Announcements

The 18th National Publicity Week of Occupational Disease Prevention and Control — April 25 to May 1, 2020

The 18th Publicity Week of the Law on Prevention and Control of Occupational Disease will be held from April 25 to May 1 of this year and has been held since 2003.

China has the largest working population in the world with about 776 million workers with most of them spending at least half their lives working (*1*). Globalization and industry revolution bring the coexistence of traditional and modern occupational hazards and present both current and future challenges in occupational health.

To fully implement national deployments of occupational disease prevention and control and protect workers' health, the National Health Commission of China has launched a series of activities during the Publicity Week themed with "Occupational Health Protection, Time to Act."

Focused on the Occupational Health Protection Campaign and the Action Plan for Prevention and Control of Pneumoconiosis, primary activities during this week include promoting knowledge and awareness of occupational health in businesses, providing occupational health management training, conducting questionnaire surveys about awareness of core knowledge on occupational health, and showcasing excellent publicizing portfolios of occupational health.

The publicity week is a comprehensive strategy to prevent and control occupational diseases and to promote work on occupational health, aiming to disseminate knowledge of occupational health, improve workers' awareness, and integrate the resources of the government, employers, workers, and other stakeholders to prioritize occupational health protection.

doi: 10.46234/ccdcw2020.076

Submitted: April 22, 2020; Accepted: April 23, 2020

REFERENCES

1. National Health Commission. National development of medical and health statistical bulletin in 2018. http://www.nhc.gov.cn/guihuaxxs/s10748/201905/9b8d52727cf346049de8acce25ffcbd0.shtml. [2020-3-24]. (In Chinese).

Preplanned Studies

Investigation on Work-Related Musculoskeletal Disorders — China, 2018–2019

Ning Jia[1]; Huadong Zhang[2]; Ruijie Ling[3]; Yimin Liu[4]; Gang Li[5]; Zaoliang Ren[6]; Yan Yin[7]; Hua Shao[8]; Hengdong Zhang[9]; Bing Qiu[10]; Meibian Zhang[11]; Dayu Wang[12]; Qiang Zeng[13]; Rugang Wang[14]; Jianchao Chen[15]; Danying Zhang[16]; Liangying Mei[17]; Yongquan Liu[18]; Jixiang Liu[19]; Chengyun Zhang[20]; Tianlai Li[21]; Qing Xu[1]; Ying Qu[1]; Xueyan Zhang[1]; Xin Sun[1,#]; Zhongxu Wang[1,#]

Summary

What is already known about this topic?

Work-related musculoskeletal disorders (WMSDs) have a high prevalence and seriously harmful, which has attracted extensive attention in various countries in the world. Currently, the occurrence and rules of WMSDs in key industries are not known in China.

What is added by this report?

The prevalence of WMSDs is relatively high among professional populations in key industries in China, with the most commonly affected body parts concentrated in neck, shoulders, and low back and increasing with age and working years.

What are the implications for public health practice?

This study determined the prevalence and distribution characteristics of WMSDs in key industries in China and provided scientific evidence to recommend for inclusion of WMSDs in the new revision of the list of occupational diseases in China.

Recent research indicates that an estimated 20% of lower back and neck pain in adults is attributable to occupation exposure worldwide (*1*). These work-related musculoskeletal disorders (WMSDs) result from many adverse ergonomic factors in the workplace, such as heavy physical load operation, repetitive work, awkward working posture, occupational stress, bad working organization, and other problems. Workers exposed to these adverse ergonomics factors for a long time are easy to cause part muscle fatigue. Such long-term chronic accumulation may eventually lead to WMSDs.

In recent decades, WMSDs have become increasingly prominent and affect all parts of an individual's life. In 2002, the International Labour Organization (ILO) explicitly added musculoskeletal diseases to the list of international occupational diseases (Recommendation 194). Musculoskeletal diseases are further detailed in the latest occupational disease list that was approved and went into effect by the ILO in 2010 (*2*). Since the 1990s, China has been paying attention to WMSDs and has carried out related research on its epidemiological characteristics, risk factors, and occurrence mechanism. So far, much of the existing research has focused on local areas or enterprises, and these results can only reflect the occurrence of WMSDs in a certain working populations and lack the occurrence and rules of WMSDs in key industries nationwide. Therefore, this study conducted a large-scale epidemiological survey on key industries in different regions to investigate the prevalence and distribution characteristics of WMSDs in key industries in China and to explore the epidemiological characteristics. An epidemiological cross-sectional survey was conducted to investigate the occurrence of WMSDs among the above-mentioned subjects using the electronic questionnaire system of "Chinese Version of Musculoskeletal Disorders Questionnaire," which has been the standard for such surveys so far (*3*).

The case definition most commonly employed by the National Institute of Occupational Safety and Health (NIOSH) required satisfaction of all of the following criteria (*4*):

Discomfort within the past year.

Discomfort began after employment in the current job.

No prior accident or sudden injury (affecting focal area of discomfort).

Episodes of discomfort occur monthly or, if not every month, at least exceeding a weeklong period of discomfort.

After the survey data were exported from the background, SPSS 20.0 statistical software (version 20.0, SPSS Inc, Chicago, IL, USA) was used to statistically process the data. Patients with congenital spinal deformity and musculoskeletal diseases caused by non-work related factors such as trauma, infectious diseases, malignant tumors, etc. were excluded.

So far, 41,310 valid questionnaires have been received covering seven regions of China's northern region, eastern region, central region, southern region, southwestern region, northwestern region, and northeastern region, and involved 14 industries or working groups including automobile manufacturing, footwear manufacturing, bio-pharmaceutical manufacturing, electronic equipment manufacturing, shipbuilding and related equipment manufacturing, petrochemical industry, construction industry, coal mining and washing and dressing industry, animal husbandry, medical staff, 4S automobile store*, vegetable greenhouses, flight attendants, toy manufacturing, etc. The prevalence rate of WMSDs (a WMSD in any body part is listed as a case) among the total working population was 42.9%, and the prevalence of WMSDs in each body part fluctuates between 7.5% and 27.0% with the highest three body parts being the neck (27.0%), shoulders (22.4%), and lower back (17.6%) (Table 1). The prevalence of WMSDs in different regions of China was significantly different ($p<0.05$), and the prevalence of WMSDs in each region ranked from highest to lowest was the central region (51.4%), northwestern region (51.2%), northeastern region (49.8%), northern region (48.6%), southwestern region (42.9%), southern region (42.3%), and eastern region (37.9%) (Figure 1). There were statistical differences in the prevalence of WMSDs among occupational groups in different industries ($p<0.05$), and the three industries with the highest prevalence of WMSDs were biopharmaceutical manufacturing (66.4%), vegetable greenhouse (60.5%), and medical staff (55.6%).

The difference of prevalence of WMSDs between age groups and working age groups was statistically significant ($p<0.05$) as the prevalence rate of WMSDs gradually increased and then decreased as age increased. The prevalence of WMSDs increased first, then decreased and then increased with the length of service (Figure 2).The prevalence of female WMSDs (48.5%) was significantly higher than that of male (38.4%) ($p<0.05$)

DISCUSSION

This study is the first large survey on the occurrence of WMSDs in key industries or working population in China. According to the survey, the prevalence of WMSDs in key industries or working groups in China was relatively high in the past year, and the prevalence of WMSDs was 42.9% (for any body part), with the most common parts are neck, shoulders, and waist. A

* 4S means sales, service, spare parts, and surveys.

TABLE 1. Incidence of WMSDs in key industries or occupational groups in China, 2018–2019.

Industry	Number (n)	Any body part		Neck		Shoulders		Upper back		Lower back		Elbows		Wrists/Hands		Hips/Thighs		Knees		Ankles/Feet	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Shipbuilding and related equipment manufacturing	3,515	1,439	40.9	788	22.4	673	19.1	494	14.1	664	18.9	326	9.3	455	12.9	419	11.9	489	13.9	414	11.8
Electronic equipment manufacturing	8,284	3,236	39.1	2,116	25.5	1,808	21.8	1,184	14.3	1,151	13.9	527	6.4	907	10.9	721	8.7	588	7.1	816	9.9
Construction industry	1,245	258	20.7	106	8.5	104	8.4	79	6.3	111	8.9	49	3.9	63	5.1	60	4.8	48	3.9	52	4.2
Coal mining and washing industry	722	328	45.4	197	27.3	179	24.8	134	18.6	150	20.8	68	9.4	83	11.5	109	15.1	137	19.0	104	14.4
Flight attendants	1,362	697	51.2	505	37.1	387	28.4	204	15.0	276	20.3	52	3.8	98	7.2	122	9.0	143	10.5	157	11.5
4S automobile store*	544	177	32.5	88	16.2	78	14.3	70	12.9	92	16.9	27	5.0	50	9.2	47	8.6	50	9.2	61	11.2
Automobile manufacturing	10,942	4,773	43.6	2,700	24.7	2,261	20.7	1,760	16.1	1,942	17.7	971	8.9	1,862	17.0	1,292	11.8	1,404	12.8	2,003	18.3
Biopharmaceutical manufacturing	286	190	66.4	131	45.8	95	33.2	82	28.7	74	25.9	18	6.3	51	17.8	51	17.8	42	14.7	81	28.3
Petrochemical industry	286	80	28.0	49	17.1	37	12.9	26	9.1	38	13.3	15	5.2	20	7.0	21	7.3	23	8.0	11	3.8
Vegetable greenhouse	243	147	60.5	51	21.0	43	17.7	16	6.6	79	32.5	5	2.1	16	6.6	30	12.3	57	23.5	13	5.3
Toy manufacturing	314	163	51.9	117	37.3	112	35.7	83	26.4	88	28.0	69	22.0	95	30.3	53	16.9	61	19.4	62	19.7
Animal husbandry	246	96	39.0	62	25.2	41	16.7	20	8.1	64	26.0	19	7.7	47	19.1	23	9.3	35	14.2	15	6.1
Medical staff	6,323	3,517	55.6	2,535	40.1	2,049	32.4	1,386	21.9	1,602	25.3	440	7.0	723	11.4	1,051	16.6	878	13.9	1,018	16.1
Footwear industry	6,998	2,608	37.3	1,696	24.2	1,395	19.9	872	12.5	954	13.6	508	7.3	1,075	15.4	600	8.6	552	7.9	599	8.6
Total	41,310	17,709	42.9	11,141	27.0	9,262	22.4	6,410	15.5	7,285	17.6	3,094	7.5	5,545	13.4	4,599	11.1	4,507	10.9	5,406	13.1
Chi-square test		1013.288		1059.531		696.041		454.052		585.164		230.955		449.286		395.853		507.486		728.203	
p value		0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000	

* Sales, service, spare parts, and surveys (customer feedback).

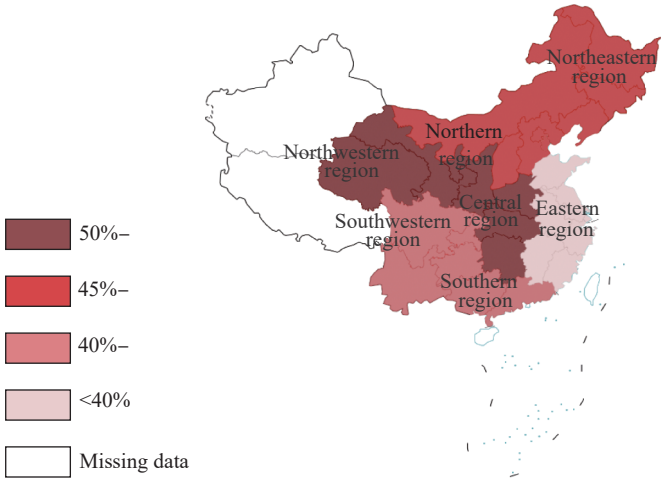

FIGURE 1. Regional distribution of work-related musculoskeletal disorders (WMSDs) among key industries or occupational groups in China, 2018–2019.

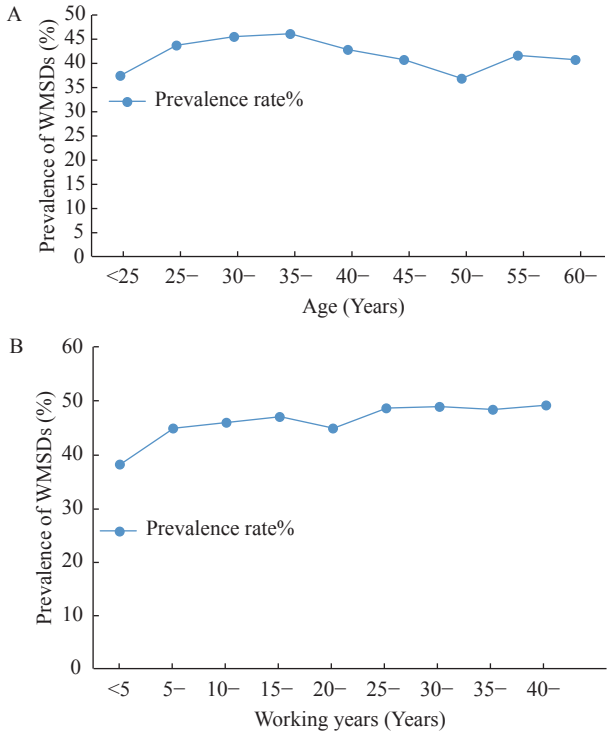

FIGURE 2. Prevalence of work-related musculoskeletal disorders (WMSDs) in different age and working years in key industries or occupational groups in China, 2018–2019.

epidemiological survey in European countries showed that nearly a quarter of adults report suffering from some kind of "arthritis or rheumatism" (*5*), but there were great differences between different countries, ranging from 16.6% in Sweden to 38.2% in Portugal (*6*). A epidemiological survey of more than 3,000 occupational groups in New Zealand showed that the prevalence of WMSDs in any body part was 92%, and the most commonly affected body parts were the lower back (54%), neck (43%), and shoulders (42%) (*7*). The prevalence and most commonly affected body part of WMSDs in China are similar to research results found in other studies.

WMSDs are widely prevalent throughout society. WMSDs occur differently due to different labor intensity, working conditions, and working methods. The results indicated that the prevalence of WMSDs in the biopharmaceutical manufacturing industry was the highest in this survey, and other industries or occupational groups with a prevalence of more than 50% were vegetable greenhouses (60.5%), medical staff (55.6%), toy manufacturing (51.9%), and flight attendants (51.2%). The characteristics of occupational activities determined which body part was most likely to have a WMSD. For example, the biopharmaceutical manufacturing industry adopts assembly line work, with hours seated as high as 12 hours per day. Workers need to repeat highly monotonous actions (such as lifting, pushing, and pulling with one or both hands) during the operation process and maintaining a working posture of bending forward and bending down for a long time so that the most commonly affected body parts are concentrated in the neck, shoulders, and upper back.

The results of this study show that sociodemographic factors such as age, length of service, and gender are closely related to the occurrence of WMSDs. The prevalence of WMSDs increased linearly with age under 40 years . This can be explained by cumulative effects as with an increase of age, the body's musculoskeletal system showed a tendency of degeneration, and the longer the period of service, the

longer the exposure time to risk factors. After the age of 40 years, the prevalence of WMSDs decreased. On-site investigations found that the management of many enterprises will adjust the working positions of front-line workers according to their age, i.e. the front-line workers will be adjusted to auxiliary positions with lighter loads or promoted to management positions such as team leaders. This may also be a reason for the decline in the prevalence of WMSDs.

In addition, the study also found that the prevalence of WMSDs in women was higher than that in men. Women were more likely to have WMSDs in the neck, shoulders, upper back, lower back, and legs. Men were more likely to have WMSDs in the knees and feet. There were three possible reasons for gender differences. First, the division of labor between male and female workers in industrial and mining enterprises is different. Men were more engaged in heavy manual work, while women are more engaged in manual manufacturing with lower physical loads, such as bio-pharmaceutical manufacturing, footwear manufacturing, and electronic equipment manufacturing. Most of these industries required workers to sit down for long periods of time to work, so the prevalence of neck WMSDs was relatively high (*8*). Second, women were smaller and their spine was less able to bear the load than men. Therefore, even in the same job, women were more likely to suffer from chronic musculoskeletal disorders (*9*). Third, women were more sensitive to pain than men or were more willing to report pain (*10*).

This study has the following limitations. First, the survey data do not cover all provincial-level administrative divisions (PLADs) in China, so there are still some key industries related to WMSDs that have not been surveyed, and the extrapolation of results has certain limitations. Second, WMSDs were collected through a self-reported questionnaire, which is affected by recall bias and reporting bias.

In conclusion, the prevalence rate of WMSDs was relatively high among the occupational groups in the key industries in China. The most common parts of WMSDs were concentrated in the neck, shoulder, and lower back and increased with age and length of service. The prevalence of WMSDs in women was higher than that in men. The biopharmaceutical manufacturing industry, vegetable greenhouses, and medical staff were the top three industries with the highest prevalence of WMSDS. In view of this, we can set up a population list in selected key industries of China, take relevant measures to reduce the impact of WMSDs on the occupational population of our country, develop standard WMSD-risk assessment systems, comprehensive assessment methods, and technical regulations suitable for the occupational population and economic development of China, and consider including the WMSDs of key industries into our country's legal occupational disease catalogue in the immediate future.

Acknowledgments: We sincerely thank all the participants involved in this study, from Chongqing, Shanghai, Jiangsu, Zhejiang, Tianjin, Beijing, Hubei, Ningxia Hui Autonomous Region, Sichuan, and Shaanxi Provincial Centers for Disease Prevention and Control, Hubei Provincial Hospital of Integrated Chinese & Western Medicine, Guangzhou Twelfth People's Hospital Affiliated to Guangzhou Medical University, Liaoning Provincial Health Service Center, Guizhou Province Occupational Disease Prevention and Control Hospital, Shandong Academy of Occupational Health and Occupational Medicine, Civil Aviation Medical Center of China Civil Aviation Administration, Tianjin Occupational Disease Prevention and Control Hospital, Fujian Province Occupational Disease and Chemical Poisoning Prevention and Control Center, Guangdong Province Hospital for Occupational Disease Prevention and Treatment, Institute of Occupational Medicine of Jiangxi.

Funding: The study is funded by the Project of Occupational Health Risk Assessment and National Occupational Health Standard Formulation of National Institute of Occupational Health and Poison Control (Project No.: 131031109000150003).

doi: 10.46234/ccdcw2020.077

[#] Corresponding authors: ZhongxuWang, wangzx@niohp.chinacdc.cn; Xin Sun, sunxin@niohp.chinacdc.cn.

[1] National Institute of Occupational Health and Poison Control, Chinese Center for Disease Control and Prevention, Beijing, China; [2] Chongqing Center for Disease Control and Prevention, Chongqing, China; [3] Hubei Provincial Hospital of Integrated Chinese & Western Medicine, Wuhan, Hubei, China; [4] Guangzhou Twelfth People's Hospital Affiliated to Guangzhou Medical University, Guangzhou, Guangdong, China; [5] Liaoning Provincial Health Service Center, Shenyang, Liaoning, China; [6] GuizhouProvince Occupational Disease Prevention and Control Hospital, Guiyang, Guizhou, China; [7] Shanghai Center for Disease Control and Prevention, Shanghai, China; [8] Shandong Academy of Occupational Health and Occupational Medicine, Jinan, Shandong, China; [9] Jiangsu Provincial Center for Disease Control and Prevention, Nanjing, Jiangsu, China; [10] Civil Aviation Medical Center, Civil Aviation Administration of China, Beijing, China; [11] Zhejiang Provincial Center for Disease Control and Prevention, Hangzhou, Zhejiang, China; [12] Tianjin Occupational Disease Prevention and Control Hospital, Tianjin, China; [13] Tianjin Center for Disease Control and Prevention, Tianjin, China; [14] Beijing Center for Disease Control and Prevention, Beijing, China; [15] Fujian Province Occupational Disease and Chemical Poisoning Prevention and Control Center, Fuzhou, China;

[16] Guangdong Province Hospital for Occupational Disease Prevention and Treatment, Guangzhou, Guangdong, China; [17] Hubei Provincial Center for Disease Control and Prevention, Wuhan, Hubei, China; [18] Institute of Occupational Medicine of Jiangxi, Nanchang, Jiangxi, China; [19] Ningxia Hui Autonomous Region Center for Disease Control and Prevention, Yinchuan, Ningxia, China; [20] Sichuan Provincial Center for Disease Control and Prevention, Chengdu, Sichuan, China; [21] Shanxi Provincial Center for Disease Control and Prevention, Xian, Shanxi, China.

Submitted: March 17, 2020; Accepted: April 23, 2020

REFERENCES

1. Punnett L, Wegman DH. Work-related musculoskeletal disorders: the epidemiologic evidence and the debate. J Electromyogr Kinesiol 2004;14(1):13 – 23. http://www.sciencedirect.com/science/article/pii/S1050641103001251.
2. NIUSheng-li. Background and significance of revision of list of international occupational diseases 2010 edition. Chin J Ind Hyg Occup Dis 2010;28(8):599 – 604. http://med.wanfangdata.com.cn/Paper/Detail/PeriodicalPaper_zhldwszyb201008013. (In Chinese).
3. Du WW, Wang S, Wang JX, He LH, Wu SS, Li JY, et al. The assessment of reliability and validity of musculoskeletal questionnaire. Chin J Ind Hyg Occup Dis 2012;30(5):335 – 8. http://www.wanfangdata.com.cn/details/detail.do?_type=perio&idzhldwszyb201205004. (In Chinese).
4. Salvendy G. Handbook of human factors and ergonomics. 4th ed. Hoboken, NJ: Wiley. 2012. http://www.doc88.com/p-7186950176862.html.
5. Cimmino MA, Ferrone C, Cutolo M. Epidemiology of chronic musculoskeletal pain. Best Pract Res Clin Rheumatol 2011;25(2):173 – 83. https://www.sciencedirect.com/science/article/abs/pii/S1521694211000052.
6. Elliott AM, Smith BH, Hannaford PC, Smith WC, Chambers WA. The course of chronic pain in the community: results of a 4-year follow-up study. Pain 2002;99(1–2):299 – 307. https://www.sciencedirect.com/science/article/abs/pii/S0304395902001380.
7. Widanarko B, Legg S, Stevenson M, Devereux J, Eng A, Mannetje AT, et al. Prevalence of musculoskeletal symptoms in relation to gender, age, and occupational/industrial group. International J Ind Ergonom 2011;41(5):561 – 72. http://www.sciencedirect.com/science/article/pii/S0169814111000801.
8. Hooftman WE, van Poppel MNM, van der Beek AJ, Bongers PM, van Mechelen W. Gender differences in the relations between work-related physical and psychosocial risk factors and musculoskeletal complaints. Scand J Work Environ Health 2004;30(4):261 – 78. https://www.jstor.org/stable/40968788.
9. Vingård E, Alfredsson L, Hagberg M, Kilbom Å, Theorell T, Waldenström M, et al. To what extent do current and past physical and psychosocial occupational factors explain care-seeking for low back pain in a working population?: results from the Musculoskeletal Intervention Center-Norrtälje study. Spine 2000;25(4):493 – 500. https://journals.lww.com/spinejournal/Abstract/2000/02150/To_What_Extent_Do_Current_and_Past_Physical_and.17.aspx.
10. Robinson ME, Wise EA. Gender bias in the observation of experimental pain. Pain 2003;104(1–2):259 – 64. http://www.sciencedirect.com/science/article/pii/S0304395903000149.