ORIGINAL ARTICLE

Risk Assessment of Occupational Factors Associated With Low Back Pain among Healthcare Workers in Community Health Clinics in Kota Kinabalu District, Sabah, Malaysia: A Prevalence Study

Ahmad Nabeil Alias, *Shamsul Bahari Shamsudin and Mohammad Saffree Jeffree

Department of Public Health Medicine, Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia.

ABSTRACT

Introduction: Low back pain is an occupational hazard that can be preventable but disabling, potentially affecting the work performance of healthcare workers. Previous studies have primarily focused on nurses, especially in hospital settings, leaving a gap in our understanding of staff in community health clinics with different work environments. **Objectives:** To determine the prevalence of low back pain and its associated occupational risk factors among healthcare workers in community health clinics. **Methods:** A cross-sectional study involving 360 healthcare workers in Kota Kinabalu district collected sociodemographic data, occupational characteristics, low back pain history, and psychological characteristics. Low back pain risk assessment was performed using the Rapid Entire Body Assessment (REBA) and BACKS tool. **Results:** Among 360 participants, 71.7% reported experiencing low back pain within the past 12 months. Significant associations were found by Chi-Square test between low back pain and the number of children, Body Mass Index (BMI), smoking status, manual handling, awkward postures, assisted lifting of heavy objects, and psychological factors. The findings highlight the high prevalence of LBP among healthcare workers and its association with various occupational factors. Implications for designing specific disease prevention programs to protect healthcare workers are considered, thus enabling them to maintain the highest level of care for the general public.

Keywords: Low back pain; Prevalence; Healthcare workers; Rapid Entire Body Assessment; Ergonomics risk assessment

Corresponding Author:
Shamsul Bahari Shamsudin, PhD
Email: shamsul@ums.edu.my
Tel: +6088320000

INTRODUCTION

Low back pain (LBP) is a common and potentially disabling condition that affects a significant portion of the global population [1,2]. LBP encompasses strains, sprains, and injuries to the lower back, often resulting from activities involving bending, twisting, lifting, and overstretching [3,4]. Studies suggest that 70% to 85% of adults experience at least one episode of LBP in their lifetime, underscoring its widespread impact [5-7]. LBP can significantly affect an individual's quality of life, productivity, and work attendance [8]. Multiple factors, such as gender, age, lifestyle, psychosocial factors, physical demands at the workplace, social support, and pain perception, are associated with LBP [9]. Healthcare workers, particularly those in hospital settings, are at a higher risk of developing LBP due to the physical and emotional demands of their profession, including stress [10,11].

While nurses in hospital settings have been the focus of many LBP studies, there is limited research on other healthcare positions, such as staff in community health clinics. These positions involve slightly different daily routines compared to hospital settings. Community-targeted health services often differ from institutionalized care, as care is provided in patients' homes, which are not designed for healthcare services [12,13].

Even care provided in community clinics varies significantly from inpatient care. To enhance ergonomics in these settings, collaboration between healthcare providers and family members is essential. By understanding the causes of LBP in this context, policymakers can allocate resources more effectively to reduce LBP among healthcare workers. Therefore, this study aimed to determine the prevalence of low back pain and its associated occupational risk factors among healthcare workers in community health clinics.

MATERIALS AND METHODS

A cross-sectional study was conducted on 360 healthcare workers from community health clinics in the Kota Kinabalu district, the largest district in Sabah, Malaysia. The study investigated the prevalence of LBP using stratified random sampling based on the type of profession as the strata. A sample size of 326 was estimated by using single proportion formula to be sufficient to address the objectives, with a 20% allowance for possible data entry errors, and the probability of having low back pain was set as 0.77 [1]. Inclusion criteria required participants to be healthcare workers willing to participate and able to complete an online survey. We excluded those with work experience of less than a year, pregnancy, recent back trauma, recent diagnosis of chronic back pain, or ongoing treatment for back issues. Informed consent was obtained from all subjects involved in the study before questionnaire administration.

The study consisted of two key stages. In the first stage, healthcare workers completed a Malay-validated questionnaire covering various aspects of their background, occupational details, low back pain history, and psychological well-being. These details included sociodemographic information like age, gender, ethnicity, education level, marital status, income, height, weight, Body Mass Index, smoking status and exercise level. Then the occupational characteristics including working year experience, shift work, history of ergonomics training, routine daily work with manual handling, body bending, body twisting, lifting a heavy object of 10kg, and lifting object using instruments. Furthermore, they reported their history of low back pain in the past 12 months, including its attributes, pain intensity, and how it affected their work. Lastly, they shared psychological aspects like headache, stress, low mood, fatigue, work satisfaction, colleague's support, and superior's support. These questions were presented in a 5-point Likert scale format. All healthcare workers participated, and the questionnaire underwent a pre-testing phase to ensure clarity and understanding. There were 36 respondents for the pre-testing which were the healthcare workers that are currently in practice in Sabah and their data were not included in the actual study analysis.

From the questionnaire responses, the BACKS tool was used to investigate the work-relatedness probability of LBP among respondents [14]. Subsequently, the second stage involved a risk assessment of low back pain by using Rapid Entire Body Assessment (REBA) as the author observes the respondents at work. Their postures performing their routine tasks as they posed the angle of their body positioning were analyzed using the REBA tool to generate their respective ergonomic risk level classification. REBA worksheet comprised of two parts: part A includes the neck, trunk, and leg analysis and part B includes arms and wrists analysis. The score derived was added to the activity score to produce the final REBA score. From the individual REBA score generated, we can classify the workers to their ergonomic risk level which then the association with low back pain can be assessed based on the levels obtained [15]. This data collection took place from February to August 2021.

As the data collection was using the online survey application, the missing data and errors were prevented as each compulsory component was tagged as the required response for the responses being recorded and submitted. The data from the online survey application were downloaded and imported for analysis by using Statistical Package for Social Sciences (SPSS) version 27. For the statistical significance, the p-value will be taken to be less than 0.05 and a 95% Confidence Interval (CI).

RESULTS

We collected responses from 360 participants, surpassing the minimum required sample size of 326. The prevalence of LBP among healthcare workers in community health clinics was noted to be 71.7% (n = 258). Table I shows the sociodemographic characteristics of the respondents and their association with LBP for the last 12 months. Among the sociodemographic characteristics, there was an association between LBP with smoking status and the number of children. In contrast, all other characteristics were found to be not associated with LBP such as age, gender, ethnicity, education level, profession, marital status, household income, Body Mass Index (BMI), and regular exercise.

Table II, shows the occupational characteristics of the respondents and their association with LBP. From all the variables under the occupational characteristics, four of them were found to be significantly associated with low back pain, which was the manual handling of patients ($p = 0.04$), body bending of $\geq 30^{o}$ ($p < 0.01$), body twisting ($p < 0.01$), and lifting object using an instrument ($p < 0.01$).

After that, among those respondents with the presence of LBP, their perceptions and consequences of LBP were shown in Table III.

Then in Table IV, it shows the psychological characteristics of the respondents and their association with LBP. From all the variables under the psychological characteristics, four of them were found to be significantly associated with low back pain, which was headache ($p < 0.01$), stress ($p < 0.01$), low mood ($p < 0.01$), and fatigue ($p < 0.01$).

Lastly, Table V, shows the ergonomic risk exposure

Table 1. Sociodemographic Characteristics and Its Association with Low Back Pain

Variables	Low back pain		X^2-value	df	*p*-value
	Yes, n=258	No, n=102			
Age	Median(IQR)	34 (9)			0.67[a]
Below 30 years old	40(15.5%)	21(20.6%)	3.421	3	0.33
30 to 39 years old	157(60.9%)	53(52.0%)			
40 to 49 years old	45(17.4%)	18(17.6%)			
More than 50 years old	16(6.2%)	10(9.8%)			
Gender			0.931	1	0.34
Male	49(19.0%)	24(23.5%)			
Female	209(81.0%)	78(76.5%)			
Ethnicity			0.718	1	0.40
Bumiputera Sabah /Sabahan	210(81.4%)	79(77.5%)			
Others	48(18.6%)	23(22.5%)			
Profession			2.319	5	0.80
Nurse	119(46.1%)	51(50.0%)			
Doctor	44(17.1%)	12(11.8%)			
Assistant medical officer	27(10.5%)	11(10.8%)			
Pharmacist	32(12.4%)	12(11.8%)			
Allied health (Lab technologist/ Radiographer/ Physiotherapist)	22(8.5%)	8(7.8%)			
Non-clinical worker	14(5.4%)	8(7.8%)			
Highest education level			2.962	2	0.23
SPM or below	43(16.7%)	23(22.5%)			
Diploma	137(53.1%)	56(55.0%)			
Degree or higher	78(30.2%)	23(22.5)			
Marital status			2.515	1	0.11
Married	198(76.7%)	86(84.3%)			
Not married	60(23.3%)	16(15.7%)			
Household income			1.634	2	0.44
Less than RM 4,360.00	125(48.4%)	42(41.2%)			
RM 4,360.00 until RM9,619.00	100(38.8%)	44(43.1%)			
More than RM 9619.00	33(12.8%)	16(15.7%)			
Number of children			7.666	2	0.02*
0	84(32.6%)	21(20.6%)			
1-3	149(57.8%)	63(61.8%)			
4 and more	25(9.7%)	18(17.6%)			
Body Mass Index (BMI)			3.436	2	0.18
Underweight/Normal	103(40.0%)	51(50.0%)			
Overweight	86(33.3%)	31(30.4%)			
Obese	69(26.7%)	20(19.6%)			
Smoking			5.945	1	0.02*
Yes	12(4.7%)	12(11.8%)			
No	246(95.3%)	90(88.2%)			
Regular exercise			0.153	1	0.70
No or occasionally	200(77.5%)	81(79.4%)			
Yes, regular	58(22.5%)	21(20.6%)			

[a] Mann-Whitney test ; * Statistically significant finding of p-value < 0.05

Table II : Occupational Characteristics and Its Association with Low Back Pain

Variables	Low back pain		X^2-value	df	*p*-value
	Yes, n=258	No, n=102			
Shift work			0.715	1	0.40
Yes	12(4.7%)	7(6.9%)			
No	246(95.3%)	95(93.1%)			
Ergonomic training			0.333	1	0.56
Yes	39(15.1%)	13(12.7%)			
No	219(84.9%)	89(87.3%)			
Manual handling			4.080	1	0.04*
Yes	100(38.8%)	28(27.5%)			
No	158(61.2%)	74(72.5%)			
Bending of body ≥ 30°			19.713	1	<0.01*
Yes	204(79.1%)	57(55.9%)			
No	54(20.9%)	45(44.1%)			
Twisting of body			23.149	1	<0.01*
Yes	151(58.5%)	31(30.4%)			
No	107(41.5%)	71(69.6%)			
Heavy object lifting ≥ 10kg			3.713	1	0.05
Yes	40(15.5%)	8(7.8%)			
No	218(84.5%)	94(92.2%)			
Lifting objects using an instrument			16.227	1	<0.01*
Yes	65(25.2%)	48(47.1%)			
No	193(74.8%)	54(52.9%)			

* Statistically significant finding of p-value < 0.05

Table III : Perceptions and consequences of Low Back Pain

Variables	Frequency (%)
LBP related to work	
Yes	163 (63.2%)
No	95 (36.8%)
Characteristics of LBP	
Localized	184 (71.3%)
Radiated or with numbness in the leg or buttock	74 (28.7%)
Recovery of LBP	
Less than 3 weeks	199 (77.1%)
3 – 6 weeks	40 (15.5%)
6 – 12 weeks	7 (2.7%)
More than 12 weeks	12 (4.7%)
Sick leaves due to LBP	
Yes	26 (10.1%)
No	232 (89.9%)
Mode of treatment being sought for	
No treatment	137 (53.1%)
Traditional medicine	51 (19.8%)
Modern medicine	30 (11.6%)
Both modern and traditional medicines	40 (15.5%)

Table IV : Psychological Characters and Its Association with Low Back Pain

Variables	Low back pain, n(%)		X^2-value	df	*p*-value
	Yes, n=258	No, n=102			
Headache			31.324	1	<0.01*
Yes	97(37.6%)	8(7.8%)			
No	161(62.4%)	94(92.2%)			
Stress			24.802	1	<0.01*
Yes	79(30.6%)	6(5.9%)			
No	179(69.4%)	96(94.1%)			
Low mood			16.713	1	<0.01*
Yes	64(24.8%)	6(5.9%)			
No	194(75.2%)	96(94.1%)			
Fatigue			26.624	1	<0.01*
Yes	106(41.1%)	14(13.7%)			
No	152(58.9%)	88(86.3%)			
Work satisfaction			0.295	1	0.59
Yes	136(52.7%)	57(55.9%)			
No	122(47.3%)	45(44.1%)			
Support from colleague			0.952	1	0.33
Yes	166(64.3%)	60(58.8%)			
No	92(35.7%)	42(41.2%)			
Support from supervisor/ employer			1.984	1	0.16
Yes	128(49.6%)	59(57.8%)			
No	130(50.4%)	43(42.2%)			

* Statistically significant finding of p-value < 0.05

Table V : Ergonomics Risk Exposure Level of LBP and Its Association Among Health Care Workers

Ergonomic Risk Exposure Level	Low back pain		X^2-value	df	*p*-value
	Yes, n=258	No, n=102			
Low risk	41(15.9%)	33(32.4%)	13.205	2	<0.01*
Medium risk	185(71.7%)	55(53.9%)			
High risk	32(12.4%)	14(13.7%)			

* Statistically significant finding of p-value < 0.05

level of LBP and its association with LBP among healthcare workers in community health clinics in ta Kinabalu based on their routine work activity being done at the workplace. The majority of the respondents having low back pain were identified to have a medium risk level (71.7%), followed by a low-risk level (15.9%), and a high-risk level (12.4%). None of them was found to be in a very high-risk level group. In addition, there is also an association between the ergonomics risk exposure level with low back pain ($p < 0.01$) in this study.

DISCUSSION

Prevalence of LBP

Healthcare workers play a crucial role in patient care, and their work exposes them to the risk of developing low back pain. In this study, the prevalence of LBP among healthcare workers in community health clinics was 71.7%. This finding is slightly lower than the prevalence among community nurses in Negeri Sembilan, Malaysia (86.8%) [16] but comparable to nurses in Penang hospitals (76.5%) [1] and healthcare workers in Sibu Hospital, Sarawak, Malaysia (72.5%) [7].

This study was conducted in East Malaysia and as a part of Borneo Island which known for its remote and rural healthcare services, which could explain some differences in prevalence compared to Peninsular Malaysia. However, it is essential to note that the clinics selected for this study were closer to urban areas, ensuring a stable internet connection for the online survey, which was necessary due to the COVID-19 pandemic and the face-to-face interview was less preferred.

Community nurses, especially, may experience low back pain due to the necessity of using motorcycles for house-to-house visits while delivering maternal or child healthcare services. The challenge arises from the prolonged duration of riding and the remote locations of many houses, often situated far from main roads and characterized by common occurrence of poor road conditions in these areas.

Sociodemographic characteristics of LBP

Among participants with LBP, most were between 30 and 39 years old (60.9%), which differs from previous studies where a larger portion of sufferers were in the 20-29 age group [1,7]. The difference could be attributed to the age distribution of respondents in this study, with three-quarters falling into the below-40 age group, and on average the respondents were 35.7 years old. Based on the Kolmogorov-Smirnov test of normality, it was shown that the respondent's age, household income, and BMI were not normally distributed ($p<0.01$).

The higher percentage of females among respondents is consistent with the majority of LBP studies that report higher prevalence among women [1,2,7]. However, there was no significant difference between genders among LBP sufferers. Then, majority of the respondents belonged to the local Kadazan/Dusun ethnicity, which aligns with the expected racial distribution, as these two groups represent the largest ethnic group in the state of Sabah [19].

In terms of education levels, most individuals with LBP, approximately 53.1%, held at least a diploma and this trend aligns with other studies [1,7]. In our study, many of the participants were nurses and assistant medical officers, who are required to have a diploma-level qualification to work in the healthcare sector. However, even though nurses had the highest prevalence of LBP in our study, it was still lower than in other studies [1,7,18].

Moving on to marital status, a significant majority of respondents with LBP, around 76.7%, were married, while 23.3% were either single, widowed, or widowers. This percentage is considerably lower than a study conducted in Port Dickson, Malaysia, where at least 87% of married healthcare workers experienced low back pain [18]. Our study also revealed a significant association between LBP and the number of children ($p = 0.02$), consistent with a study in Tehran [20]. Among married individuals, there was a linear trend of an increased risk of LBP with more children. Regarding household income, in our study, among those with LBP, 48.4% fell into the B40 category (monthly household income less than RM4,360.00), 38.8% were categorized as M40 (RM4,360.00 to RM9,619.00), and 12.8% belonged to the T20 category (more than RM9,619.00). This classification of economic status aligns with the current system in Malaysia based on total household income.

Over half of the respondents in our study, approximately 57.2%, were either overweight or obese, which is higher than the national data from the National Health and Morbidity Survey of 2019, where 50.1% of Malaysians were classified as overweight or obese. However, this figure is lower than the state-level data, which indicated that 63.4% of Sabahans were either overweight or obese in NHMS 2019 [19]. The average BMI in our study was 26.7 kg/m^2.

As for smoking status, our study found that only 6.7% of participants were current smokers, whether of tobacco or vape. This percentage is considerably lower than the national data from 2019, which reported 21.3% of active smokers in Malaysia or 25.3% among Sabahans. This discrepancy may be attributed to the fact that one-fourth of the respondents in our study were females, and it's well-established that only 1 out of 10 women in the country smoke [19]. Most of the respondents with LBP were non-smokers, with only 4.7% being smokers. Additionally, there was a statistically significant association between smoking status and LBP ($p = 0.02$), consistent with findings in Tunisia [10].

Lastly, among all the respondents, only 3.9% (16 out of 360) were physically inactive, which is significantly better than the data from NHMS 2019, where 25.1% of Malaysians were physically inactive, and even lower than the rate among Sabahans, which was 16.0% [19]. Among those suffering from LBP, the majority either did not exercise or exercised only occasionally, accounting for 77.5%, which is higher than in other studies [7].

In contrast, our study did not find any associations between age, gender, marital status, or exercise with LBP, which contradicts previous studies that showed a significant association with factors such as increasing age, female gender, marriage, divorce, and exercise as protective factors against LBP [10]. The discrepancies in our findings may be attributed to variations in research techniques, the choice of questionnaires, the medical histories of the staff members, and their self-reports of the patterns of LBP occurrence and reduction.

Occupational Factors of LBP

The majority of our respondents, specifically 94.7%, were not employed in shift work positions. This is largely because the operating hours of community health clinics typically span from 7.30 a.m. to 5 p.m., following the common practice for public health facilities across Malaysia. Occasionally, some workers may be required to be on call during off-office hours,

but they are usually on standby and only need to be at the clinic when their services are necessary. This differs from most other studies conducted in a hospital setting where the majority of workers operate on a shift work system.

This study also examined ergonomic risk factors. Among LBP sufferers in health clinics in Kota Kinabalu, some were involved in activities such as manual handling (38.8%) and lifting heavy objects equal to or exceeding 10kg (15.5%). These figures were considerably lower than what other studies have reported [1,7,18]. Additionally, the prevalence of LBP was notably higher when it came to body bending at 30 degrees or more (79.1%) and body twisting (58.5%). These findings may be better or worse when compared to other states in Malaysia [1,7,17]. Of particular concern is the fact that 68.7% (n=247) of respondents did not use any lifting assistance when handling heavy objects, and 78.1% of these workers reported LBP in this study. This finding was worse than what was observed in previous studies [1,7,17].

With regards to occupational factors related to ergonomics, the activity of manual handling did show a statistically significant association with LBP ($p=0.04$). This finding is consistent with numerous studies conducted both locally [1,7,17] and internationally [10,11]. In addition, awkward postures such as body bending ($p<0.01$) and body twisting ($p<0.01$) were also linked to LBP. Some studies have shown a significant relationship between bending and back pain, suggesting that bending increases the risk of back pain six-fold [21]. Adopting postures that significantly deviate from a more neutral position, particularly when repeatedly performing tasks in such positions, places increased stress on joints and spinal discs [22]. Surprisingly, there was no association found between lifting heavy objects and LBP in this study. This could be attributed to the work environment of healthcare workers in community health clinics, where manual patient transfer is less frequent compared to a ward setting, where patients are more stable and mobile.

Psychological Factors of LBP

In the psychological aspects of our study, only a minority of respondents attributed their LBP to psychological factors, such as headaches (37.6%), stress (30.6%), low mood (24.8%), and fatigue (41.1%). These findings contrast with previous studies conducted in other regions [1,7,17]. Additionally, around half of the respondents with LBP reported being satisfied with their work and receiving good support from their supervisors or employer. Support from colleagues was slightly higher, at 64.3%. However, these percentages were considerably lower than what was observed in previous studies in other Malaysian states [1,7,17]. This study aligns with earlier research when it comes to the association of LBP with factors like headaches in India [23,24], stress in Hong Kong [24], or Iran [25], and low mood factor [24,26]. A previous study also indicated that patients with LBP and poor mental well-being exhibit significantly higher levels of disability and depression [26]. Lastly, the psychological factors related to fatigue, which were found to be significant in this study, are in line with findings in other studies [27]. All of these psychological factors are closely linked to emotional issues [15,28].

It is difficult to explain the reason for the association between psychological factors and low back pain for this study and further study is needed to explore the specific reasons. However, some studies suggest that pain can be exacerbated by psychological factors which are aggregated by lowered dopaminergic effects, pain sensitization, and stress-related neuroadaptations [29,30]. In addition, there are also reported higher odds of experiencing low back pain in individuals with low emotional awareness, mood issues, or having difficulties in processing their feelings [29,31]. There are also possible biological explanations such as differences in gene expression related to pain perception and signaling, mutation in NGF (nerve growth factor) or TRPM8 (transient receptor potential cation channel subfamily M member 8) involved in pain modulation [29,32], and monoclonal antibodies targeting CGRP (calcitonin gene-related peptide) that also take part in pain mechanism [29,33]. But all of these factors were not studied in this study due to the limitation of time and cost.

It is advisable for Malaysia's Ministry of Health to develop an effective intervention to address this situation. Many studies have shown that the management of mild to moderate LBP involves a combination of treatment, health education, and appropriate back exercises. To ensure that all healthcare employees have a decent working environment, the Ministry of Health may need to reassess the handling policy. Additionally, the existing policy should be reviewed to ensure that the current issue is properly addressed, and violations of the policy are dealt with effectively.

Limitations

This study has several limitations that should be considered. First, the use of a cross-sectional study design in which the assessment of occupational factors and ergonomics risk factors with LBP were conducted simultaneously. With this, it limits the prediction and evidence to conclude the temporal relationship between the exposures and the outcome measures. Furthermore, healthcare workers may have unique susceptibilities that could influence the occurrence of LBP. Additionally, the cross-sectional design may accede to the potential recall bias. Since data on the duration of exposures and symptoms of LBP were

collected via a self-administered online questionnaire, participants were prone to report inaccurate information. For example, the increased workload of handling COVID-19 pandemic which on rise in Sabah during data collection phase may have led to an overestimation of negative symptoms related to LBP, including psychological factors, which were not specifically considered in this study.

Other limitations include the risk of underreporting or overreporting of musculoskeletal disorders, as well as the potential for recall and nonresponse bias. There may also be uncertainty related to the wording and design of the questionnaire. The recall bias may have occurred especially on their LBP experience. The usage of a self-administered questionnaire would also raise interviewer bias as all of the questions were intended to be answered well by the respondents. Additionally, the ergonomics risk level assessment by using REBA in this study which was taken at a single point in time may not accurately represent the full range of exposures that healthcare workers accumulate over the years due to various factors. Furthermore, although the vast majority of cases were classified as low probability of work-relatedness in relation to low back pain, the quantitative method used does not allow for the identification of possible contributors to pain in this population.

Despite all the limitations that discuss thoroughly, this study has its strengths. It stands as one of the few studies conducted on healthcare workers in the Sabah state, which adds to its value. We made an extra effort to calculate the ergonomics risk factors, which was a mandatory requirement for all healthcare workers in selected facilities. This approach differs from previous studies that relied solely on questionnaire-based analysis.

CONCLUSION

This study has shown that there was a 71.7% prevalence of low back pain among healthcare workers in government health clinics of Kota Kinabalu. Importantly, it has unveiled a range of factors associated with this condition, including the number of children, smoking, manual handling, awkward postures (body bending, body twisting), lifting heavy objects using specific equipment, as well as the presence of headache, stress, low mood, fatigue, and ergonomics risk levels.

These findings provide a valuable insight into the issue of low back pain among the healthcare workers in government health clinics of Kota Kinabalu. These findings also can be better to be used for designing a better program for work-related musculoskeletal disorders (MSD) prevention among healthcare workers. By addressing these factors, we can better protect our healthcare workforce, ensuring their well-being and enabling them to continue delivering high-quality care to the public.

Author Contributions: Conceptualization, A.N.A. and S.B.S.; formal analysis, A.N.A.; funding acquisition, S.B.S.; investigation, A.N.A.; methodology, A.N.A., S.B.S.; supervision, S.B.S. and M.S.J.; validation, writing and editing, A.N.A.; reviewing, S.B.S. and M.S.J.

This study was approved by the Medical Research Ethics Committee (MREC) of Universiti Malaysia Sabah [Approval code : JKEtika 1/21 (6) ; date 12 April 2021] and the Medical Research Ethics Committee (MREC) of the Ministry of Health for the Malaysia [NMRR ID : NMRR-21-471-58537 (IIR) ; Ref MREC KKM : KKM/NIHSEC/P21-831(10) ; date 10 June 2021].

ACKNOWLEDGEMENT

We would like to thank the Director General of Health Malaysia for his permission to publish this article. We are also very grateful to the Dean of the Faculty of Medicine and Health Sciences at Universiti Malaysia Sabah for supporting this research. As for permission to access and use of BACKS tool, we give acknowledgment to Universiti Kebangsaan Malaysia as the owner; Centre for Innovation & Technology Transfer (INOVASI@UKMTM) as the caretaker of the copyrights; and also Dr. Jenn Zhueng Tam as the creator of the BACKS tool which also spent his time for providing one-to-one coaching with A.N.A. on the mechanism to use the tool.

REFERENCES

1. Mohd Ismail I, Izani Uzair Z, Najib Majdi Y, Mohd Izmi A, Mohd Nazri S. Low back pain and its associated factors among nurses in public hospitals of Penang Malaysia. International Journal of Environmental Research and Public Health. 2019;16(4254):1-12 [cited 2020 December 1]. Available from: https://doi.org/10.3390/ijerph16214254
2. Hoy D, March L, Brooks P, Blyth F, Woolf A, Bain C, et al. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Annals of Rheumatic Diseases. 2014;73(6):968-974 [cited 2021 March 1]. Available from: https://doi.org/10.1136/annrheumdis-2013-204428
3. Nachemson A, Jonsson E. Neck and back pain: The scientific evidence of causes, diagnosis, and treatment. Philadelphia, USA: Lippincott Williams & Wilkins; 2000 [cited 2020 November 24]. Available from: https://doi.org/10.1302/0301-620X.84B6.0840935
4. National Institute of Neurological Disorders. Low back pain fact sheet; 2020 [cited 2020 November 24]. Available from: https://www.ninds.nih.gov/

DISORDERS/PATIENT-CAREGIVER-EDUCATION/FACT-SHEETS/LOW-BACK-PAIN-FACT-SHEET
5. Andersson GB. Epidemiological features of chronic low back pain. Lancet. 1999;54(9178):581-585 [cited 2020 November 24]. Available from: https://doi.org/10.1016/S0140-6736(99)01312-4
6. Freburger J, Holmes G, Agans R, Jackman A, Darter J, Wallace AS, et al. The rising prevalence of chronic low back pain. Archives of Internal Medicine. 2009;169(3):251-258 [cited 2020 November 24]. Available from: https://doi.org/10.1001/archinternmed.2008.543
7. Wong T, Teo N, Kyaw M. Prevalence and risk factors associated with low back pain among health care providers in a district hospital. Malaysian Orthopaedic Journal. 2010;4(2):23-28 [cited 2020 November 24]. Available from: http://morthoj.org/2010v4n2/Low_Back_Pain.pdf
8. Coste J, Delecoeuillerie G, Cohen de Lara A. Clinical course and prognostic factors in acute low back pain: an inception cohort study in primary care practice. BMJ. 1994;308(6928):577-580 [cited 2020 November 24]. Available from: https://doi.org/10.1136/bmj.308.6928.577
9. Schneider S, Randoll D, Buchner M. Why do women have back pain more than men? A representative prevalence study in the Federal Republic of Germany. Clin J Pain. 2006;22:738-747 [cited 2020 November 24]. Available from: https://doi.org/10.1097/01.ajp.0000210920.03289.93
10. Beija I, Younes M, Jamila HB, Khalfallah T, Salem KB, Touzi M, et al. Prevalence and factors associated to low back pain among hospital staff. Joint Bone Spine. 2005;72:254-259 [cited 2020 November 24]. Available from: https://doi.org/10.1016/j.jbspin.2004.06.001
11. Landry MD, Raman SR, Sulway C, Golightly YM, Hamdan E. Prevalence and risk factors associated with low back pain among health care providers in a Kuwait Hospital. Spine. 2008;33(5):539-545 [cited 2020 November 24]. Available from: https://doi.org/10.1097/BRS.0b013e3181657df7
12. Yip VY. New low back pain in nurses: work activities, work stress and sedentary lifestyle. Journal of Advanced Nursing. 2004;46:430-440 [cited 2021 January 26]. Available from: https://pubmed.ncbi.nlm.nih.gov/15117354/
13. Knibbe JJ, Friele RD. Prevalence of back pain and characteristics of the physical workload of community nurses. Ergonomics. 1996;39(2):186–198. doi:10.1080/00140139608964450
14. Tam JZ, Zuraida M, Sharifa Ezat WP, Noor Hassim I. BACKS Tool: A study in identifying associated factors of occupational chronic low back pain in developing country. Malaysian Journal of Public Health Medicine. 2019;19(2):1-10 [cited 2020 November 24]. Available from: https://doi.org/10.37268/mjphm/vol.19/no.2/art.32
15. Middlesworth M. A step-by-step guide to the REBA Assessment Tool. 2019 [cited 2020 December 1]. Available from: https://ergo-plus.com/reba-assessment-tool-guide/#:~:text=The%20Rapid%20Entire%20Body%20Assessment%20(REBA)%20was%20developed%20to%20%E2%80%9C,associated%20with%20certain%20job%20tasks.&text=A%20single%20page%20worksheet%20(above,action%2C%20repetition%2C
16. Rahmah MA, Rozy J, Jamsiah M, Shamsul AS. Prevalence of back pain among nurses working in government health clinics and hospital in Port Dickson, Malaysia. Journal of Community Health. 2008;14(2):11-18 [cited 2021 April 5]. Available from: http://journalarticle.ukm.my/4607/1/Vol14%281%29-aniza.pdf
17. Jann N, Chan S. Low back pain among registered nurses in surgical unit at Hospital Raja Perempuan Zainab (HRPZ) II, Kota Bharu Kelantan. The Malaysian Journal of Nursing. 2018;10(1):35-41 [cited 2020 December 1]. Available from: https://doi.org/10.31674/mjn.2018.v10i01.005
18. Vinstrup J, Jakobsen MD, Andersen LL. Perceived stress and low-back pain among healthcare workers: A multi-center prospective cohort study. Frontiers in Public Health. 2020;8(297) [cited 2021 January 31]. Available from: https://www.frontiersin.org/articles/10.3389/fpubh.2020.00297/full?utm_source=F-NTF&utm_medium=EMLX&utm_campaign=PRD_FEOPS_20170000_ARTICLE
19. Sabah State Government. Mengenai Sabah. 2021 [cited 2020 December 1]. Available from: https://www.sabah.gov.my/cms/?q=ms/content/pengenalan
20. Malaysia National Institute of Health. National Health and Morbidity Survey (NHMS) 2019. Putrajaya: Malaysia National Institute of Health. 2020 [cited 2021 July 30]. Available from: https://iku.gov.my/images/IKU/Document/REPORT/NHMS2019/Report_NHMS2019-NCD_v2.pdf
21. Mehrdad R, Pouryaghoub G, Afsah MM. Association between absenteeism and Low Back Pain in an automobile factory. SN Comprehensive Clinical Medicine. 2020;2:278-283 [cited 2021 August 1]. Available from: https://doi.org/10.1007/s42399-020-00225-z
22. Anuar I, Nurulakhmar AS, Mazrura S, Azhar AH. Kajian sakit belakang dan faktor-faktor yang mempengaruhinya di kalangan pekerja pemasangan industri automotif. Jurnal Kesihatan Masyarakat. 2010;16(2):10-16 [cited 2021 August 1]. Available from: http://journalarticle.ukm.my/5396/
23. Department of Occupational Safety and Health. Guidelines for manual handling at workplace 2018 (1st ed.). Putrajaya: Department of Occupational Safety and Health. 2018 [cited 2021 June 1]. Available from: https://www.dosh.gov.my/index.php/competent-person-form/occupational-health/

regulation/guidelines/ergonomic/2959-guidelines-for-manual-handling-at-workplace-2018/file
24. Arani V, Edwin C, Pincus T, Manjit M, Parsons H, Underwood M. The association between headache and low back pain: a systematic review. The Journal of Headache and Pain. 2019;20(82) [cited 2021 August 1]. Available from: https://doi.org/10.1186/s10194-019-1031-y
25. Yip Y. A study of work stress, patient handling activities and the risk of low back pain among nurses in Hong Kong. Journal of Advanced Nursing. 2001;36(6):794-804 [cited 2021 August 1]. Available from: https://doi.org/10.1046/j.1365-2648.2001.02037.x
26. Hamid RK, Nayereh B, Jila A, Ali G, Hamid A. Determining the association between low back pain and occupational stress in nurses. J Arak Uni Med Sci. 2006;9(3):73-81 [cited 2021 August 1]. Available from: http://jams.arakmu.ac.ir/article-1-32-en.html
27. Kothe R, Kohlmann T, Klink T, Rüther W, Klinger R. Impact of low back pain on functional limitations, depressed mood and quality of life in patients with rheumatoid arthritis. Journal of Pain. 2007;127(1):103-108 [cited 2021 August 1]. Available from: https://doi.org/10.1016/j.pain.2006.08.011
28. Christensen A, Petersen F, Sore S, Spencer-Hwang R. The association between low back pain and fatigue among commercial drivers. Occupational Medicine & Health Affairs. 2013;1(1):1-4 [cited 2021 August 1]. Available from: http://dx.doi.org/10.4172/omha.1000101
29. Vivekanantham, A., Edwin, C., Pincus, T, Mathary M, Parsons H, Underwood M. The association between headache and low back pain: a systematic review. J Headache Pain. 2019;20(82) [cited 2021 August 1]. Available from: https://doi.org/10.1186/s10194-019-1031-y
30. Simons LE, Elman I, Borsook D. Psychological processing in chronic pain: a neural systems approach. Neurosci Biobehav Rev. 2014;39:61–78 [cited 2021 August 1]. Available from: https://doi.org/10.1016/j.neubiorev.2013.12.006
31. Mehling WE, Krause N. Are difficulties perceiving and expressing emotions associated with low-back pain? The relationship between lack of emotional awareness (alexithymia) and 12-month prevalence of low-back pain in 1180 urban public transit operators. J Psychosom Res. 2005;58 [cited 2021 August 1]. Available from: https://doi.org/10.1016/j.jpsychores.2004.05.007
32. Sutherland HG, LRA-Ohoo G. Genetics of migraine: insights into the molecular basis of migraine disorders. Headache. 2017;57:1526–4610.
33. Hou M, Xing H, Cai Y, Wang X, Li P, Hu X, Chen J. The effect and safety of monoclonal antibodies to calcitonin gene-related peptide and its receptor on migraine: a systematic review and meta-analysis. J Headache Pain. 2017;18(42).
34. Chou L, Brady SR, Urguhart DM, Teichtahl AJ, Cicuttini FM, Pasco JA, et al. 2016. The association between obesity and low back pain and disability is affected by mood disorders: A population-based, cross-sectional study of men. Medicine (Baltimore). 2016;95(15):e3367 [cited 2021 August 1]. Available from: https://dx.doi.org/10.1097%2FMD.0000000000003367