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ASSESSMENT OF KNOWLEDGE, ATTITUDE AND PRACTICES (KAP) TOWARDS THE PREVALENCE OF WORK-RELATED MUSCULOSKELETAL DISORDER (WMSD) AMONG MALAYSIAN RAILWAY MAINTAINANCE WORKERS IN CONSTRUCTION SECTOR: A PILOT STUDY

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Abstract:

One of the most commonly reported occupational diseases is Work-related Musculoskeletal Disorder (WMSD), which have shown a rising trend of exposure in the construction sector. Studies on worker's Knowledge, Attitude, and Practices (KAP) on WMSD in the construction sector are limited. Hence, it is necessary to discover the underlying KAP factors in order to provide interventions to prevent MSDs. This study assesses the level of Knowledge, Attitude and Practice (KAP) on Work-related musculoskeletal disorder (WMSD) with the prevalence of WMSD among workers in construction sector. 30 workers from construction sector in Selangor were selected in this pilot study. All of them were specialised in railway maintenance work. There are two sets of questionnaires that were used throughout this pilot study: KAP on WMSD Questionnaire and CORNELL Musculoskeletal Questionnaire. Results showed the prevalence of WMSD is high at lower back body region (86.2%). Spearman correlation was used in order to test the relationship between KAP scores and KAP variables and prevalence of WMSD. The Kruskal Wallis test was used to test the KAP score and demographic. From Spearman correlation a significant relationship has been established between knowledge and practices ($r= -0.483$, $p < 0.05$) on KAP level of workers. Moreover, the attitude component has a significant difference ($T= 8.411$, $p<0.05$) with education level. The three highest prevalence of WMSD based on body region were

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found in lower back (86.2%), upper back (72.4%), and neck (65.5%). WMSD cases are increasing hence understanding the underlaying KAP factors in WMSD is crucial in order to deal with the problem. The findings will enhance awareness and engagement not only among employees but of all parties including industry players and stakeholders regarding WMSD and ergonomic hazards, leading to effective interventions and a safer working environment.

Keywords:

Work-Related Musculoskeletal Disorders (WMSD), Knowledge, Attitude And Practice (KAP), Railway Maintenance Workers

Introduction

Maintenance railway construction workers are at a high risk of developing work-related musculoskeletal disorders (WMSD) due to various occupational factors. Studies have shown that these workers often experience injuries such as sprains, cuts, and fractures, with the main reasons being neglect of safety precautions, slipping and falling, and lack of awareness (Das, 2020). Biomechanical exposures, including hand-arm vibration and repetitive tasks like lifting, pushing, and bending, have been linked to shoulder, elbow, wrist, hand, finger, neck, back, and knee symptoms among railway maintenance workers (Landsbergis et al., 2019; Landsbergis et al., 2020; Landsbergis et al., 2021). Prevention programs focusing on ergonomic interventions, proper training, job rotation, and avoiding awkward postures are recommended to reduce the prevalence and severity of WMSD among railway maintenance workers. Additionally, workplace practices such as ergonomics, force reduction, and training play a crucial role in mitigating WMSD risks, highlighting the importance of proactive and customized approaches in WMSD prevention (Van Eerd, 2022).

Musculoskeletal disorders (MSDs) are a significant occupational health concern among construction workers in railway maintenance work. These disorders encompass a range of conditions affecting the skeletal muscles, ligaments, tendons, and joints, including sprains, strains, back pain, sciatica, tennis elbow, and carpal tunnel syndrome (Khan & Singh, 2018). The prevalence of WMSD among railway maintenance workers is particularly high due to the physically demanding nature of their work, which often involves manual handling of heavy loads, extensive working on ballast, and repetitive tasks that can lead to biomechanical work exposures (Khan & Singh, 2018; Boschman et.al., 2012; Landsbergis et al., 2019).

One of the primary risk factors for WMSD among railway maintenance workers is the use of high-vibration vehicles. Studies have shown that prolonged exposure to whole-body vibration is associated with neck pain, knee pain, and sciatica (Landsbergis et al., 2020). Additionally, tasks that involve lifting, pushing, pulling, or bending, such as manual material handling, are significant contributors to the development of WMSD. The prevalence of WMSD among railway maintenance workers can have significant economic and social impacts. For instance, WMSD can result in prolonged absenteeism, disability, and healthcare costs, which can be substantial for both the individual and the organization (Mokhasi, 2022). Furthermore, WMSD can also lead to compensation claims and decreased productivity, ultimately affecting the overall efficiency of the railway maintenance operations (Das, 2020; Lei et al., 2005)

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Literature Review

Work-Related Musculoskeletal Disorders (WMSD)

Work-related musculoskeletal disorders (WMSD) represent a major public health issue that impact workers in many industries. WMSD are defined as impairments of the muscles, joints, tendons, ligaments, and nerves that are caused or made worse by activities related to the job. These conditions can cause musculoskeletal pain, discomfort, or dysfunction, which can have a major impact on workers' quality of life and productivity (Bayih et al., 2024). The ergonomic risk factors are one of component that contributing to WMSD. Ergonomics is the scientific discipline concerned with understanding interactions among humans and other components of a system. It applies theory, principles, data, and methods to design to enhance human well-being and overall system performance. The goal of ergonomics is to improve the fit between the worker and their work environment, thereby reducing the risk of WMSD (Bhandari et al., 2021).

The prevalence of WMSD varies across different occupational groups. A systematic review indicated that the prevalence of musculoskeletal symptoms among workers in various sectors can range from 38.5% to 100%, with significant implications for health and productivity (Khan et al., 2021). Specific sectors like construction, healthcare, and manufacturing report particularly high rates of WMSD due to the physical demands of the work. There is numerous risk factors contribute to the development of WMSD, this is including physical factors (repetitive motions, awkward postures, and heavy lifting), psychosocial factors (stress, job satisfaction, and workplace culture) and individual factors (age, gender, and pre-existing health conditions). Physical factors can lead to increased strain on muscles and joints, resulting in injuries (Kumar et al., 2020). For the workers in high-stress environments may be more susceptible to musculoskeletal pain (López et al., 2019) and older workers, for instance, may have a higher risk due to decreased physical resilience (Bhandari et al., 2021).

WMSDs are a critical issue that requires ongoing research and intervention. Understanding the multifactorial nature of these disorders, including the role of ergonomics, is essential for developing effective prevention strategies. Future research should focus on longitudinal studies to better understand the long-term effects of ergonomic interventions on WMSD prevalence.

Construction Workers And Work-Related Musculoskeletal Disorder (WMSD)

The prevalence of WMSDs among construction workers in Malaysia is alarmingly high. A study indicated that approximately 76% of construction workers reported experiencing WMSD within a 12-month period, highlighting the urgent need for effective preventive measures (Zainal et al., 2020). Additionally, the Social Security Organization (SOCSO) reported a rising trend in work-related injuries among construction workers, indicating a growing concern for occupational health in this sector (Mohd et al., 2023).

Several risk factors contribute to the high incidence of WMSD among construction workers which is physical demands, environmental factors and psychosocial factors. Under physical demand, construction work often involves repetitive motions, heavy lifting, and awkward postures, which increase the risk of musculoskeletal injuries. A survey of 100 construction workers revealed that the most common areas of pain were the lower back, shoulders, and wrists, primarily due to these physical demands (Sulaiman et al., 2022). The construction environment, characterized by hard surfaces and vibrations from tools, further enhance the risk of WMSD. Workers are frequently exposed to conditions that strain their musculoskeletal

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systems (Zainal et al., 2020). Job-related stress and inadequate support systems which is under psychosocial factors can also influence the prevalence of WMSD. Workers in high-stress environments may experience increased discomfort and pain, leading to a higher incidence of musculoskeletal disorders (Mohd et al., 2023).

Knowledge, Attitude And Practice (KAP) Of Work-Related Musculoskeletal Disorder

Understanding the knowledge, attitude, and practices (KAP) of workers regarding WMSD is important for developing effective prevention strategies. Knowledge, attitude, and practices (KAP) is a survey method used to study what is known, believed, and done in a specific population regarding a particular topic. In the context of WMSD, KAP studies aim to assess the level of understanding, beliefs, and behaviors related to musculoskeletal disorders caused by work-related activities (Zainal et al., 2020).

There are several studies which investigated the relationship between KAP and WMSD among Malaysian workers. A study on electronics manufacturing workers found that assessing KAP is necessary to provide interventions for preventing WMSD. The researchers developed a KAP instrument and identified patterns of KAP on WMSD from both employee and employer perspectives (Nordin, 2016). Another study aimed to assess the level of KAP on WMSD from employers' perspectives in various Malaysian industries. The researchers found that employers' knowledge, attitudes, and practices play a crucial role in preventing and managing WMSD among workers (Nordin et al., 2018). The relationship between KAP and WMSD has also been explored in other countries. A study in India used a web-based KAP intervention on office ergonomics to prevent musculoskeletal discomfort among corporate office employees. The intervention, which included an online questionnaire and training with animation graphics, successfully influenced behavior modification towards proactive and practical office ergonomics (Madhwani & Nag, 2017).

KAP studies are essential for understanding the knowledge, attitudes, and practices of workers and employers regarding WMSD. The reviewed studies demonstrate the importance of assessing KAP in various industries, including Malaysia, to develop targeted interventions for preventing and managing musculoskeletal disorders caused by work-related activities. There is lack of KAP of WMSD study being perform in Malaysia. Future research should focus on longitudinal studies to evaluate the long-term effectiveness of KAP-based interventions in reducing the prevalence of WMSD among construction workers.

Methodology

To analyse the KAP level on prevalence of work-related musculoskeletal disorder (WMSD) among construction workers, two instrument were used. KAP survey questionnaire was adapted from Nordin et al., (2018) to measure the knowledge, attitude and practice level on work related musculoskeletal disorder among construction workers. To measure the prevalence of WMSD, Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) was used. The socio-demographic data for employer comprises of age, education level and employment year. For KAP survey questionnaire under knowledge section the general aspects of WMSD, law, psychology, risk factors, sign and symptoms and treatment were included. In the attitude section, general aspects on WMSD, health seeking attitude, prevention, treatment and risk-taking attitude were included. Practices section includes practicing WMSD prevention in the organisation. The response in knowledge section were recorded using 3 scale ranging from 1 (True), 2 (Not sure), 3 (False). Attitude sections were recorded using Likert scale 5 ranging from 1 (strongly disagree) to 5 (strongly agree) and for practices, the response was also

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recorded using Likert scale 5 ranging from 1 (very low) to 5 (very high). The questionnaire on knowledge content 16 items, for attitude 14 items and 11 items for practices. The level of each component in KAP were analyse by using scale adapted from the study by Benson et al., (2019). Correctly answering between 1 to 8 questions was regarded to having poor knowledge, and correctly answering between 9 to 16 questions was regarded to having good knowledge. For attitude section, correctly answering between 1 to 7 questions was regarded to having poor attitude, and correctly answering between 8 to 14 questions was regarded to having good attitude. Practice section shows correctly answering between 1 to 5 questions was regarded to having poor practice, and correctly answering between 6 to 11 questions was regarded to having good practice.

To identify the prevalence of WMSD, Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) was used. CMDQ are considered suitable for the studies that intend to evaluate work execution results as well as the degree of musculoskeletal disorders among workers. CMDQ consists of 60 items for 20 body parts, which identify the body parts most vulnerable to musculoskeletal issues. A body-map diagram is used to indicate the 20 body parts, including neck, shoulders, upper back, upper arms, lower back, forearms, wrists, hip/buttocks, thighs, knees, lower legs, and foot. The questionnaire was distributed to all respondent, and the respondent were interviewed directly to obtain their responses. The questionnaire consists of three sections to rate the discomfort of the respondent in the following areas: (1) frequency of ache, pain, or discomfort, (2) the intensity of ache, pain, or discomfort, and (3) the interference of ache, pain, or discomfort with work.

Pilot test was done on the 30 construction workers specialised in railway maintenance. The process then followed by performing descriptive analysis to measure the frequency and percentage on socio-demographic characteristics and KAP level. The relationship between KAP scores and demographic characteristics was done using Kruskal-Wallis test and a correlation study was done to see the relationship between KAP scores by using Spearman correlation. All analyses were performed using SPSS version 29.

The findings of this study will enhance understanding of the existing KAP levels in the sector and guide targeted interventions and strategies to improve occupational health and well-being concerning WMSD.

Results

Table 1 showed most of respondent ranged from 26 to 35 years old which shows 33.3% respectively. Majority of respondent were married which shows 70%. The respondent under primary education were 23.3%, secondary education 50% and tertiary education 26.7%. As for employment year 50% have worked more than 5 years while other respondent shows more than 6 years of their employment service. The summary of socio-demographic analysis is shown in Table 1 below.

Table 1: Workers' Socio Demographic Characteristics

Variable	N	(%)
Age group		
18-25 years	3	10.0
26-35 years	10	33.3
36-45 years	8	26.7
46-55 years	5	16.7
above 55 years	4	

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		13.3
Marital status		
Single	9	30.0
Married	21	70.0
Education level		
Primary Education	7	23.3
Secondary Education	15	50.0
Tertiary Education	8	26.7
Employment year		
0-5 years	15	50.0
6-10 yeras	13	43.3
11-15 years	1	3.3
Above 20 years	1	3.3

Table 2 shows the prevalence of WMSD by body region from CDMQ. The scoring comprising of maximum involvement in lower back with 86.2% have musculoskeletal discomfort on lower back. It is followed by involvement of upper back and neck comprising of 72.4% and 65.5%. Shoulder (right) and foot (right) each comprising of 51.7% and 44.8 %. The rest of all parts have an average involvement of 20%.

Table 2: The Prevalence Of WMSD By Body Regions

Example No.	Example Body Regions	Example Prevalence (%)
1	Neck	65.5
2	Shoulder (Right)	51.7
3	Shoulder (Left)	34.5
4	Upper back	72.4
5	Upper arm (Right)	34.5
6	Upper arm (Left)	31.0
7	Lower back	86.2
8	Forearm (Right)	27.5
9	Forearm (Left)	20.6
10	Wrist (Right)	27.5
11	Wrist (Left)	24.1
14	Hip/buttocks	17.2
15	Thigh (Right)	24.1
16	Thigh (Left)	27.5
17	Knee (Right)	24.1
18	Knee (Left)	17.2
19	Lower leg (Right)	34.5
20	Lower leg (Left)	31.0
21	Foot (Right)	44.8
22	Foot (Left)	31.0

International Journal of Entrepreneurship and Management Practices
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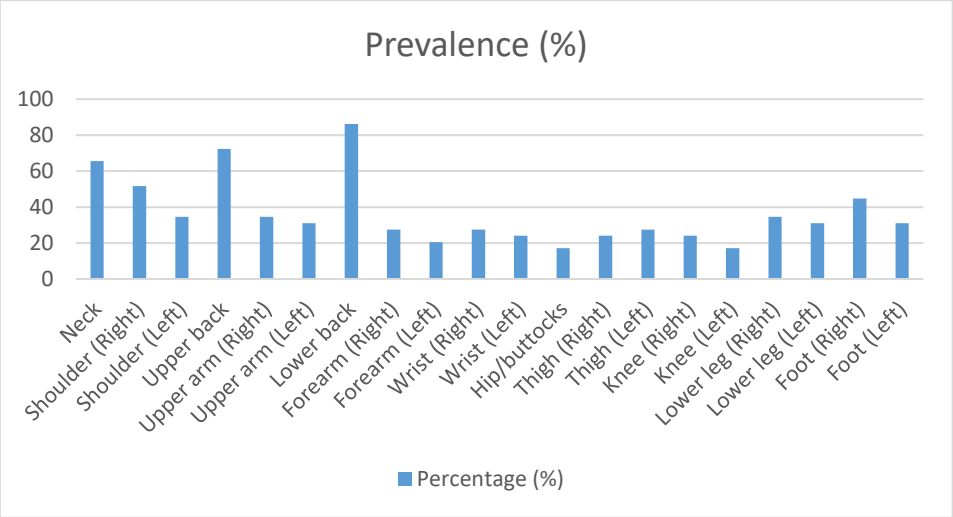

Figure 1: The Prevalence Of WMSD On Body Regions

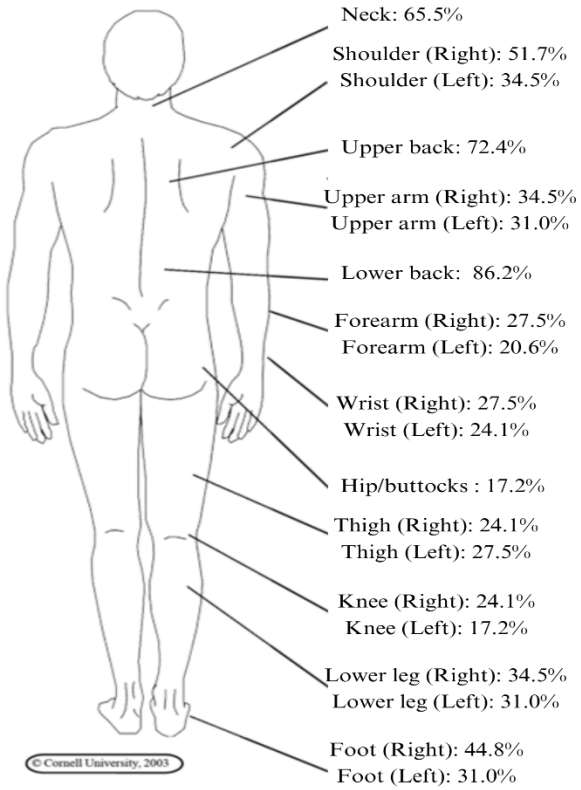

Figure 2: Anatomic View On Prevalence Of WMSD

Table 3 shows that majority of the respondents had good knowledge (24, 80%) as they were able to correctly respond to 9 or more of 16 questions asked to assess their knowledge. 6 (20%) of the respondents, however had poor knowledge regarding WMSD injuries. Majority of respondents 29 (96.7%) had good attitude towards WMSD injuries. 1 (3.3%) of the respondent, however had poor attitude towards WMSD injuries. Under practice, majority of study respondents had good level of practice of WMSD injuries (26, 86.7%). However, 4 (13.3%) respondents poorly practiced these WMSD injuries.

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Table 3: Level Of KAP Toward Work-Related Musculoskeletal Disorder (WMSD) Injuries By Respondents

Level of KAP	N	(%)
Knowledge		
Poor knowledge (selected 1-8 correct options)	6	20
Good knowledge (selected 9-16 correct options)	24	80
Attitude		
Poor attitude (selected 1-7 correct options)	1	3.3
Good attitude (selected 8-14 correct options)	29	96.7
Practice		
Poor practice (Applied 1-5 WMSD injuries practices)	4	13.3
Good practice (Applied 6-11 WMSD injuries practices)	26	86.7

Table 4 shows the relationship between KAP scores and respondents' socio-demographic. Age, education level and employment year are the parameter which being tested with KAP scores. A Kruskal Wallis test indicate that there were statistically significant differences between education level and attitude which shows x^2 value equal to 8.411 and p less than 0.05.

Table 4: Relationship KAP Scores And Socio-Demographic

	Knowledge			Attitude			Practice		
Variable	**df**	**x^2**	**p**	**df**	**x^2**	**p**	**df**	**x^2**	**p**
Age group	4	4.209	0.378	4	3.861	0.425	4	4.106	0.392
Education level	2	0.507	0.776	2	8.411	**0.015**	2	1.496	0.473
Employment year	3	7.057	0.070	3	5.502	0.139	3	1.692	0.639

*$p < 0.05$

Table 5 shows the Spearman correlation on the workers KAP-level. All KAP variables are being tested. As shown in result table, there is a relationship between knowledge and practice ($r = -0.483$, $p < 0.05$) from worker perspective.

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Table 5: Workers' KAP-Level

Variable	Knowledge		Attitude		Practice	
	r	p	r	p	r	p
Knowledge	1	-	0.165	0.384	**-0.483**	0.007
Attitude	0.165	0.384	1-	-	-0.400	0.835
Practice	-0.483	0.007	-0.400	0.835	1	-

*p < 0.05

Discussion

In construction industry which focus on railway sector, maintenance is a labour-intensive activity where workers must carry out several tasks to guarantee dependable train operation. In this study, the lower back, upper back, neck and shoulders were the body parts where WMSD were most prevalent. By contrast, the least affected body part was the hip/buttocks and knee (left), this is similar with study by Yusof & Mohd Shalahim, (2021). The same type of finding has been found among railway track maintainers in India (Das, 2020). The result of the study shows that the lower back was the most affected body part and shoulder is the next affected part in which the railway maintainers felt severe pain. A similar finding was reported in research conducted by Irshad et. al., (2021) among railway workers, where the most prevalent areas were lower back (71.3%), shoulders (50.7%), and upper back (41.3%). Findings from Landsbergis, (2019) indicate that biomechanical risk factors (repeated lifting, pushing, pulling, or bending) are significantly more common among railway maintenance workers. Despite their unique exposures and working conditions, little research has been conducted on the health and safety among railway maintenance workers in Malaysia, specifically the work-related musculoskeletal disorders (WMSD) which they are exposed to. Study by Ramlee et al., 2024 shows there is lacks insight of WMSD among maintenance and repair workers even though they are included in the occupational category that reports the highest number of WMSD.

For affective application of ergonomic concept in preventing WMSD, it is important that the workers know what the principles are and how it can succeed. This study found the high level of knowledge, attitude and practices on WMSD injuries among study respondents. Majority of respondents had good knowledge (80%) of WMSD injuries. This finding is similar to the study by Kalghatgi et. al., (2014) and Benson et al., (2019), which shows high proportion of study respondents having good knowledge on WMSD injuries. The result study on attitude and practices on WMSD injuries also found high. Majority of respondents had good attitude (97.7%) and good practices (86.7%) of WMSD injuries, which is also also similar to the study by Kalghatgi et. al., (2014) and Benson et al., (2019). The study by Janakapriya and Ramanujam, (2024) also supported this study which showing the high level of KAP on WMSD injuries among study respondents. In addition, preventing WMSD requires understanding on ergonomic concepts and best practices. The goal of ergonomic design is to minimize discomfort and injury risk while maximizing human performance while creating workstations, tools, and other equipment. Workers that understand ergonomic best practices can employ ergonomic tools, modify their workspaces, and adopt good body mechanics and posture. With this knowledge, workers can make their workplace a safer and healthier place for both themselves and their coworkers.

The correlation analysis revealed significant negative correlation between knowledge and practice (r= - 0.483). This signifies that despite the presence of awareness toward WMSD during railway maintenance work, there is a lack of practice of the same. A similar finding was

International Journal of Entrepreneurship and Management Practices
IJEMP
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Volume 7 Issue 26 (September 2024) PP. 367-378
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reported in research conducted by Kalghatgi et. al., (2014), where there was a significant negative correlation between knowledge and practices (r = - 0.363). The Kruskal Wallis analysis revealed there is significance differences between attitude and education level. The findings showed that there was a significant relationship between the level of education and attitude toward WMSD. Similar results were reported in the study by Harithasan et al., (2022) and Adje et al., (2019).

Conclusion

This study found high prevalence of low back pain among Malaysian railway maintenance workers. Meanwhile, finding also reported that the respondent has high level of knowledge, attitude and practice on WMSD injuries. There are significance differences found in this study between attitude and difference level of education. The study also reported the relationship between knowledge and practice among Malaysia railway maintenance workers. In conclusion, this study aimed to assess the knowledge, attitudes, and practices regarding work-related musculoskeletal disorders (WMSD) among workers in a railway maintenance industry. The findings of this study provide valuable insights into the awareness and understanding of ergonomic hazards and WMSD among railway maintenance workers in construction sector. Research study of KAP and WMSD among railway maintenance in construction sector is important because there isn't much research that related to this topic and to improve the awareness and productivity of the workers toward WMSD at the workplace.

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Declaration of Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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