Investigation the Prevalence of Work-Related Musculoskeletal Disorders (WRMSDs) among Factories Packaging Workers in Kermanshah (2015)

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Abstract: Work-Related Musculoskeletal Disorders (WRMSDs) are considered as major health problem in the workplace. WRMSDs are a group of painful disorders of muscles, tendons and nerves. The present study was performed aim to determine the prevalence of WRMSDs among the packaging part workers of Kermanshah factories in 2015. This study was cross-sectional descriptive analytic study. Generally the numbers of 264 samples were selected randomly among the packing part worker in different industries of Kermanshah city. The prevalence of WRMSDs was identified through Nordic musculoskeletal questionnaire. The obtained data was analyzed using SPSS 20 Software, t and Chi square tests. The study population consisted of men worker (63.12%) and women worker (37.87%). The highest WRMSDs was observed in women (40%). the obtained result of this study showed that the highest WRMSDs related to back (24.6%) and then neck pain (7.6%). The high prevalence of WRMSDs among packing part worker of Kermanshah factories was found and also there was not a significant difference between musculoskeletal disorder and individual and job factors. As regards to the high prevalence of musculoskeletal disorder among the packaging workers, so it should be necessary to enhance the occupational medicine and occupational health units in the factories.

Key words: Musculoskeletal disorders, packaging workers, WRMSDs, Kermanshah, Iran

INTRODUCTION

Work-Related Musculo Skeletal Disorders (WRMSDs) are considered as common disease and occupational injuries due to undesirable exposure of body in different stages of production, loading and transportation which create the irreversible physical effects and spinal cord injury (da Costa and Vieira, 2010; Adegok et al., 2008).

The occupational musculoskeletal disorders can affect the muscles, tendons, joints, nerves and soft tissues in the body. The body part regularly affected is neck and upper limb including shoulder and neck (Ovellet and vezina, 2014). The 3 major characteristic of WRMSDs are accumulation over the time, impacted by physical and mechanical stress and discomfort, disorder and abnormality (Bhattacharya, 2014). WRMSDs are associated with a wide range of multifactorial which actually influenced by four group of genetic, morphological, psychosocial and biomechanical factors (Choobineh et al., 2013, 2008). WRMSDs are one of the largest categories of defects and workplace injuries in industrialized and developing countries and mainly industrialized countries have shown the high prevalence of WRMSDs (Choobineh et al., 2013). The increasing trend of mechanical process in developed country, led to control and minimize the pressure of physical activity and subsequently the risk factor of musculoskeletal disorders (Waters et al., 2011; da Costa and Vieira, 2010). Generally in the world, WRMSDs are responsible approximately for 40% of all cost related to work (Morken et al., 2003; Abedi et al., 2011). However, the musculoskeletal disorders account 7% of all diseases in the society, 14% of referred to physician and 19% of hospitalizations as well which cause the time consuming and additionally pose severe human damage (Zamanian et al., 2014).

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As noted by numerous survey, the principal reason in terms of absence in workplace are WRMSDs(Salvendy, 2012). WRMSDs are known as serious difficulties and social problems due to burden the substantial cost in terms of compensation medicine and subsequently leads to reduce the quality life and efficiency at work as well (Warnakulasuriya *et al.*, 2010).

Now a days in most of countries, the prevention strategies regarding to WRMSDs has become an urgent and national priority. National Institute of Occupational Safety and Health (NIOSH) have classified the complications of the disease based on its national importance in regard to prevalence, severity and possible prevention which ranked the musculoskeletal disorders in the second place after the occupational respiratory disease (Buckle, 2005).

Packaging is considered as one the substantial and important stages in modern and traditional process of production. Packaging process done manually in most of packaging workshop. The physical activity such as lifting and displacement of loads, continual repetition of movement and also undesirable body position are common activity in packaging workshop. By consideration this situation, so the widespread musculoskeletal disorders prevalence might be expected in different region of body among the packaging part workers. Therefore, the significant of WRMSDs is completely apparent by respect to the huge number of workers in Iran.

Is taken in to account that WRMSDs prevention still is in the primary step and also sufficient information has not been conducted about musculoskeletal disorders. Hence, the investigation regarding to WRMSDs prevalence in Iran caused the attention of authorities, accordingly lead to prevent the irreversible adverse effect and the medical financial burden as well. So this study, aimed to investigate the prevalence of WRMSDs among the packaging workers in Kermanshah factories.

MATERIALS AND METHODS

The present study was cross-sectional descriptive analytic study. The study population included packaging worker in Kermanshah factories. Totally this study were analyzed the number of 264 samples through using of census and random sampling. This study were investigated the parameter such as the employment >4 days a week and also having work history >3 months. Inclusion criteria were worker having the musculoskeletal disorders before employment and also having the second job.

WRMSDs prevalence was identified through Nordic Musculoskeletal questionnaire which contain of two sections (general information and specific questions). The questionnaires were completed through interview with study population and then their posture was analyzed during the working. It must be noted that the explanations was presented to study population and afterward if worker were desired to participate in this study they would sign the consent form before starting the process. The different variables of this study were gender, height, weight, age, level of education and type of factories. In this study, the descriptive statistics (mean and standard deviation) and statistics analysis (t-test and chi-square to investigate the relationship between variables) were analyzed trough SPSS 16 Software at significant level of (p<0/05).

RESULTS AND DISCUSSON

Generally, data of 264 worker included 164 men (62.12%) and 100 women (37.9%) obtained that worked at 10 factory of Kermanshah. The highest and lowest number of workers were related to Mahidasht poultry (51 worker equal to 19.3%) and corn factory (10 worker equal to 3.18%) which are demonstrated in Table 1.The result revealed that the worker with the history work >4 years showed the highest frequency of musculoskeletal disorders (Table 2).

Table 1: The relative frequency distribution of workers according to type of factory

Factory (name of factory)	Number	Percent
Cement (Saman)	19	7.2
Oil (Nazgol)	35	13.3
Poultry feed (Modalal)	12	4.5
Poultry feed (Kermanshah)	15	5.7
Corn	10	3.8
Dishes (Gharb Plast)	18	6.8
Tile (Dalahoo)	23	8.7
Meat products	32	12.1
Poultry (Mahidasht)	51	19.3
Canning	49	18.6
Total	264	100.0

Table 2: The relative frequency distribution of study population according to employment period (year)

Education	No	Percent
1	18	5.7
2	28	10.6
3	32	12.1
4	64	24.2
5	51	19.3
6	42	15.9
7	13	4.9
8	13	4.9
9	4	1.5
11	1	0.4
13	1	0.4

from musculoskeletal disorders. Corresponding to obtained result, the most musculoskeletal disorders among workers were back pain (24.6%), neck pain (7.6%) and then limbs pain (pain in the wrist and knee) (6.4%). As shown in Table 3, the weight of packages ranged from 2-25 kg and average of 7±4.31 kg. It was also found that there was not a statistically significant relationship between both gender and musculoskeletal disorders (p>0.05).

According to the findings, the average of musculoskeletal disorder was observed in men and women equal to 37.855 and 40%, respectively. But the result indicated a significant difference in both gender in terms of musculoskeletal disorders form. In other words, men and women worker in packaging part suffered from back and neck disorder, respectively and the other disorder was not different remarkably (Table 4).

The workers position including three positions (sitting, standing and bending). The result showed that 46.2, 18.2 and 35.6% of study population working in the sitting, standing and bending position, respectively.

Generally the result of this study revealed that there was a significant relationship between education and musculoskeletal disorders in general. So that the high level of education led to fewer musculoskeletal disorder and the workers had more level of education showed the fewer musculoskeletal disorder (p<0.05).

Also there was a significant relationship between the education and musculoskeletal disorder form. Therefore, the musculoskeletal disorder include (neck pain, back pain and limbs pain) decreased by the increment of high level of education and also the less educated of worker led to increase the musculoskeletal disorder (p<0.05) as it can be

shown in Table 5. Therefore, in respect to the lesser workers in some factories, there was not a significant relationship between the type of factory and the musculoskeletal disorder form. Although by integration the obtained result of 3 factories include seed (modalal), poultry (Kermanshah) and corn, a significant relationship wasshowed. So far the worker in Disposal factory demonstrated the highest disorder include (neck and limb pain) and back pain was the highest disorder in worker of dalahoo tail factory (Table 6).

As it can be seen in Table 7, a significant relationship was observed between the musculoskeletal disorder form and body posture. Neck and limb pain were more in sitting position and the back pain more observed in bending position of worker.

Working in the industry is considered as jobs which workers expose to risk factor of musculoskeletal disorder and undesirable posture and static body posture as well. Standing position in workplace continuously for hours, so as a result, it leads to increase the pressure on musculoskeletal organs.

In the present study, the study population was young people with the average of 77 kg and had low average of work history. Generally, the high prevalence of musculoskeletal disorder (at least at one of the body region) observed among packaging workers at various factories in Kermanshah. The investigation related to demographic characteristic showed that there was not a significant relationship between age and musculoskeletal disorder (p>0.05). The result of present study was consistent with Kausto *et al.* (2011).

The result of this study was contrasted with some publication that has confirmed the effect of aging on the musculoskeletal disorder prevalence (Janwantanakul *et al.*, 2009; Kortt and Baldry, 2002). Also based on obtained result, there was not a significant difference between the average of height and education level with musculoskeletal disorder. the different result have been reported by various publication, so that some study have proved the increment of musculoskeletal disorder in short worker (Rouse *et al.*, 2002) and some study showed the association with tall worker (Haghdorst *et al.*, 2011; Abedi *et al.*, 2012). It can be deducted that the effect of various factors such as

Table 3: The relative frequency distribution of packages in the factory the weight of packages (kg)

Weight	No	%
2	69	26.1
3	37	14.0
5	79	29.9
10	23	8.7
15	10	3.8
20	27	10.2
25	19	7.2

Table 4: The relative frequency distribution according to type of musculoskeletal disorder

Gender	Neck		Back		Wrist		Knee		Without of Musculoskeletal disorder		Total	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
Men	4	2.4	50	30.5	6	3.7	2	1.2	102	62.2	164	100
Women	16	16.0	15	15	8	8.0	1	1.0	60	60.0	100	100
Total	20	7.6	65	24.4	14	5.3	3	1.1	162	61.4	264	264

df: 4; p>0.001

Table 5: Investigation the relation between the types of musculoskeletal disorders with education

| | The type of musculoskeletal | | | | | | | | | |
| | Neck pain | | Back pain | | Limbs pain | | Without of musculoskeletal disorders | | Total | |
Education	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
Middle school	3	9.7	13.0	41.9	2	6.5	13.0	41.9	31.0	100
High school	11	9.5	31.0	26.7	12	10.3	62.0	53.4	116.0	100
Diploma	6	5.1	21.0	17.9	3.0	2.6	87.0	74.4	117.0	100
Total	20	7.6	65.0	24.6	17.0	6.4	162.0	61.4	264.0	100

df:6; p<0.05

Table 6: Investigation the relation between the types of musculoskeletal disorder with type of factory

| | The type of musculoskeletal | | | | | | | | | |
| | Neck | | Back | | Limbs | | Without of Musculoskeletal disorders | | Total | |
The type factory	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
Cement (Saman)	0	0.0	10	52.6	1	5.3	8	42.1	19	100
Oil (Nazgol)	3	8.6	8	22.9	3	8.6	21	60.0	35	100
Poultry feed (modalal)	1	2.7	11	29.7	3	8.1	22	59.5	37	100
Dishes (Gharb Plast)	5	27.8	3	16.7	3	16.7	7	38.9	18	100
Toil (Dalahoo)	0	0.0	7	30.4	1	4.3	15	65.2	23	100
Meat products	5	15.6	6	18.8	2	6.2	19	59.4	32	100
Poultry (Mahidasht)	2	3.9	9	17.6	3	5.9	37	72.5	51	100
caning	4	8.2	11	22.4	1	2.0	33	67.3	49	100
Total	20	7.6	65	24.6	17	6.4	162	61.4	264	100

df: 21; p< 0.05

Table 7: Investigation the relation between types of musculoskeletal disorder with posture of worker

| | The type of musculoskeletal | | | | | | | | | |
| | Neck | | Back | | Limbs | | Without of Musculoskeletal disorder | | Total | |
The body posture	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
Sitting	17	13.9	17	13.9	9	7.4	79	64.8	122	100
Standing	3	6.2	33	27.1	3	6.3	29	60.4	48	100
Bending	0	0.0	35	37.2	5	5.4	54	57.4	94	100
Total	20	7.6	65	24.6	17	6.4	162	61.4	264	100

df:6; p>0.001

environmental factor and type of working on the prevalence of musculoskeletal disorder, which led to no significant difference between prevalence of musculoskeletal disorder and demographic characteristic (Chobineh *et al.*, 2009; Askaripoor *et al.*, 2013).

The WMSDs are associated with several risk factors. The most remarkable factors were job parameter such as undesirable condition of workplace in terms of ergonomic, physical activity, repetition of movement and lifting the heavy loads (Widanarko *et al.*, 2011).

The obtained result from musculoskeletal disorder prevalence revealed that the large extent of study population suffered from back pain. This result was consistent with Paskiewicz and Fathauallah (2007) study that investigated the disorder among the worker of furniture workshop (Eskandari *et al.*, 2011). The high prevalence of back pain in this study may be attributed to inappropriate posture of worker during working, so is necessary to amend the posture and also training program should be considered.

Anyway, it bit can be deducted that the factors such as undesirable posture, excessive force, manual handling and improper working station and other factor caused the prevalence of disorder and type the region of body. The obtained result of Ghasemkhani *et al.* (2008) showed that the maximum prevalence of musculoskeletal disorders in worker related to back pain (44%), shoulder (44%) and neck pain (33%) (Paskiewicz and Fathauallah, 2007).

In the present study, the highest prevalence of musculoskeletal disorders related to back, neck and then the other limbs. This result may be attributed to standing position of workers for long hour and their neck tend to down position. Hence, the high prevalence of musculoskeletal disorders in back, neck and other limbs are inevitable. The risk factor for hands and wrist disorder were the continual repetition of movement according to Bruno study.

And corresponding to NIOSH reports it has been identified as major cause of hand, wrist, shoulder and

knee disorder (Ghasemkhani *et al.*, 2008). The result of study that conducted by Zeidi and Hashemi (2009) about the musculoskeletal disorders prevalence in pharmacy packaging workers showed that the 36.8, 44.7, 36.8 and 31.6% suffered from spinal cord disorder, knee pain, back and neck pain, respectively.

The diferent result in respect to body part commonly affected in various studies may be arisen to diferent type of working in industries. The consistent and contrasted results can be associated with the difference and match the type of jobs. The increasing prevalence of WRMSD$_s$ in the workplace directly related to the workplace ergonomics cause. So that the factors such as repetitive movement, force concentrated on body region, the improper body position, transportation of loads, low temperature, overexertion force, monotonous task and vibration cause the WRMSDs prevalence in compare to other ergonomic factors (Zeidi and Hashemi, 2009).

Therefore, the quick corrective actions are essential corresponding to high risk of WRMSD$_s$.we recommended classic (Kohammadi *et al.*, 2016) and new methods (Yarmohammadi *et al.*, 2016) of ergonomics risk assessment for posture analysis and relationship between WRMSDs and job content and job performance is useful data for reduce this risk factors.

CONCLUSION

The result of this study showed that the factors such as improper agronomic condition, lack of training, inappropriate practice in workplace, lack of attention to some enterprise, inaccurate break, high speed and longtime of working and also lack of diversity in workplace caused the high prevalence of musculoskeletal disorders among the packaging workers. Therefore, the training of packaging part worker is necessary. Also, exercise should be considered in work schedule of employee that increase the muscle strength and endurance of people and subsequently it pose to minimize the stress on musculoskeletal system.

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REFERENCES

Abebi, G., J. Shojaii and F. Rostami, 2011. Analytical approaches of impellent and preventive power on hospital services. World Applied Sci. J., 12: 2071-2077.

Abedi, G., I. Ebadattalab and F. Rostami, 2012. Analyzing quality gap of nursing services in the selective academic hospitals. Intl. J. Collaborative Res. Internal Med. Public Health, 7: 1809-1815.

Adegoke, B.O.A., A.K. Akodu and A.L. Oyeyemi, 2008. Work-related musculoskeletal disorders among Nigerian Physiotherapists. Biol. Med. Chem. Musculoskeletal Disord., 9: 112-112.

Askaripoor, T., A. Kermani, J. Jandaghi and F. Farivar, 2013. Survey of musculoskeletal disorders and ergonomic risk factors among dentists and providing control measures in Semnan. J. Health, 4: 241-248.

Bhattacharya, A., 2014. Costs of occupational musculoskeletal disorders (MSDs) in the United States. Int. J. Ind. Ergon., 44: 448-454.

Buckle, P., 2005. Ergonomics and musculoskeletal disorders: Overview. Occup. Med., 55: 164-167.

Choobineh, A., A. Mokhtarzadeh, M. Salehi and S.H.R. Tabatabaei, 2008. Ergonomic evaluation of exposure to musculoskeletal disorders risk factors by QEC technique in a rubber factory. Jundishapur Sci. Med. J., 7: 46-55.

Choobineh, A., E. Solaymani and A.M. Beigi, 2009. Musculoskeletal symptoms among workers of metal structure manufacturing industry in Shiraz, 2005. Iran. J. Epidemiol., 5: 35-43.

Choobineh, A.R., H.A.D.I. Daneshmandi, M. Aghabeigi and A. Haghayegh, 2013. Prevalence of musculoskeletal symptoms among employees of Iranian petrochemical industries: October 2009 to December 2012. Int. J. Occup. Environ. Med., 4: 253-255.

Da Costa, B.R. and E.R. Vieira, 2010. Risk factors for work-related musculoskeletal disorders: A systematic review of recent longitudinal studies. Am. J. Ind. Med., 53: 285-323.

Eskandari, D., A. Ghahri, A. Gholamie, M.M. Kashani and S.G.A. Mousavi, 2011. Prevalence of musculoskeletal disorders and work-related risk factors among the employees of an automobile factory in Tehran during 2009-10. Feyz J. Kashan Univ. Med. Sci., 14: 539-545.

Ghasemkhani, M., E. Mahmudi and H. Jabbari, 2008. Musculoskeletal symptoms in workers. Int. J. Occup. Saf. Ergon., 14: 455-462.

Haghdoost, A.A., F. Hajihosseini and H. Hojjati, 2011. Relationship between the musculoskeletal disorders with the ergonomic factors in nurses. Koomesh, 12: 372-378.

Janwantanakul, P., P. Pensri, W. Jiamjarasrangsi and T. Sinsongsook, 2009. Associations between prevalence of self-reported musculoskeletal symptoms of the spine and biopsychosocial factors among office workers. J. Occup. Health, 51: 114-122.

Kausto, J., H. Miranda, I. Pehkonen, M. Heliovaara, E. Viikari-Juntura and S. Solovieva, 2011. The distribution and co-occurrence of physical and psychosocial risk factors for musculoskeletal disorders in a general working population. Int. Arch. Occup. Environ. Health, 84: 773-788.

Kohammadi, Y.H., Y. Sohrabi, M. Poursadeghiyan, R. Rostami, A.R. Tabar, D. Abdollahzadeh and F.R. Tabar, 2016. Comparing the posture assessments based on RULA and QEC methods in a carpentry workshop. Res. J. Med. Sci., 10: 80-83.

Kortt, M. and J. Baldry, 2002. The association between musculoskeletal disorders and obesity. Aust. Health Rev., 25: 207-214.

Morken, T., T. Riise, B. Moen, S.H.V. Hauge and S. Holien et al., 2003. Low back pain and widespread pain predict sickness absence among industrial workers. BMC Musculoskelet Disord., 4: 21-21.

Ouellet, S. and N. Vezina, 2014. Work training and MSDs prevention: Contribution of ergonomics. Int. J. Ind. Ergon., 44: 24-31.

Paskiewicz, J.K. and F.A. Fathallah, 2007. Effectiveness of a manual furniture handling device in reducing low back disorders risk factors. Int. J. Ind. Ergon., 37: 93-102.

Rouse, W., N. Kober and A. Mavor, 2002. The Case for Human Factors in Industry and Government. National Academy Press, Washington DC., USA.

Salvendy, G., 2012. Handbook of Human Factors and Ergonomics. 4th Edn., John Wiley and Sons, New York, USA., ISBN: 9781118131350.

Warnakulasuriya, S.S.P., R.J. Peiris-John, D. Coggon, G. Ntani, N. Sathiakumar and A.R. Wickremasinghe, 2010. Musculoskeletal pain in four occupational populations in Sri Lanka. Occup. Med., 64: 269-272.

Waters, T.R., R.B. Dick and E.F. Krieg, 2011. Trends in work-related musculoskeletal disorders: A comparison of risk factors for symptoms using quality of work life data from the 2002 and 2006 general social survey. J. Occup. Environ. Med., 53: 1013-1024.

Widanarko, B., S. Legg, M. Stevenson, J. Devereux and A. Eng et al., 2011. Prevalence of musculoskeletal symptoms in relation to gender, age and occupational/industrial group. Int. J. Ind. Ergon., 41: 561-572.

Yarmohammadi, H., M. Ziaei, M. Poursadeghiyan, M. Moradi, B. Fathi, H. Biglari and M.H. Ebrahimi, 2016. Evaluation of occupational risk assessment of manual load carrying using KIM method on auto mechanics in Kermanshah city in 2015. Res. J. Med. Sci., 10: 116-119.

Zamanian, Z., Z. Salimian, H. Daneshmandi and Y. AliMohammadi, 2014. The REBA technique ergonomic assessment of musculoskeletal disorders risk level among midwives of shiraz state hospitals. J. Urmia Nurs. Midwifery Facul., 12: 18-24.

Zeidi, I.M. and H.J. Hashemi, 2009. Evaluation working posture and musculoskeletal disorders prevalence in pharmacy packaging workers. Eur. J. Sci. Res., 29: 82-88.