Prevalence and Risk Factors Analysis for Low Back Pain Among Occupational Groups in Key Industries of China

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Research Article

Keywords: Low back pain, Incidence, Risk factor

Posted Date: December 15th, 2021

DOI: https://doi.org/10.21203/rs.3.rs-1106406/v1

Abstract

Background: With the acceleration of industrialization and the growth of population aging, LBP has become the main disease of life loss caused by disability, which brings huge economic burden to society and is a global public health problem that needs to be solved urgently. The purpose of this study is to carry out epidemiological investigation and research on a large sample of people in key industries in different regions of China, to find out the incidence and distribution characteristics of LBP in key industries in China, to explore the epidemic law, and to provide reference basis for alleviating the global public health problems caused by LBP.

Methods: This study adopts the modified epidemiological cross-sectional survey method and the stratified cluster sampling method. From the representative enterprises in key industries in seven regions of North China, East China, central China, South China, southwest, northwest and Northeast China, all workers on duty and fulfill the criteria are taken as the research objects. The Chinese version of musculoskeletal disease questionnaire modified by a standardized Nordic Questionnaire was used to collect information, and a total of 57501 valid questionnaires were received. Descriptive statistics were used and multivariate logistic regression analysis ($p < 0.05$) was performed to explore the associations between musculoskeletal disorders and potential risk factors.

Results: The annual incidence of LBP in key industries or workers in China is 16.4%. There was significant difference in the incidence of LBP among occupational groups in different industries ($P < 0.05$). The results of multivariate regression model show that always make the same movements with your trunk, working in the same positions at a high pace, trunk position, always turn round with your trunk, often work overtime, lift heavy loads (more than 20 kg), education level, staff shortage, working age (years), cigarette smoking, use vibration tools at work Body mass index (BMI), lift heavy loads (more than 5 kg) and age (years) were risk factors for LBP. Physical exercise, standing often at work and absolute resting time are protective factors.

Conclusion: The incidence of LBP in key industries or workers in China is high. It is urgent to take relevant measures according to individual, occupational and psychosocial factors of LBP to reduce the adverse impact of LBP on workers' health.

Background

With the development of science and technology and the acceleration of industrialization, great changes have taken place in the working mode of workers. In the working process, workers generally suffer from the work-related musculoskeletal diseases (WMSDs) caused by adverse ergonomic factors, such as repetitive operation, bad working posture, excessive force load, continuous muscle tension, vibration contact. The World Health Organization defines this as "the health problems of muscle, tendon, bone, cartilage, ligament, nerve and other motor systems caused or aggravated by work activities, including all

forms of health disease states from minor and short-term injuries to irreversible and incapacitated injuries". Low back pain is the most common part.

Research shows that [1] about 80% of people in the world have experienced low back pain in their life. Low back pain brings great pain to people, high medical costs and significant impact on social economy, especially the loss of working hours brings huge medical and economic burden to the society [2]. It is estimated that the number of years of disability caused by low back pain increased by 54% globally from 1990 to 2015, which has become the main cause of global disability [3]. In March 2018, the Lancet published three consecutive reports calling for measures to be taken as soon as possible against the global problem of low back pain [3–5]. In 2002, the International Labor Organization (ILO) explicitly added musculoskeletal diseases to the international list of occupational diseases (recommendation No. 194). Musculoskeletal diseases were further refined in the latest version of the list of occupational diseases approved by ILO in 2010 [6]. In China, LBP also shows a high incidence, with high incidence, great harm and serious economic losses. According to the disease burden report of China and provincial administrative regions from 1990 to 2016 [7], lower back pain ranked the first disease causing the loss of life years caused by disability from 2005 to 2016. Therefore, LBP is a global public health problem to be solved urgently.

Therefore, this study aims to explore the incidence and distribution characteristics of low back pain by conducting a large sample epidemiological investigation and study on key industries in different regions of China, and to provide reference for reducing global public health problems caused by LBP incidence.

Methods

Source and study population

The study involved people from North, East, central, South, Southwest, northwest and northeast China, It involves 15 industries or working groups related to WMSDs, such as automobile manufacturing, shoemaking, biomedical manufacturing, electronic equipment manufacturing, ship and related equipment manufacturing, petrochemical, construction, furniture manufacturing, coal mine cleaning, animal husbandry, medical personnel, automobile 4S shops, vegetable greenhouses, civil aviation flight attendants, toy manufacturing, etc. Inclusion criteria of the study population: persons who have served for 1 year or more; Exclusion criteria: congenital spinal malformations and patients without WMSDs, such as trauma, infectious diseases, and malignancy, etc. This study has passed the ethical review of the Ethics Review Committee of The Chinese Center for Disease Control and Prevention, and the respondents were informed and consent. Statement that all methods of this study were performed in accordance with relevant guidelines and regulations. The data handling and storage were compatible with the law. All protocols was carried out in accordance with the Helsinki Declaration.

Sample size determination and sampling procedures

In this study, stratified cluster sampling method was adopted to select all on-duty employees meeting the inclusion criteria from representative enterprises in key industries in North China, East China, Central China, South China, Southwest China, northwest China and Northeast China. A total of 64052 people were surveyed and 61034 questionnaires were received, with a response rate of 94.6%; A total of 57501 valid questionnaires were collected with effective rate of 94.2%. The total number of respondents was 57501, including 37240 males and 20261 females.

Data collection tool and procedure

The incidence of WMSDs among occupational groups in key industries in different regions of China was investigated by using the electronic questionnaire system of <Chinese version of musculoskeletal disease questionnaire> compiled by our research group. This electronic questionnaire system is based on Nordic Musculoskeletal Disorders Questionnaire (NMQ) [8]. After appropriate modification, it has been proved to have good reliability and validity and can be used for Chinese occupational population. The survey contents include: ▯ general information such as age and years of service; ▯ Occurrence of musculoskeletal symptoms; ▯ Work type, the organized form of work, working posture, etc.

The survey was conducted in the form of 1: N. One investigator conducted a face-to-face survey on N respondents. The respondents scanned the QR code of the electronic questionnaire and answered the questions online. After submitting the questionnaires were directly uploaded to the cloud database.

Criteria for low back pain

The criteria of NIOSH for musculoskeletal injury [9] were adopted: pain, stiffness, burning, numbness or tingling and other uncomfortable symptoms, which were consistent with ▯ discomfort in the past year;▯ After accepting the current job, I began to feel uncomfortable;▯ No previous accidents or sudden injuries (local effects and discomfort);▯ If discomfort occurs every month or lasts for more than 1 week, it is judged as musculoskeletal disease in this part.

Data quality control

In order to ensure the scientific nature of research conclusions and the authenticity, validity and reliability of data, quality control runs through the whole research process, including design, implementation, data collection and data collation.

Research design

Refer to relevant literature, clarify the research purpose and investigation methods and other key aspects, take appropriate measures to control the possible bias in research design.

On-site investigation and measurement

Before the investigation, the investigators should be trained strictly so that they can fully understand the purpose and significance of the research and master the investigation and monitoring methods. During

the survey, the investigators will explain the purpose, significance and requirements of the survey, and conduct a face-to-face survey with the investigators. The respondents will fill in the questionnaire and submit it on the spot to ensure the authenticity, integrity and high retrieving rate of information sources.

Data collection

Investigators monitored the completion of questionnaires to ensure that all surveyed information was from the respondents themselves. Electronic questionnaire has logical error correction to avoid unreasonable information. If there are blank items that cannot be submitted, you can negotiate with the investigator to fill in the blanks to ensure that the information is complete.

Data management and analysis

After the survey data were exported from the backend database, the data were statistically processed by Spss20.0 statistical software. The measurement data adopts $\bar{x}\pm s$ indicators, and the single factor analysis of WMSDs adopts χ^2 test method, multivariate analysis was analyzed by unconditional logistic regression model.

Results

Socio-demographic characteristics of the study population

This study covers seven regions in North, East, Central, South, Southwest, Northwest and Northeast China, covering 15 industries or operating groups such as automobile manufacturing, footwear, biopharmaceutical manufacturing, electronic equipment manufacturing, ship and related equipment manufacturing, petrochemical industry, construction, furniture manufacturing, coal mining and washing industry, animal husbandry, medical personnel, automobile 4S stores, vegetable sheds, civil aviation crews, and toy manufacturing. Of the 57,501 respondents, 7,376 (12.8%) were in North China, 19,414 (33.8 %) in East China, 2,287 (4.0%) in central China, 18,457 (32.1%) in South China, 3,565 (6.2%) in southwest China, There were 4,391 (7.6%) in the northwest and 2,011 (3.5 %) in the Northeast. Among them 37,240 (64.8 percent) were males and 20,261 (35.2 percent) were females.; Male height :171.10±10.34cm, weight :67.83±15.98kg; Female height 159.57±9.74cm, weight 57.24±13.72kg. The age of the total population was 32.32±9.16 years, and the length of service was 7.51±7.19 years. The educational level, marital status, BMI and smoking status of the total population are shown in Table 1.

Prevalence of LBP in key industries in China

The annual incidence of LBP in key industries or workers in China was 16.4%. There was statistical difference in the incidence of LBP among workers of different industries ($P < 0.05$). The incidence of LBP in various industries from high to low was vegetable greenhouses (32.5%), toy manufacturing (27.3%), animal husbandry (26.0%), medical personnel (25.3%), biopharmaceutical manufacturing (21.8%), civil aviation flight attendants (20.3%), shipbuilding and related device manufacturing (18.9%), coal mining

and washing industry (17.3%), automobile 4S stores (16.9%) and automobile manufacturing (16.0%), electronic equipment manufacturing (13.9%), shoemaking (13.3%), construction (12.0%), furniture manufacturing (10.3%) and petrochemical industry (6.7%). See Figure1 for details.

Factors associated with low back pain

Univariate analysis showed that among single factors, female, age, length of service, educational level, BMI, smoking status and exercise were all related to the occurrence of LBP ($P < 0.05$). Lower back pain is more common in women than in men. In the control group <25 years old, the risk of LBP increased with age before 45 years old, decreased after 45 years old, and slightly increased after 55 years old. The risk of LBP increased with age of service, education level and BMI. Occasional smoking and occasional or regular physical exercise may be protective factors for low back pain. Among the workplace factors, work standing frequently, work standing or kneeling frequently, lift heavy objects more than 5 kg to 20kg, lift heavy objects more than 20kg, Use vibration tools at work, Working in the same postures at a high pace, Bending slightly with your trunk, Bending heavily with your trunk, Always turn round with your trunk, Always bend and twist with your trunk, Always make the same movements with your trunk, Working in bent posture for a prolonged time were associated with the occurrence of low back pain ($P < 0.05$). Among the factors of psychosocial, frequent overtime work, staff shortage and doing the same job almost every day were associated with LBP ($P < 0.05$). Abundant resting time Decide the rest time independently and work on rotation may be protective factors for LBP ($P < 0.05$). As shown in the table 2.

Multivariate logistic regression model showed that the influencing factors entering the model were always make the same movements with your trunk, working in the same situations at a high pace, trunk pose, always turn round with your trunk, oven work overtime, lift heavy loads (more than 20 kg), education level, staff shortage and working age (years), cigarette smoking, use vibration tools at work, body mass index (BMI), lift heavy loads (more than 5 kg), age (years), physical exercise, standing often at work and abundant resting time. The last three were protective factors. As shown in the table 3.

Discussion

This study investigated the epidemiological characteristics of LBP among occupational populations in key industries in China from January 2018 to December 2020, which is the largest population survey on LBP in China so far. The survey found that the incidence of LBP in key industries or workers in China was 16.4%, which was slightly higher than that in other studies. According to the 2010 Global LBP disease burden study report [10], the global LBP incidence is estimated to be 9.4%, the highest in Western Europe (15.0%), followed by North Africa / Middle East (14.8%) and central and Latin America (6.6%).

This study found that the incidence of LBP in vegetable greenhouse farmers was higher than that in other industries. The field investigation found that greenhouse planting is a very hard work. Greenhouse vegetable farmers work in the greenhouse for at least three quarters of a year. Due to the narrow working space in the greenhouse, the farmers are in bad working posture most of the time, such as large forward tilt and bending of the back, and kneeling or squatting for a long time. In addition, due to the low degree

of mechanization of greenhouse operation, there are almost no power tools and auxiliary tools to use, resulting in more repetitive operations and heavy physical labor of greenhouse vegetable farmers. The above operation characteristics increase the risk of LBP for greenhouse vegetable farmers. It is worth mentioning that medical personnel, this survey also found that the incidence of LBP of medical staff is generally high. More and more domestic and international reports have reported that the incidence rate of WMSDs occurs on medical staff is generally high. It is consistent with the results of this study. A survey on WMSDs of dentists in western countries from 2005 to 2017 shows that the incidence of WMSDs is between 10.8-97.9%, and the prevalence in most studies is more than 60% [11], which is higher than the survey results of this study. This may be related to the LBP determination method adopted in this study. NIOSH's judgment method is adopted in this study. There are four judgment criteria, which are stricter than the judgment criteria of Nordic Questionnaire [8]. Therefore, the prevalence of this survey is slightly lower than other survey results.

In terms of individual factors, the results of this study show that age, BMI, smoking status, sports and other factors are closely related to the occurrence of LBP. The incidence of WMSDs increased linearly with age under 45 years old. This can be explained by cumulative effect. That is, with the increase of age, the musculoskeletal system of the body shows a trend of degradation. The longer the length of service, the longer the time exposed to risk factors. Therefore, acute or chronic load acts on musculoskeletal tissue, resulting in injury accumulation and increasing the incidence of musculoskeletal diseases [12]. After the age of 45, the incidence of WMSDs showed a downward trend. The field survey found that the management of many enterprises will adjust the operation positions of front-line workers according to the age of workers, that is, front-line workers will be adjusted to auxiliary positions with light load, or promoted to management positions such as team leader. This may also be the reason for the decline in the incidence of WMSDs. This survey found that the risk of LBP increased with the increase of BMI. Houda Ben ayed [13] and others also found that BMI > 25kg / m^2 was closely related to the occurrence of LBP. Dianat [14] and others also found that light BMI is the protective factor of LBP. The survey also found that occasional smoking and occasional or regular physical exercise were the protective factors of LBP. This is basically consistent with previous studies. Regular smoking aggravates the occurrence of LBP. Abdulrazag H AL- salameen [15] and others found that smoking is a risk factor for LBP. Smoking causes intervertebral disc degeneration by interfering with intervertebral disc metabolism, proteoglycan and collagen synthesis, which may lead to low back pain [16]. Previous studies have shown that [13, 17], a weekly regular physical activity can reduce the risk of LBP. According to the recommendations of the American Physical Therapy Association guidelines [18], moderate- to high-intensity exercises are recommended for LBP without pain, and low intensity exercises for LBP with generalized pain. Research shows that [19], moderate physical exercise can enhance muscle strength and endurance, improve cardiovascular function, promote the diffusion of tissue fluid, ensure the absorption of nutrition by bone and muscle tissue, and alleviate muscle fatigue. Therefore, appropriate physical exercise can reduce the risk of LBP.

In terms of workplace factors, adverse posture operation i.e. always make the same movements with your trunk, working in the same posture at a high pace, bend slightly with your trunk, bend heavily with your trunk, always turn round with your trunk and lift heavy loads are risk factors for LBP, while standing often at work is protective factor. Moreover, previous studies have shown that [20], Stretching/overstretching and repeated bending at work may be risk factors for LBP. Studies have shown that [21], Workers who needed repetitive bends at work were 97 percent more likely to develop LBP than those who did not.

The research shows that [22], long-term continuous poor posture operation is easy to cause blood circulation disorder, serious insufficient blood supply in the spine area, and the muscles and bones can not absorb nutrition, which is easy to cause muscle tissue ligament strain. LBP can be caused when there is continuous low load or short-term strong load impact. Laboratory research shows that [23, 24], there is a positive correlation between heavy physical load and physical exertion. Coenen P and others [25] found that handling more than 25kg per day could cause an annual incidence rate of LBP increasing by 4.3%.

In terms of psychosocial factors, the results of this study show that staff shortage and do the same job almost every day can increase the risk of LBP, and absolute resting time and decide the rest time independently can reduce the occurrence of LBP, which is in consistent with the previous research results. The research shows that [26], psychosocial factors have been found to play an important role in the development of low back pain. High job requirements are closely related to the occurrence of LBP. Frequently work overtime, fast work pace and insufficient time to complete the work can lead to the occurrence of WMSDs [27]. According to the 2010 National Health Interview Survey [28], female workers work 41 – 45 hours a week and male workers work more than 60 hours a week, which can increase the risk of LBP. Therefore, ensuring adequate rest time can relax muscle tissue, reduce the pressure of lumbar intervertebral disc and prevent the occurrence of LBP. This study shows that autonomous control of work progress is a protective factor for LBP. Domestic and international scholars have also found similar results. Werner and others found that the lower perceived decision authority (i.e. lack of rules and decision-making and participation) is related to the wrist WMSDs. If workers can decide the pace of their activities, theoretically, they could avoid activities that aggravate their symptoms and thereby allow for healing to occur.

This study has the following limitations. First of all, the research objects are from 15 industries or working groups in China, and some key industries related to LBP have not been investigated, so the deduction is limited. Secondly, due to the design nature of the cross-sectional study, it is impossible to make causal inference between risk factors and LBP. Finally, because this study uses a questionnaire survey, and the time limit of the questionnaire survey is the past year, the resulting reporting bias and recall bias will affect the results.

Conclusion

This study basically clarified the epidemic characteristics of lower back pain and the distribution of LBP risk factors among occupational groups in key industries in China, and provided technical support for

making LBP intervention plan. When making the global public health strategy of prevention, treatment, management and research of LBP, decision makers and employers should consider the individual, workplace and psychosocial factors above to make comprehensive ergonomic prevention interventions.

Abbreviations

AOR: Adjusted odds ratio; BMI: Body mass index; CI: Confidence interval;

COR: Crude odds ratio; LBP: Low back pain;

WMSDs: Work-related Musculoskeletal disorders;

SPSS: Statistical package for social science

Declarations

Ethics approval and consent to participate

This study has passed the ethical review of the Ethics Review Committee of The Chinese Center for Disease Control and Prevention, and the respondents were informed and consent. All experimental protocols of this study were approved by the ethics review committee of China Center for Disease Control and prevention. Statement that all methods of this study were performed in accordance with relevant guidelines and regulations. All participants in this study signed informed consent. Participation was voluntary and confidential. The data handling and storage were compatible with the law. All protocols was carried out in accordance with the Helsinki Declaration.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analyzed during this study are included in this article. All methods were performed in accordance with the relevant guidelines and regulations. The data that support the findings of this study are also available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

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.: 131031109000160004).

Authors' contributions

Ning Jia: contributed to the study design, data collection, data analysis, interpretations of the results and manuscript write-up.

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Xin Sun and Zhongxu Wang、contributed to the study design, data collection, data analysis, interpretations of the results and manuscript write-up AD contributed to data analysis, interpretations of the results and manuscript write-up and review.

All authors read and approved the final manuscript.

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 Supervision Center, Shenyang, Liaoning, China, 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.

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Tables

Table 1 Socio-demographic and Personal characteristics of the study participants, China, 2018-2020 (n= 57501)

Variables	Frequency(n)	Percentage (%)
Gender		
Male	37240	64.8
Female	20261	35.2
Age (years)		
25	12085	21.0
25-	26139	45.5
35-	12301	21.4
45-	5802	10.1
55-	1174	2.0
Working age (years)		
2	16061	27.9
2-	12072	21.0
4-	7299	12.7
6-	9717	16.9
8-	12352	21.5
Education level		
Junior high school	15369	26.7
Senior high school	21901	38.1
University degree	19231	33
Graduate degree	1000	1.7
Marital status		
Single	20997	36.5
Married	35343	61.5
Divorced/Widowed	1161	2.0
Body mass index(BMI)		
18.5	6006	10.4
18.5-	39328	68.4
25-	12167	21.2

Cigarette smoking		
No	36527	63.5
Occasionally	10111	17.6
Frequently	10863	18.9

Table 2 Univariate analysis of low back pain among occupational groups in key industries in China, 2018-2020

Variables	Low Back Pain		
	Number of workers	Case	*COR（95%CI）*
Individual risk factors			
Gender			
Male	37240	5514	1
Female	20261	3935	1.387(1.326～1.451)*
Age (years)			
≤25	12085	1462	1
25-	26139	4577	1.542(1.448～1.643) *
35-	12301	2238	1.616(1.505～1.735) *
45-	5802	964	1.448(1.326～1.581) *
55-	1174	208	1.565(1.334～1.835) *
Working age (years)			
≤2	16061	1886	1
2-	12072	1857	1.366(1.275～1.464) *
4-	7299	1292	1.617(1.497～1.746) *
6-	9717	1853	1.771(1.652～1.899) *
8-	12352	2561	1.966(1.843～2.098) *
Education level			
Junior high school	15369	2225	1
Senior high school	21901	3399	1.085(1.024～1.150) *
University degree	19231	3626	1.373(1.296～1.454) *

Graduate degree	1000	199	1.468(1.249–1.725) *
Body mass index (BMI)			
<18.5	6006	908	1
18.5-	39328	6414	1.094(1.015–1.180) *
25-	12167	2127	1.189(1.093–1.295) *
Smoking			
No	36527	6074	1
Occasionally	10111	1453	0.841(0.791–0.895) *
Frequently	10863	1922	1.078(1.019–1.140) *
physical exercise			
No	17947	3375	1
Occasionally	32797	5116	0.798(0.761–0.837) *
Frequently	6757	958	0.713(0.660–0.771) *
Workplace risk factor			
Standing often at work			
No	8758	1284	1
Yes	48743	8165	1.171(1.099–1.248) *
Sitting often at work			
No	25385	4134	1
Yes	32116	5315	1.019(0.975–1.066)
Squatting or kneeling often at work			
No	33942	4750	1
Yes	23559	4699	1.531(1.465–1.601) *

Lift heavy loads (more than 5 kg)			
No	21719	2787	1
Yes	35782	6662	1.554(1.481–1.630) *
Lift heavy loads (more than 20 kg)			
No	33670	4669	1
Yes	23831	4780	1.558(1.491–1.629) *
Use vibration tools at work			
No	35673	5267	1
Yes	21828	4182	1.368(1.308–1.431) *
Working in the same postures at a high pace			
No	11044	970	1
Yes	46457	8479	2.319(2.162–2.487) *
Trunk posture			
Trunk straight	18566	2001	1
Bend slightly with your trunk	31361	5364	1.708(1.617–1.805) *
Bend heavily with your trunk	7574	2084	3.142(2.934–3.365) *
Always turn round with your trunk			
No	20584	2592	1
Yes	36917	6857	1.583(1.508–1.663) *
Always bend and twist with your trunk			
No	33046	4069	1
Yes	24455	5380	2.009(1.921–2.100) *
Always make the same movements with your trunk			
No	27365	2882	1

Yes	30136	6567	2.367(2.258–2.482) *
Work in bent posture for a prolonged time			
No	17966	2777	1
Yes	39535	6672	1.110(1.058–1.165) *
Work organization factors			
Often work overtime			
No	24830	3385	1
Yes	32671	6064	1.444(1.379–1.511) *
Abundant resting time			
No	31483	6766	1
Yes	26018	2683	0.420(0.400–0.441) *
Decide the rest time independently			
No	47308	8015	1
Yes	10193	1434	0.803(0.755–0.853) *
Staff shortage			
No	31477	4123	1
Yes	26024	5326	1.707(1.633–1.785) *
Do the same job almost every day			
No	7009	716	1
Yes	50492	8733	1.838(1.696–1.992) *
Take turns with colleagues to finish the work			
No	28980	4944	1
Yes	28521	4505	0.912(0.873–0.953) *

LBP: low back pain; Crude odds ratio; CI: confidence interval; *: $P<0.05$

Table 3 Multivariate logistic regression model predicting the risk factors of LBP among occupational groups in key industries in China, 2018-2020

Variable	Coefficient	Waldχ^2	AOR	95%CI	*P* value
Always make the same movements with your trunk	0.451	254.409	1.57	1.486-1.66	0.000
Working in the same postures at a high pace	0.338	76.079	1.401	1.299-1.512	0.000
Trunk posture	0.285	208.993	1.33	1.28-1.383	0.000
Always turn round with your trunk	0.247	76.57	1.28	1.211-1.353	0.000
Often work overtime	0.173	45.938	1.189	1.131-1.25	0.000
Lift heavy loads (more than 20 kg)	0.154	26.14	1.166	1.099-1.237	0.000
Education level	0.14	80.491	1.15	1.115-1.186	0.000
Staff shortage	0.138	30.886	1.147	1.093-1.205	0.000
Working age (years)	0.116	162.307	1.123	1.103-1.143	0.000
Cigarette smoking	0.113	41.701	1.119	1.082-1.158	0.000
Use vibration tools at work	0.087	11.129	1.091	1.037-1.149	0.001
Body mass index (BMI)	0.082	14.221	1.086	1.04-1.133	0.000
Lift heavy loads (more than 5 kg)	0.075	5.345	1.078	1.011-1.149	0.021
Age (years)	0.032	4.576	1.033	1.003-1.064	0.032
Physical exercise	-0.125	43.315	0.882	0.85-0.916	0.000
Standing often at work	-0.178	22.741	0.837	0.778-0.9	0.000
Abundant resting time	-0.532	390.399	0.587	0.557-0.619	0.000

AOR: adjusted odds ratio; CI: confidence interval.

Figures

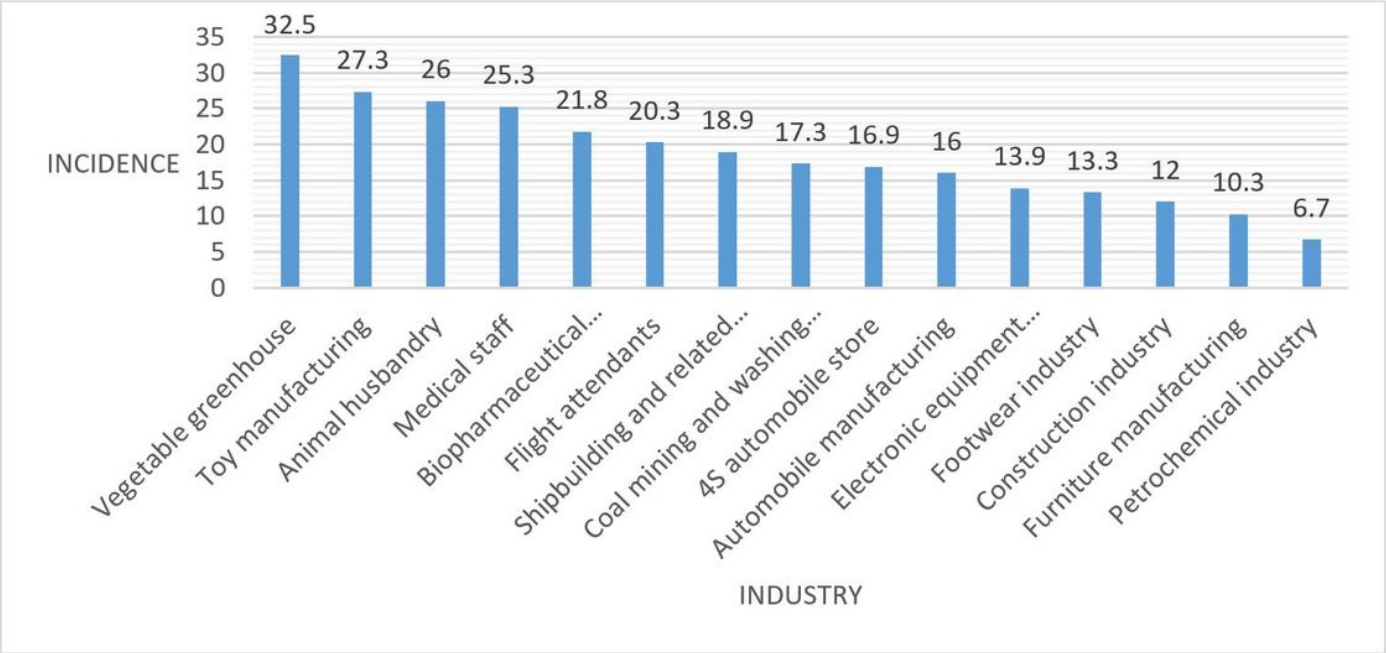

Figure 1

Incidence of LBP in key industries or occupational groups in China, 2018-2020(n= 57501)