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Original Article

Prevalence of work related musculoskeletal disorders (WRMSD) and the associated risk factors among malaysian physiotherapists: A cross sectional study

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Abstract:
Groups in diverse environments are exposed to WRMSD including physiotherapists. There is a lack of study which evaluates the WRMSD among physiotherapists in Malaysia as studies are confined to certain geographical locations and work settings. This study investigated the prevalence of WRMSD among physiotherapists in Malaysia working in various physiotherapy settings and geographical locations. The significance of this study is increasing awareness of WRMSD among physiotherapists which will create the need for prevention strategies and ergonomic devices in various physiotherapy settings. A cross-sectional study was conducted using self-administered online questionnaires consisting sections on demographic, working characteristics, occupational risk factors and Nordic Musculoskeletal questionnaire. 387 physiotherapists were recruited using a purposive sampling method. Descriptive statistics were used to evaluate the prevalence of WRMSD and the association between the prevalence of WRMSD and risk factors was determined by the Chi-Square test. The highest prevalence of WRMSD was at wrist-hands (65.9%), neck (52.5%), lower back (41.3%), and the least, elbow (6.2%). Gender, work settings, number of patients treated per week, manual therapy application, frequent trunk bending/twisting, excessive workload, poor ergonomic workplace, continued work with WRMSD and psychological stress were the associated risk factors, with $p<0.05$. There is a high prevalence of WRMSD among physiotherapists in Malaysia. Demographic data, working characteristics, and occupational risk factors are significant risk factors causing WRMSD among physiotherapists in Malaysia. These associations highlight the importance of early interventions, measures and ergonomics in future to prevent further WRMSD and improve quality of work and life among Malaysian physiotherapists.
Key Words: - **Ergonomic, Malaysia, Prevalence, Risk factors, Work-related musculoskeletal disorders**

Introduction

Work related musculoskeletal disorder (WRMSD) is defined as a disorder involving damage in the muscle, tendon, nerve, ligaments and soft tissue as the result of job tasks execution and working environments. It is associated with discomfort, pain and frustration. It affects worker's social and emotional well-being. WRMSD is also strongly associated with fatigue and resulting in reduced work productivity and contributes to high absenteeism rate in a worker (Ng Y.G et al., 2014; L.Hoang et al., 2018). Therefore, due to the disability, it increases the medical expenses while slowing down the economy (L.Hoang et al., 2018).Various studies have been carried out in investigating the severity, risk factors, effects, preventive strategies and recovery measures of WRMSD among working adults (Z. Podniece et al., 2008). Studies reported that 83.8% academicians, 71.9% office workers and 62.8% housekeepers experienced WRMSD (V.Mohan et al., 2015; O. C. Okezue et al., 2020; S. D. Wami et al., 2019). About 50.7% to 74.6 % of the health care workers including administrative and clinical staff in the healthcare sector developed WRMSD (N. O. Oranye & J. Bennett, 2018; S. Yasobant and P. Rajkumar, 2014). Health care workers such as physiotherapists were reported with higher prevalence of developing WRMSD despite being trained with the knowledge and skills on ergonomic, human body dynamics and prevention strategies for WRMSD (S. Yasobant and P. Rajkumar, 2014; H.Dong et al., 2019, Hafner et al., 2018). More than 89% of the physiotherapists reported with WRMSD throughout their practices and careers with 32.2% of them experiencing the injuries during their first five years of practice (I. D. Anyfantis & A. Biska, 2018; E. R. Vieira et al., 2016; Z. Iqbal & A. Alghadir, 2015). According to Nordin et al. (2011), 70% to 71.6% of the Malaysian physiotherapists reported work related injuries in the past 12 months. The most common affected areas were lower back (44%-51.7%), neck (20-46.5%) and upper back (14%-44.8%) with the elbow the least (0% - 8.6%) (N. A. M. Nordin et al., 2011; B. Rajan & M. N. Nur Asyikin, 2016). Work nature such as prolonged operating in the same place, repetitive lifting or moving heavy patients and manual therapy were three main contributing factors of WRMSD (E. R. Vieira et al., 2016; N. A. M. Nordin et al., 2011; B. Rajan & M. N. Nur Asyikin, 2016). Apart from working nature, junior physiotherapists and females experience WRMSD due to less working experience and biological differences (E. R. Vieira et al., 2016; N. A. M. Nordin et al., 2011). In a

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study done by I. D.Anyfantis & Biska (2018) reported that physiotherapists who work in a private setting experience less WRMSD comparative with those working in the public setting. Most of the studies that investigated the prevalence of WRMSD and its associated risk factor among physiotherapists were carried out in Western and European countries. However, due to differences in workload, work setting, practice and equipment used, therefore the result might be varying. Two local studies had been conducted in Malaysia on physiotherapists related to WRMSD, nevertheless, the studies were carried out in Kuala Lumpur (N. A. M. Nordin et al., 2011) and Sabah (B. Rajan & M. N. Nur Asyikin, 2016). Till date, limited research done nationally in Malaysia, and there is very little information regarding the prevalence of WRMSD among physiotherapists in nationwide Malaysia. Therefore, this will be the first study to discover the WRMSD prevalence and identify the associated risk factors in a wide range of physiotherapy settings across a broader geographical area in Malaysia. This study aims to increase the awareness among physiotherapists on WRMSD, enabling early interventions, measures and ergonomics preventive mechanisms to reduce prevalence of WRMSD among physiotherapists in the future.

Material & methods

A cross-sectional study was used to investigate the prevalence of WRMSD among Malaysian physiotherapists and to determine the WRMSD associated risk factors. Purposive sampling method was used to recruit the subjects from Malaysia's national physiotherapist communities. It involved a wide range of physiotherapy settings including public and private hospitals, fitness clinic, physio centre, geriatrics care centre, sports centre, nursing home, disabled children's homes, medical rehabilitation centre, private practitioners, etc. in Malaysia. Thus, the study findings would broadly be interpreted and extrapolated to whole communities of physiotherapists working in Malaysia. An electronic self-administered online questionnaire was used and sent to Malaysian Physiotherapists through email and social media. The inclusion criteria of this study include being qualified Malaysian clinical physiotherapists who work at least 1 year and age between 22-55 years old plus able to understand English language. 442 responses were collected with 55 of them being excluded according to the exclusion criteria. Exclusion criteria in this study include having musculoskeletal disorder before their commitment in physiotherapy career or with recent trauma, injury, surgery, motor vehicle accident, sport related injury in the past two weeks were excluded. The self-administered questionnaire were divided into four sections: demographic data, Nordic Musculoskeletal Questionnaire (NMQ), work related questions such as work location, work setting, working hours, number of patient treated per week, and some adapted questions from the Dutch Musculoskeletal Questionnaire. NMQ was used to evaluate the prevalence of musculoskeletal disorders and the affected areas and has Cronbach's Alpha value of 0.945 (A. Chairani., 2020) with high sensitivity, 82.3%- 100% (A. Descatha et al., 2007). The collected data was analysed using the 26th edition of Statistical Package for Social Sciences (SPSS). All categorical variables such as demographics, working characteristics, occupational risk factors, prevalence of WRMSD in past 12 months and 7 days, job and life effects of WRMSD as well as seeking physician upon WRMSD with respect to different body area were thereby summarized and presented using descriptive statistics (frequency and percentages). The association between the prevalence of WRMSD and the demographic, working characteristics, and occupational risk factor were determined using Chi-square (test of association). The significant level, p value is set at < 0.05.

Results

Four-hundred and forty-two physiotherapists across all states in Malaysia were recruited to participate in this study. 55 were excluded as they met the exclusion criteria; experienced surgery, accident, and trauma in the past 2 weeks (n=10), age < 22 years old (n=45). Only 387 physiotherapists fulfilled the inclusion criteria and completed the questionnaire. Table 1 shows the demographic data including age, gender, Body Mass Index (BMI), and education level. Majority physiotherapists were females (59.7%) and aged between 22-32 (61.8%). Most physiotherapists (46.5%) had normal BMI (18.5- 24.9kg/m²) with only 2.6% in class III obesity, BMI within >40 kg/m². The highest level of qualifications for 54.0% of physiotherapists were bachelor's degree, while only 4.5% of physiotherapists qualified with a postgraduate certificate.

Table 1. Demographic data

Demographic variable	Subcategory	Number (n) N=Total 387	Percentage (%)
Age (year)	22-32	239	61.8
	33-43	101	26.1
	44-55	47	12.1
Gender	Female	231	59.7
	Male	156	40.3
BMI (Kg/m^2)	Underweight: <18.5	26	6.7
	Normal: 18.5-24.9	180	46.5
	Pre-obese: 25-29.9	96	24.8
	Obese Class I: 30-34.9	46	11.9
	Obese Class II: 35-39.9	29	7.5
	Obese Class III: >40	10	2.6
Education level	Diploma	63	16.3

Advanced diploma	96	24.8
Bachelor's degree	209	54.0
Master's degree	17	4.4
Doctoral degree	2	0.5

High prevalence of WRMSD among physiotherapists working in Malaysia in the past 12 months was reported and presented in Figure 1. The highest WRMSD prevalence on wrist / hands (65.9%), followed by neck (52.5%), lower back (41.3%), shoulder (26.9%), upper back (26.4%), knee (18.3%), hip/thighs (10.9%). The least areas affected were the elbow (6.2%, n=24) and ankle / toes (9.6%, n=37).

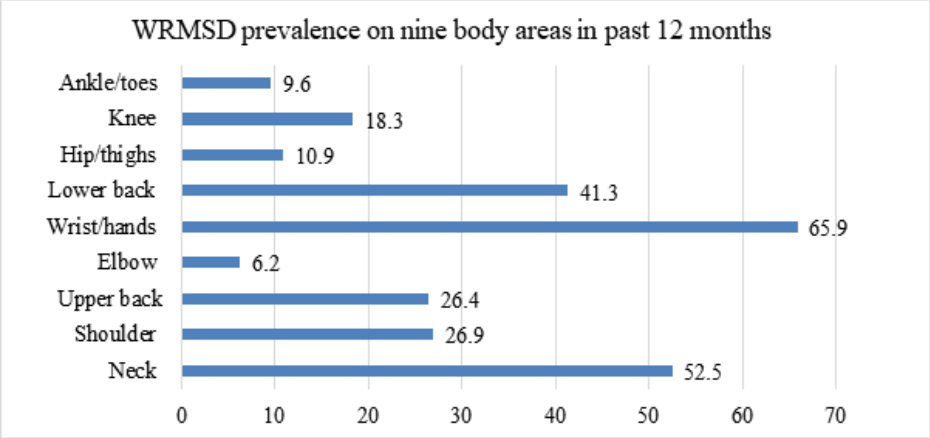

Figure 1. WRMSD prevalence on nine body areas in past 12 months in percentage

Discussion

WRMSD is common among physiotherapists working in Malaysia. According to the current study, physiotherapists in Malaysia reported having WRMSD in the previous 12 months, with 65.9% of WRMSD prevalence at wrist/hands compared to other body regions. This is similar to a previous study with 57%-83% of physiotherapists having thumb pain and discomfort due to work tasks (E. R. Vieira et al., 2016). On the contrary, other studies by Nordin et al. (2011) and Priyanka et al. (2015) showed low prevalence of WRMSD at wrist/hand. WRMSD affecting wrist and hands may be attributed to the work practice, such as frequently applying manual therapy (Mahajan et al., 2020). The possible reasons for frequently applying manual therapy might be because it evidenced great benefits in pain reduction and breaking scar adhesions. However, the high prevalence of thumb and wrist in WRMSD was due to the tedious and increasing use of manual therapy in clinical practice and, in the worst-case scenario, resulted in thumb and wrist osteoarthritis (H. Jenkins & H. Myezwa, 2015). Despite previous study reporting only 17.6 % WRMSD affecting wrist and hand of physiotherapists in Tricity (M. Priyanka et al., 2015) and in the American Physical Therapy Association observing generally low prevalence of WRMSD among physiotherapists since the majority of them were WRMSD-free, with just as low as 28 % of the overall occurrence of WRMSD in the previous 12 month, the current findings of the study matched those of Campo and co-author (2008), who found that the lower back was the most affected, followed by the wrists/hands and neck.

The present study found 41.3% of physiotherapists reported lower back pain, which is the second leading area prone for WRMSD reported after the wrist and hands. Similarly, a study from Malaysia reported that 44% of physiotherapists experienced low back pain (B. Rajan & M. N. Nur Asyikin, 2016). However, the prevalence of lower back pain was reported to be less consistent with previous similar findings from Malaysia (51.7%) by N. A. M. Nordin et al. (2020); India (61.5%) by D. Sharan et al. (2018); Israel (80%) by V. Rozenfeld et al. (2010), Nigeria (57.8%) by U. Abaraogu et al. (2016). Based on the narrative review, it is obvious that low back pain was most likely to be prevalent, with a prevalence of 22-73.1% throughout a 12-month period (Mohammad Milhem et al., 2016). According to researchers (N. A. M. Nordin et al., 2011; B. Rajan & M. N. Nur Asyikin, 2016), among physiotherapists with WRMSD, the most common affected areas are the lower back (44%-51.7%), neck (20-46.5%) and upper back (14%- 44.8%) with the elbow the least (0%-8.6%). Whereas, the present study found physiotherapists to be more prevalent over the neck (52.5%), shoulder (26.9%), upper back (26.4%), and knee (18.3%), followed by hip/thighs (10.9%). Besides that, the elbow (6.2%) and ankle/toes (9.6 percent) were found to be the least common. In terms of the low prevalence of WRMSD at the elbow, these study's findings were consistent with previous findings (0%) and (1%) from physiotherapists in Malaysia (I. D. Anyfantis & A. Biska., 2018; B. Rajan & M. N. Nur Asyikin, 2016).

In specific to gender, the current study showed a significant association with pain over the neck, shoulder, upper back, lower back and ankles-toes, particularly in female physiotherapists predominantly exposed to WRMSD. This finding was similar to reported findings that gender was associated with contributing to

WRMSD among female physiotherapists (N. A. M. Nordin et al., 2011; R. Edgar et al., 2015; Mohammad Milhem et al., 2016). This could be attributable to biological differences, higher pain thresholds for males, as well as variations in social roles, activities, and behaviors (R. Fillingim et al., 2009). In contrast, this was controversial as a study done on Greek physiotherapists had shown no significant association between gender and WRMSD (I. D. Anyfantis & A. Biska, 2018) while another study by D. Sharan et al. (2018) showed higher prevalence of WRMSD in male physiotherapists, which was contrary to our findings.

Physiotherapist work setting also in this present study showed a significant association with all 9 body areas. Similarly, physiotherapists in Greece showed a solid association between work setting and WRMSD (I. D. Anyfantis & A. Biska, 2018). In contrast, a study showed no major association between WRMSD and working environmental settings (V. Rozenfeld et al., 2010). Further, the number of patients treated by physiotherapists was found to have a significant association with most of the body areas, including the neck, shoulder, upper back, wrist-hand, lower back, and ankle-toes in this present study. This might be due to excessive workload causing high impact of physiological and psychological stress and eventually leading to a high prevalence of WRMSD. However, a study by V. Rozenfeld et al. (2010) had concluded treating a large number of patients to be related to lower back WRMSD. The number of patients treated and followed by physiotherapists utilizing manual therapy was found to be associated with WRMSD in all 9 body areas in the current study. This was supported by research which found a substantial link between manual therapy and the prevalence of WRMSD, particularly in the thumb and wrist (M. Campo et al., 2008; AR Darragh et al., 2009; S. Yasobant & P. Rajkumar, 2014; R. Edgar et al., 2015). This could be due to repetitive manual techniques causing heavy impact on soft tissue and specific joints, eventually causing wear and tear on the thumb and wrist (Kogi et al., 2003). Other than that, continuing work with WRMSD was also associated with WRMSD in all 9 body areas. This is similar to a previous study in Tricity that showed a significant association between WRMSD rate and refusing to take sick leave among physiotherapists in Tricity (M. Priyanka et al., 2015). Without proper rest and recovery after experiencing WRMSD, the physiotherapist would be highly drained, and this might further affect the healing process, hence increasing the severity of WRMSD.

Moreover, there was a significant association between trunk bending/twisting and WRMSD in all body areas except the elbow. Previous similar articles showed lower back WRMSD was associated with bending the trunk regularly, whereas neck WRMSD was associated with neck bending or winding (H. Dong et al., 2019). The possible reason could be that frequent bending and twisting can cause muscle strain, joint sprain, and even trigger muscle spasms, which increase the prevalence of WRMSD, especially in the lower back among physiotherapists. Excessive workload was also significantly associated with WRMSD in all body areas except the elbow. Previous studies have reported high workload, such as treating a massive number of patients, was associated with the high prevalence of WRMSD (V. Rozenfeld et al., 2010; S. Yasobant & P. Rajkumar., 2014; M. Priyanka et al., 2015; Mohammad Milhem et al., 2016). A study by Lee and colleagues. (2018) found that prolonged working hours lead to excessive workload and are associated with WRMSD. The possible reasons might be due to the high demand for physiotherapists in the community and the limited number of physiotherapists in Malaysia. Malaysia experiences a shortage of physiotherapists as a typical physiotherapist would need to manage 15-20 patients per day with the ratio of one physiotherapist to the number of people in Malaysia is 1:13,000 (Borneo Post Online, 2014). This scenario of high workload might cause a massive outstanding burden on physiotherapists. Without adequate recovery, physiotherapists experience burnout and are more vulnerable to WRMSD (N.H Alqahtani et al., 2020).

Current study shows significant association between poor ergonomic workplace and WRMSD on shoulders, wrist/hands, upper back, lower back, hip-thighs, knees, and ankle-toes, similar to the study by H. Dong et al. (2019) which showed a significant association between ergonomic components and WRMSD occurrence. A workplace which is ergonomically friendly can reduce overstress and injury due to work, which improves the quality and productivity of work, whereas non-ergonomics will result in additional stress on muscles, joints, tissue, and ligaments, which contribute to the high prevalence of WRMSD (I. D. Anyfantis & A. Biska, 2018; NIOSH, 2018). With proper ergonomics, there would be positive outcomes for pain, work status, and activities of daily living (L. Chetty, 2010). Similarly, a study done among dental specialists also reported a higher incidence of WRMSD due to poor ergonomics practice (T. Shamim, 2017). Finally, psychological related stress also showed an association with WRMSD on shoulders, wrist/hands, upper back, lower back, and ankle-toes similar to a study which showed a significant association between psychological related stress and burnout syndrome (P. Ibikunle et al., 2012). A previous study showed individuals with burnout syndrome experienced a higher prevalence of WRMSD (N. H Alqahtani et al., 2020). However, no association was reported between psychological job-related stress and WRMSD among Nigerian physiotherapists (U. Abaraogu et al., 2017).

Conclusions

Current study showed high prevalence of WRMSD among physiotherapists in Malaysia. The wrist/hands, lower back, and neck were the most commonly affected regions.The study showed work settings, number of patients treated per week and gender were the associated risk factors to WRMSD among physiotherapists in Malaysia. Occupational risk factors resulting in the steep rise of WRMSD among physiotherapists in Malaysia included manual therapy application, continuing work upon experiencing MSD,

frequent trunk bending-twisting, excessive workload, poor ergonomic workplace and experiencing psychological job-related stress. WRMSD affects the work productivity and quality of both work and life which brings negative impacts. Hence, these associations bring up the importance to address appropriate and adequate early interventions, measures, and ergonomics in the future to prevent further WRMSD and improve the quality of work and life among Malaysian physiotherapists.

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