

THE CAUSES OF DISORDER'S DEVELOPMENT AMONG FARMERS AS A RESULT OF MECHANIZED TASKS

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Abstract

Nowadays, in agriculture there are many different sources of accidents and risks developing disorders in musculo-skeletal system. Farmers are often exposed to the possibility of overloading the musculo-skeletal system due to many different activities performed in farms. Based on these circumstances, the studies were conducted aiming as main objective to investigate the causes of disorders in farmer's musculo-skeletal system. Therefore, a survey was conducted on 96 farms. It turned out that many farmers transport the loads only manually. Due to many various tasks performed in farms, farm workers adopt an uncomfortable body position very often: forward inclination of the spine and head, sitting without back support and often kneeling. It generates pains of the upper limbs and legs or stiffness of hands. Based on these results it is very important to perform each agricultural activity very careful and paying attention to other worker during work process in the same farm.

Key words: farmer, musculo-skeletal disorders, safety, tractor

INTRODUCTION

Work on a farm it is described often as high complexity - during working day the farmer performs a series of diversity activities that often require different skills. The natural consequence of this type of work is exposure to a high number of dangerous and troublesome factors. All this leads to the fact that farming is described as area of high number of accidents [2, 10, 19]. An accident in agriculture is defined here as such an event which is caused by external circumstances, was related to agricultural activity and caused injury [22, 23]. Besides work-related accidents in farming, farm workers are often exposed to some disorders. Whereas an accident in agricultural is always unexpected, the symptoms of human disorders appear after a longer period of work and are associated with troublesome factors accompanying these activities [20]. These considerations make the prevention of disorder's symptoms among farmers much more difficult than preventing accidents in agricultural work.

MATERIALS AND METHODS

Taking into account some reasons given in the introduction, it is necessary to identify the risk of human disorders connected with farming profession.

This analysis was conducted in selected works that generate relatively high risk of developing musculoskeletal disorders.

The objective of the article was to evaluate a risk of appearing disorders among farmers as a result of performing a different tasks in individual farms.

The study was conducted in randomly selected farms located in the province of Łódź and Lower Silesia.

A questionnaire consisted of 30 questions (16 open and 14 closed).

The study was performed in 96 individual farms and took form of a direct interview generally among farmers and their families involved in process of agricultural production. The research was entirely anonymous and the age of the surveyed farmers ranged from 25 to 65 years.

RESULTS AND DISCUSSIONS

Nowadays a tractor is an essential element of each modern farm. During many operation with the tractor farmer is exposed to a number of dangerous risk. As a matter of fact is that the share of tractors in the total number of accidents is low, but the consequences of such events are relatively serious [4]. A part of agricultural accidents involving tractor doesn't consider the tractor drivers, but people standing near the vehicle attaching a machine to the tractor while the tractor is moving. The most common accidents include the person being driven over by tractor or caught by the vehicle in motion. In order to reduce the risk of accident, the tractor drivers should take a special care, always before driving make sure that people not involved in agricultural operations are safe [17, 18]. Figure 1 shows the answers of farmers to questions concerning a safe start driving of the tractor.

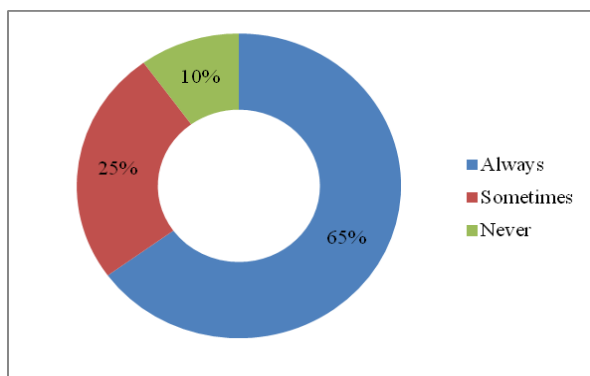


Fig. 1. The distribution of answers to the question of whether the farmers make sure that not involved people in work accompany the farmer while starting the vehicle. Source: own study

Based on the survey (Fig. 1) it found that 65% of surveyed farmers "always" before starting the tractor make sure that other people don't accompany them. This is a key issue in prevention of accidents involving machinery and vehicles. For 10% of the farmers this issue don't matter, because in their farms very often children and elderly people are exposed to direct risk. The rest of the respondents stressed that this issue is determined by many different factors such as good work organization or know-how, because only in some situations they are willing to pay

attention to persons in the area of tractor driving. In addition to the risk of accidents associated with the use of tractors, farmers are exposed to troublesome factors, that in the long term lead to the disorders symptoms. The method of tractor use, may leads among farmers to musculoskeletal-skeletal disorders. This is caused by the forced position of the body while driving the tractor. Figure 2 summarizes the types of work that were often mentioned by farmers as heavy because of the stress on them spine.

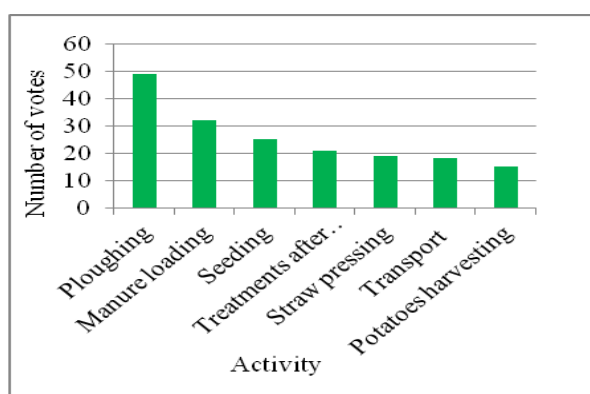


Fig. 2. Cultivation techniques performed with tractor and resulting in disorders of farmer's musculo-skeletal system. Source: own study

According to Fig.2. ploughing is an activity that most respondents (49 farmers) indicated as troublesome. A significant number of people (32) mentioned that loading manure is a potential source of discomfort associated with tractor driving. A small group of farmers indicated transportation works and a collection of agricultural potatoes with the use of combine - respectively 18 and 15 replies. Based on these results it can be concluded that the pain of the spine among tractor drivers is the most experienced in the performance of plowing.

Safety of agricultural machinery is the most important issue for 72% of respondents (Figure 3); firstly because of the level of safety for men during contact with the machine and secondly because of the work performance, i.e. the elimination of machine breakdowns which could occur over time and interrupt the work. Approximately 1/5 of the respondents do not see the need for safety checks on the machinery and the remaining group does not have any problems with

machine safety.

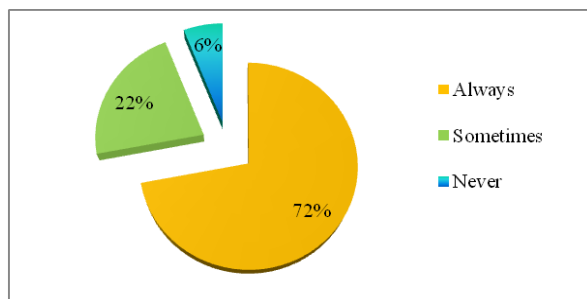


Fig. 3. The frequently of checking machinery condition in safety aspect. Source: own study

Farmers are often exposed to the possibility of overloading the musculo-skeletal system due to the farming work complexity. Such a possibility of developing disorders may be manifested by pain sensations during the execution of specific works. Figure 4 summarizes activities indicated by farmers as those which most often lead to pain in their musculo-skeletal system. It turns out that the work identified as the most onerous is the manual transport of loads, among which is the carrying of the bags containing mineral fertilizer and animal feed (53 responses).

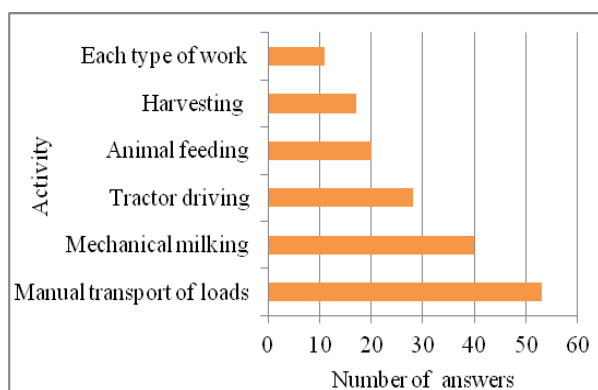


Fig. 4. Some types of agricultural activities developing musculo-skeletal disorders. Source: own study

Other onerous works include (mechanical) milking and tractor driving. Harvesting was also specified by many respondents (17 people), and each type of work was indicated by every tenth farmer. The nuisance of mechanical milking of cows does not result from heavy loading, but from the repeatability of operations performed in a forced body position - washing udders and fitting milking cups take most of the time in milking [12]. In turn, tractor driving indicated by farmers as

onerous (without indicating a specific type of work) should be attributed primarily to the previously described specific design of the tractors (lack of sufficient shock absorbing properties and power steering in the case of older tractors). It should be noted that the design of tractors is constantly modernised with the emphasis on improving ergonomics and safety of use [3]. Because farmers identified manual handling of loads as taking the first place in terms of nuisance, another question in the survey was dedicated to this activity. Figure 5 summarizes replies pertaining to feelings during the manual handling of loads.

The analysis of the graph allows observing that 18% of respondents indicated the stiffness of hands and forearms as inseparable elements of lifting, 16% pointed to pain in the upper limbs and 14% to the forward and sideways inclination of the body. The effects that are the least likely to be felt include: tingling of the limbs - 6% and the so-called "cold limbs" effect - 5%.

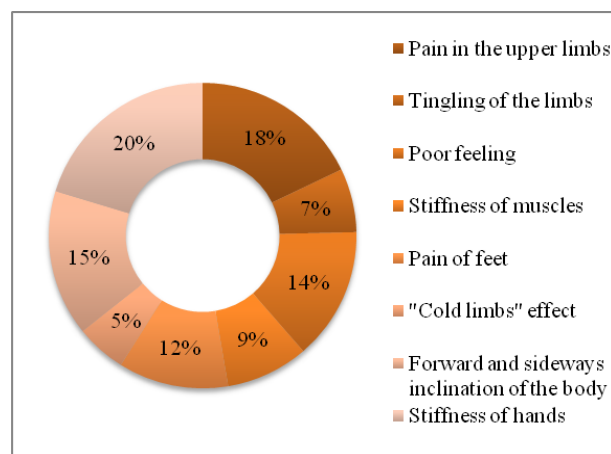


Fig. 5. Feelings among farmers during a manual transport of loads. Source: own study

The nuisance which was most often mentioned (hands and forearms stiffness and excessive inclination of the body) may be associated with taking a wrong position in the lifting of heavy loads - it was demonstrated that many farmers perform this type of work "in the traditional way" without taking safety standards into account [5, 20].

Nuisance related to the handling of loads can be minimized by following the recommendations and standards, as well as

through the use of appropriate technical measures [1, 20]. The farmers' awareness of the possible consequences of incorrect handling of loads is of a key importance here. Figure 6 summarizes the responses to the question on how to move 50 kg weights.

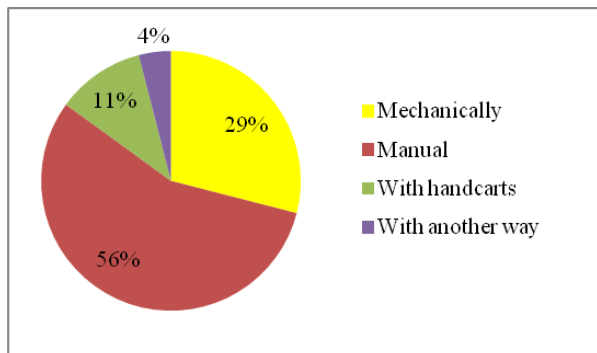


Fig. 6. Methods used in farms on how to move 50 kg weights. Source: own study

The analysis of the above table allows concluding that as many as 56% farmers do not have adequate technical solutions to support the transfer of loads from one place to another. It is not a problem for 29% of farmers who have the transport work done mechanically (e.g. with the use of conveyors). Handcarts are regularly used in 11% farms, and in the remaining group the loads handling is performed with the help of another person, as shown in Figure 5. When assessing the above statement it can be concluded that a large number of farmers are not aware of the potential effects of manual handling of loads or they do not realize the benefits from the use of technical measures in loads handling activity. The body position during work is one of the most important elements influencing the development of disorders in the musculo-skeletal system [5, 20]. Figure 7 shows responses of farmers as to the most uncomfortable body positions adopted while performing various works. In their responses they listed many "uncomfortable" body positions which resulted from the specific nature of the activities.

The most frequently mentioned threats to the motoric system of farmers include sideways twisting of the torso (19% of the responses), forward inclination of the spine (13%), holding upper limbs in a forced position

(14%) as well as keeping feet and flexing legs (10% responses for each).

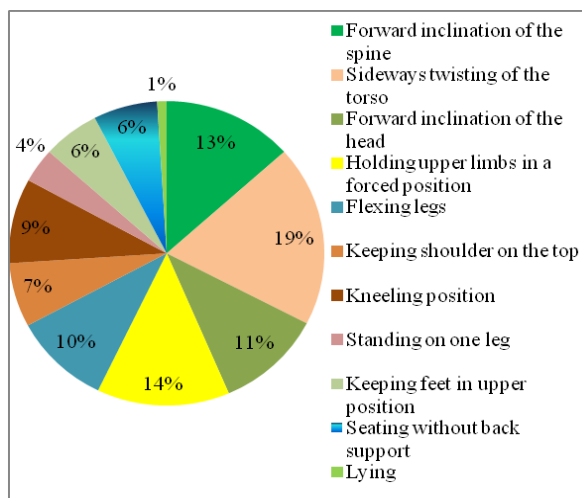


Fig. 7. Uncomfortable body position resulting from specific nature of the activities. Source: own study

Standing on one leg was rarely mentioned (4%), while tilting the head from the vertical position and seating without back support constituted 6% of the responses for each of the activities. Kneeling position was also considered uncomfortable by 9% of the respondents.

Based on the result analysis regarding the risks and inconveniences associated with the use of tractors, it can be concluded that the awareness of farmers on this issue is continuously improving - it is consistent with the observations offered in the works by Pawlak [17, 18]. It should be noted that even 15 - 20 years ago the percentage of farmers who disrespected risks associated with the use of tractors was higher than it is today [4]. The development in the design of tractors is of great importance here, due to which it is possible to improve the safety and ergonomics of tractor usage [3, 7, 21].

Not only in Polish farming a large number of accidents is related to the use of machinery and equipment [9, 13, 16]. As in the case of tractors an increase in the amount of news about dangers associated with improper use of machinery and equipment on the farm is observed - this trend is consistent with the analyses performed periodically by the Agricultural Social Insurance Fund [9, 10, 11]. The financial condition of the farm is

important. It was demonstrated that a better economic situation allows improving the age and the condition of the machinery, which directly translates to the improved safety for farmers [6, 14].

The observations of farmers about the nuisance of individual works are partly consistent with those reported by other researchers. In works 4 and 5 the manual handling of loads is indicated as an activity of a high nuisance which may lead to developing disorders. This trend seems to be confirmed by the results of this study, where the manual handling was identified as the most burdensome for farmers. Some discrepancies with the literature data appear in the case of milking operation, which scored second place in terms of nuisance. In work 12 it was demonstrated that the milker's operation is not marked by a significant nuisance. However, in paper 15 it was stated that the milker's work is subject to high risk of developing musculo-skeletal disorders.

The analysis of nuisance associated with manual handling of loads gave reasons to conclude that the inconveniences most often experienced during this operation are the stiffness and excessive inclination of the body. The most common cause of this type of ailment is the incorrect technique when moving loads and consequently the absence of proper habits when performing these activities. This hypothesis is consistent with the results reported by other researchers [5, 20]. It was also found out that most farmers do not use technical solutions to move loads, which obviously increases the risk of developing musculo-skeletal disorders. Other studies demonstrated that the manual handling of loads is one of the main causes of musculo-skeletal disorders [1].

CONCLUSIONS

The conducted studies determine the most dangerous activities connected with driving a tractor and resulting in disorders of musculo-skeletal system. Among many different types of agricultural work, manual transport of loads generates most often pain among farmers. There were described farmer's

feelings during the manual handling of loads. Many farmers indicated a stiffness of hands and pain in the upper limbs as a consequence of uncomfortable position during agricultural activities. The most frequently mentioned risk were connected with forward inclination of the spine and sideways twisting of the torso. It turned out that many farmers don't check a machinery condition before using it. It leads to many different accidents in farms. The conducted research will allow for development of favorable working conditions for farmers who don't meet safety condition. It is very important to workers and farm owners to reduce a risk developing a disorders in musculo-skeletal system, because the body position during work is one of the most important elements influencing the pain during work.

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