



## Investigation of Catering Services in Ice and Snow Industry in Northeast China

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### Description

Ergonomic survey and questionnaire were conducted for 865 employees working for catering service in the ice and snow industry in northeast China. The purpose was to research the current working conditions of the employees and to assess the risk factors for Work-related Musculoskeletal Disorders (WMSDs) for the ice and snow industry in northeast China. The collected data include general background information of the staff and their main work contents, work postures and working movements. More than 20 biological factors, psychological factors and social factors were assessed. Multivariate logistic regression analysis was used to identify the potential risk for WMSDs. The analysis shows that catering employees in the ice and snow industry generally lacked enough rest and exercise after work and, therefore, had a high potential risk of musculoskeletal injury. Results show that catering staff had higher prevalence of Low Back Pain (LBP) caused by lumbar muscle strains and sprains. Prolonged periods of standing, frequent bending and twisting of waists, holding heads in one position for long time, physical activity and working environment factors, such as workplace temperature changes, are found to be positively correlated with LBP.

Work-related Musculoskeletal Disorders (WMSDs) are one of the major causes of disabilities among workers across all employment sectors. According to the statistics of the bureau of labor statistics in 1995, occupational injuries caused by repetitive or cumulative injuries represented 65% of all occupational injuries in the United States. WMSDs not only cause mental and physical discomfort of employees, but also result in financial loss. According to the study of the U.S. department of occupational safety and health, WMSDs cost about \$1.4 billion every year. WMSDs have become the most frequently researched occupational injuries in both advanced industrial and commercial countries in Europe and the United States and developing countries. WMSDs commonly occur as a result of a combination and interaction among many factors including, for example, individual factors, such as gender, weight, disease and even dietary habits physical factors, human factors, working environments, social psychological factors and ergonomic factors. Among them, poor posture, repetitive movements, heavy body load and other ergonomic factors present the main risk factors for developing WMSDs especially in the head and upper limbs.

### Cross Sectional System

Catering service is the business of providing food service. The main tasks of the service include cooking, baking, frying, boiling, packing, supplying and other handling and repetitive physical work. According to a recent study, the prevalence of WMSDs reported by catering staff in the ice and snow industry in northeast China ranges from 21.5% (thigh) to 58.9% (shoulder). Lower back/Lower Back Pain (LBP) is common (around 54.7%). Shoulder pain is associated with frequent, prolonged moving of heavy objects and bending while moving and lifting heavy objects; and finger/wrist pain is associated with continuous twisting and vigorous actions among catering workers. The purpose of this study is to examine the risk factors and the prevalence of LBP among the kitchen workers at catering services in ice and snow industry in northeast China. To establish preventative measures for LBP, the perceived work-related risks, such as working hours, the use of equipment and tools, body movement and postures, and work-related LBP are examined using logistic regression for ice and snow catering service personnel in northeast China.

This study was conducted during October to December in 2018 using structured questionnaires and personal interviews for 24 ice industry services in northeast China. The questionnaire was based on epidemiologically cross-sectional and retrospective design to investigate personal status, occupational status, working postures, workplace environment, and WMSDs. A total of 865 catering service personnel agreed to have interviews and to fill in self-administrated questionnaires. A total of 865 questionnaires were issued, out of which 852 were recovered and 15 copies of invalid questionnaires were eliminated.

The questionnaires contained demographic characteristics (gender, age, Body Mass Index (BMI)), job description (the main work content such as tasks required to perform the everyday, service duration, type of work, daily activities, working conditions, common work postures and movements, as well as frequency of postures and movements), social-psychological factors in the workplace (overtime work, resting time, work intensity, job demand and control, repetitive tasks, working postures, working rhythm, and work pressure), social psychological factors and organizational factors (levels of social support, work satisfaction from supervisors and co-workers, salary level, promotion system and adequate pre-job training), workplace environmental factors (air temperature change and workspace atmosphere) and ergonomic factors (working postures, such as long standing, bent wrist, forcible activities of the fingers and thumb that carried items, shoulder postures, bending and turning of neck and back for heavy items, lifting or holding heavy items, etc).

The questionnaire was pre-tested and revised twice by three experts before its formal release. The pre-testing design was conduct for six employees working at a restaurant in Jilin University. The reliability of the test before and after three weeks was 0.92. The questionnaire provided instructions to subjects one month prior to fill in the questions. Physical exercise is defined as body movement that requires energy expenditure. The interviewed workers normally had 20 minutes of vigorous-intensity activity of body movement at least three times per month. Backbend is defined as a stretch up that the back is bended continuously for at least five minutes. Labor intensity is classified as continuous work for at least two hours (high), one hour (medium), and 30 minutes (low).

## Psychological Factors

Risk factors include subjective working posture comfort, space size of work environment, control of work progress, staff shortage, satisfaction of salary level, satisfaction of promotion system, satisfaction of work and other psychological factors that can help alleviate burnout. Some subjective feelings for LBP symptoms that presented minor negative correlation factors were also considered. Uncontrollable factors, such as frequent shift replacement by colleagues, satisfaction of salary level, etc., were not included in the final multivariate ergonomic analysis. Although the content of work differed significantly from the main tools used in the work, catering service work required standing for long period of time or working hours. Back, shoulder and the wrist moves were commonly used during their work, for example, caring heavy objects above shoulder level, performing lifts with a semi squatting position, turning and bending of back and waist to pick up objects, and bending the back forward to perform work. Poor posture at work is a major cause of

LBP for employees in the ice and snow industry in China. Although the types of food and beverage services provided by carting staff differed, the overall labor intensity was high. From the perspective of traditional Chinese medicine, static work maintaining the same posture for a long period with high intensity can cause structural deterioration of bone tissue and defects in the innate immune system, leading to bone fragility and an increased risk of fractures of the hip, spine, and wrist. Long-standing means continuous standing for more than one and a half hours at a time. According to modern preventive medicine, long-standing is similar to a sedentary lifestyle and has a negative cumulative effect on the overall functioning of the body. For people whose work involves lifting, carrying or performing similar, vertebrae and intervertebral disc are subjected to compression. Poor posture can result in spinal and joint dysfunction and result in pain or damage. It is recommended to take sitting positions to alternate between sitting and standing for long-standing posture, which can provide appropriate support to better maintain proper body position.