.5	7	0	0	0
CBM	7		17.5	6	1	0	0
Security	5		12.5	5	0	0	0
OSS	5		12.5	4	1	0	0
SME	4		10	4	0	0	0
BSS	3		7.5	2	1	0	0

BSS, business service supervisor; CBM, consumer business manager; n, number of participants; OMA, operational manager assistant; OSS, operational service supervisor; SME, small and medium enterprises

0.000, indicating that a person's level of ergonomics knowledge will influence their actions in efforts to prevent MSD complaints.²⁰

Data on the respondent's height and weight are used to measure BMI, which is then classified according to Asia-Pacific guidelines, namely underweight, normal, overweight, and obese. In this study, 9 people had an overweight BMI, 15 people had an obese BMI, and 16 others had a normal BMI. The relationship between BMI and MSD is that the higher a person's weight, the risk of experiencing complaints will increase. This happens

because someone who is overweight will try to support their body weight from the front by contracting their lower back muscles, and over time this will cause muscle fatigue.¹⁸ This theory is supported by findings from research by Aljonak (2022), which examined musculoskeletal complaints in office workers, finding a correlation between BMI and pain complaints experienced by respondents p -value = 0.033.²¹

Longer years of service will cause fatigue in the musculoskeletal system and bring up complaints. In this study, 19 respondents worked more than 8 hours

per day, and the rest worked less or equal to 8 hours per day. The average total length of service of the respondent was 9.25 years. The complaints felt by respondents are likely the result of the accumulation of continuous exposure over a long period of time. This is supported by research by Helmina et al. (2019), with the results of statistical analysis showing $p = 0.014$, showing a relationship between years of service and MSD.²² Another study by Haq et al. (2022) found a significant correlation between length of work per day and MSD complaints ($p = 0.020$).²³

The results of filling out the NBM

Table 2. Distribution of musculoskeletal disorders

No	Lokasi	NP		SP		MP		VP		%
		n	%	n	%	n	%	n	%	
0	Pain in upper neck	22	55.0	11	27.5	7	17.5	0	0	8.8
1	Pain in lower neck	26	65.0	8	20.0	6	15.0	0	0	6.8
2	Pain in left shoulder	26	65.0	8	20.0	6	15.0	0	0	6.8
3	Pain in right shoulder	29	72.5	6	15.0	4	10.0	1	2.5	5.4
4	Pain in left upper arm	35	87.5	2	5.0	3	7.5	0	0	2.4
5	Pain in back	25	62.5	9	22.5	5	12.5	1	2.5	7.3
6	Pain in right upper arm	30	75.0	6	15.0	4	10.0	0	0	4.9
7	Pain in the waist	23	57.5	12	30.0	3	7.5	2	5.0	8.3
8	Pain in the buttocks	30	75.0	4	10.0	5	12.5	1	2.5	4.9
9	Pain in the bottom	36	90.0	3	7.5	1	2.5	0	0	2.0
10	Pain in the left elbow	37	92.5	2	5.0	1	2.5	0	0	1.5
11	Pain in the right elbow	35	87.5	4	10.0	1	2.5	0	0	2.4
12	Pain in left lower arm	35	87.5	4	10.0	1	2.5	0	0	2.4
13	Pain in right lower arm	33	82.5	6	15.0	1	2.5	0	0	3.4
14	Pain in left wrist	33	82.5	6	15.0	1	2.5	0	0	3.4
15	Pain in right wrist	34	85.0	5	12.5	1	2.5	0	0	2.9
16	Pain in left hand	38	95.0	1	2.5	1	2.5	0	0	1.0
17	Pain in right hand	37	92.5	2	5.0	1	2.5	0	0	1.5
18	Pain in left thigh	37	92.5	1	2.5	2	5.0	0	0	1.5
19	Pain in right thigh	36	90.0	3	7.5	1	2.5	0	0	2.0
20	Pain in left knee	34	85.0	4	10.0	1	2.5	1	2.5	2.9
21	Pain in right knee	35	87.5	2	5.0	3	7.5	0	0	2.4
22	Pain in left calf	34	85.0	6	15.0	0	0	0	0	2.9
23	Pain in right calf	34	85.0	6	15.0	0	0	0	0	2.9
24	Pain in left ankle	35	87.5	4	10.0	1	2.5	0	0	2.4
25	Pain in right ankle	36	90.0	4	10.0	0	0	0	0	2.0
26	Pain in left foot	36	90.0	4	10.0	0	0	0	0	2.0
27	Pain in right foot	34	85.0	6	15.0	0	0	0	0	2.9

MP, moderate pain; n, number of participants; NP, no pain; SP, slight pain; VP, very painful

Table 3. Distribution of respondents' musculoskeletal disorder (MSD) risk levels

MSD Risk Levels	n	Percentage
Low	35	87.5%
Moderate	5	12.5%
High	0	0%
Very high	0	0%

questionnaire showed that musculoskeletal complaints were found in the upper neck 8.8%, lower neck 6.8%, left shoulder 6.8%, right shoulder 5.4%, back 7.3%, and waist 8.3%. 12 people experienced complaints of slight pain in the waist, 7 people experienced complaints of moderate pain in the upper neck, and 2 respondents were found to have very painful complaints in the waist. The results obtained are similar to the findings of Haq et al. (2022), The body parts that employees complained about were the waist (n = 22), lower neck (n = 18), upper neck (n = 15), left shoulder (n = 15), right shoulder (n = 14),

and lower back (n = 14).²³ In line with other research by Pantoiyo et al. (2016), there were musculoskeletal complaints in employees in the upper neck, lower neck, back, waist, and lower waist.²⁴ The complaints experienced by respondents may be caused by unnatural working postures away from the body's normal position, such as the back and neck being too flexed. If this position is held for a long time, the extensor muscles would work harder and fatigue. This also triggers anaerobic metabolism, thereby stimulating chemociceptives to release bradykinin, histamine, and serotonin, which will bind

to pain receptors. This stimulation is then perceived as pain in the brain.²⁵

The results of the respondents' Nordic Body Map questionnaire will be scored using a Likert scale. The level of complaints of no pain is given a score of 1, slightly painful is given a score of 2, moderate pain is given a score of 3, and very painful is given a score of 4. The final scoring number of complaints experienced is then classified into low risk levels (28–49), moderate (50–70), high (71–91), and very high (92–112).²⁶ In this study, 35 respondents had a low risk level and 5 respondents had a medium risk level. The low risk level of respondents could be caused by individual exercise habits. A person will rarely experience complaints in their muscles if they exercise frequently, and vice versa. Muscle flexibility and muscle strength will be maintained if they exercise regularly.²⁷ Ergonomic approaches, such as managing working hours, designing work equipment

that is adjusted to the body, and training on ergonomic working positions, can be used to reduce musculoskeletal complaints in respondents with a higher risk level.²⁸

Based on the discussion above, this study has several limitations. First, the number of samples is limited even with the total sampling technique. This was caused by the company's policy which only allowed research to be carried out in specific sectors. Second, there are still many factors in the work environment and sleep environment that have not been controlled by researchers, such as temperature, which affects works for a business.

CONCLUSION

There were risks of MSD occurring in formal sector workers. Musculoskeletal complaints were found in the upper neck 8.8%, lower neck 6.8%, left shoulder 6.8%, right shoulder 5.4%, back 7.3%, and waist 8.3%. 12 people experienced complaints of slight pain in the waist, 7 people experienced complaints of moderate pain in the upper neck, and 2 respondents were found to have complaints of severe pain in the waist. A total of 35 respondents had a low-risk level of MSD 87.5% and 5 respondents had a moderate-risk level of MSD 12.5%. An ergonomics approach can be applied to respondents with a higher level of risk. These results can be a reference for formal workers whose work is identical to office work to take preventive measures. For other researchers, the research results can be used as basic data for further research regarding the relationship between variables or used as a comparison with other similar research.

ETHICAL CLEARANCE

Before beginning the study, the author obtained consent from the sample to ensure their willingness to participate as respondents.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

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AUTHOR CONTRIBUTIONS

GMW prepares study designs, collects data, processes data, and writes manuscripts. MHSN and NLNA are directing data collection and revising the manuscript

REFERENCES

1. Ayu D, Saraswati T. Analisis perbedaan tingkat fertilitas pekerja wanita di sektor formal dan informal di Kabupaten Badung. *J Ekon Pembang*. 2017;8(5):23–78.
2. Utama AA, Kamayoga IDGA, Widnyana M, Putra IPYP. Relationship between core muscles, leg arch, hamstring, and lumbar flexibility on pop-up ability among surfers. *Physical Therapy Journal of Indonesia*. 2023;4(1): 25–30.
3. Sasongko DA, Purnomo H. Analisis tingkat paparan risiko musculoskeletal disorders pada aktivitas workshop pt. x dengan menggunakan quick exposure check didik. 2017;5(1):30–5.
4. Septrianto MR. Hubungan karakteristik pekerja dan pekerjaan dengan keluhan musculoskeletal disorder (msds) pada pekerja bagian mobile equipment maintenance (mem) pt vale indonesia. *J Penelit Kesehat*. 2017;15(1):15–20.
5. Nurliah A. Analisis risiko musculoskeletal disorders (msds) pada operator forklift di pt. lli tahun 2012. Tesis Magister Keselam dan Kesehat Kerja UI. 2012;3(1):100–105.
6. James, S.L., Abate, D., Abate, K.H., Abay, S.M., Abbafati, C., Abbasi, N., Abbastabar, H., Abd-Allah, F., Abdela, J., Abdelalim, A., Abdollahpour, I., Abdulkader, R.S., Abebe, Z., Abera, S.F., Abil, O.Z., Abraha, H.N., Abu-Raddad, L.J., Abu-Rmeileh, N.M.E C.J.L. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the global burden of disease study 2017. *Lancet*. 2018;3(9):230–250.
7. Mekonnen, T.H., Kekeba, G.G., Azanaw, J., dan Kabito GG. Prevalence and healthcare seeking practice of work-related musculoskeletal disorders among informal sectors of hairdressers in ethiopia, 2019: findings from a cross-sectional study. *BMC Public Health*. 2020;20(1)15–25.
8. Roy A. Including musculoskeletal diseases in the health policy agenda in india evidence on burden and economic impact on indian households indrani gupta. 2021;5(1):5–15.
9. Andersson GB. The impact of musculoskeletal disorders on americans - opportunities for action. 2016;1(2):26–33.
10. Rachman R. Hubungan antara sikap kerja dan umur dengan keluhan musculoskeletal pada tenaga cleaning service di rsup prof. dr.r.d. kandou manado. *J Kesehat Masy*. 2019;8(7):372–389.

11. Badan Penelitian dan Pengembangan Kesehatan. Laporan provinsi bali riskesdas 2018. 2018;2(1):100–115.
12. Suryaningtyas I, Kurniawan B, Widjasena B. Analisis tingkat risiko ergonomi pada aktivitas machining di px x plant jakarta. *J Kesehat Masy*. 2017;5(5):193–205.
13. Sigar AJG, Suoth LF, Rattu JAM. Hubungan antara posisi kerja duduk dan indeks masa tubuh dengan keluhan musculoskeletal pada karyawan di bank sulutgo cabang utama manado. *Kesmas*. 2019;8(7):380–387.
14. Wijaya K. Identifikasi risiko ergonomi dengan metode nordic body map terhadap pekerja konveksi sablon baju. *Semin dan Konf Nas IDEC*. 2019;1(1):1–9.
15. Ramdan IM, Duma K, Setyowati DL. Reliability and validity test of the indonesian version of the nordic musculoskeletal questionnaire (nmq) to measure musculoskeletal disorders (msd) in traditional women weavers. *Glob Med Heal Commun*. 2019;7(2):123–130.
16. Maurits LSK. *Selintas tentang kelelahan kerja*. Yogyakarta. Amara Books; 2012;1(1):33–50.
17. Marcilin M, Situngkir D. Faktor prediksi keluhan musculoskeletal disorders pada pekerja unit sortir di pt . indah kiat pulp and paper tangerang tbk tahun 2018. *J Ind Hygine Occup Heal*. 2020;4(2):54–65.
18. Djaali NA. Analisis keluhan musculoskeletal disorders (msds) pada karyawan pt. control system arena para nusa. *J Ilm Kesehat*. 2019;11(1):80–7.
19. Yazid B, Situmorang H. Hubungan aktivitas fisik dengan gangguan musculoskeletal pada perawat di rsu sundari medan budiana. *J Kel Sehat Sejah*. 2021;19(2):38–47.
20. Indriyani I, Badri PRA, Oktariza RT, Ramadhani RS. Analisis Hubungan usia, masa kerja dan pengetahuan terhadap keluhan musculoskeletal disorders (msds). *J Kesehat*. 2022;13(1):186.
21. Aljonak AV, Tejamaya M. Pengaruh faktor individu terhadap gangguan musculoskeletal pada pekerja kantor pt . x. *J Kesehat*. 2022;6(1):12–29.
22. Helmina, Diani N, Hafifah I. Hubungan Umur, jenis kelamin, masa kerja dan kebiasaan olahraga dengan keluhan musculoskeletal disorders (msds) pada perawat. *Caring Nurs Journal*. 2019;3(1):24.
23. Haq FWN, Hardi I, Sididi M, Mahmud NU, Hasan C. Faktor yang berhubungan dengan keluhan musculoskeletal disorders (msds) pada pegawai yang menggunakan personal komputer di pt. pln ulp panakkukang makassar selatan. *Wind Public Heal J*. 2022;2(3):39–51.
24. Pantooyo, I.W., Pinontoan, O.R., & Josephus J. Gambaran lama kerja, sikap kerja dan keluhan musculoskeletal pada pengguna personal komputer di kantor bpjs ketenagakerjaan cabang manado. *J Kesehat*. 2016;2(1):35–40.
25. Nirarya Putri NP, Dewi AANTN, Juhanna IV, Sutadarma IWG. The correlation between work posture and work sitting duration with risk of neck disability in denpasar city workers. *Maj Ilm Fisioter Indones*. 2019;7(1):1–5.
26. Dewi NF. Identifikasi risiko ergonomi dengan metode nordic body map terhadap perawat poli rs x. *J Sos Hum Terap*. 2020;2(2):125–134.

27. Nugraha MHS, Negara AAGAP, Winaya IMN, Adhitya IPGS. Pemeriksaan disabilitas, sosialisasi postur kerja, pelatihan peregangan aktif, serta pelayanan kesehatan fisioterapi dalam menangani nyeri punggung bawah. *Jurnal Pengabdian Masyarakat Sasambo*. 2022;4(1):26-32.
28. Winaya IMN, Nugraha MHS, Adhitya IPGS, Kinandana GP. Efektivitas penambahan mobilization with movement dalam menurunkan nyeri dan meningkatkan kemampuan fungsional lutut pada

patellofemoral pain syndrome. *FISIO MU: Physiotherapy Evidences*. 2023;2(4):181-188.



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