

SPECIFIC ERGONOMIC TRAINING FOR FISHERMEN AND OTHER BOAT WORKERS

1. Organisations involved

River shipping company JSC 'Smiltynes Perkela'

2. Description of the case

2.1. Introduction

Straining or overloading the same groups of muscles (stooping, squatting or kneeling) for a long period of time usually leads to various musculoskeletal problems. From this point of view various works on the fishing and transport boats could be qualified as works of greater risk. Most of them are related to manual handling and lifting of the various loads and repetitive movements or awkward working postures. These worsening factors e.g. limited working spaces, high humidity and other unfavorable ambient factors and long time stay on the boat etc increase the risk. Therefore proper equipment in the workspace along with a high level of relevant occupational knowledge and the use of adequate working practices play a major role in the prevention of musculoskeletal disorders (MSDs) among fishermen and other boat workers.

JSC 'Smiltynes Perkela' is a river shipping company owning 6 river boats with the staff of fifty persons working on them. Three boats were built in 2004-2006 and other three are old but renovated. All workplaces on the boats are equipped in accordance with applicable requirements. Therefore the management of the company decided to step forth and develop a combined method of ergonomic training for raising employees' awareness regarding musculoskeletal problems and their solution. The project was implemented in 2007.

2.2. Aims

Aims of the project were to detect how working practices used could influence workers wellbeing. Also to define the relationship between various risk factors and these working practices, in order to implement appropriate preventive measures.

2.3. What was done, and how?

Permanent improvement of working conditions on the boats is an essential part of occupational safety and health policy of the river shipping company JSC 'Smiltynes Perkela'. All company's floating devices are new or newly renovated and results of risk assessment show that all workplaces on the boats are equipped in accordance with applicable requirements. Therefore next step in this direction was a project of workers ergonomic education realized in 2007.

In order to ensure full realization the project's working group (composed of the company's subdivision managers and specialists) was created and representatives of the trade union were involved. Table 1 gives a detailed overview on the number of JSC's 'Smiltynes Perkela' employees working on the boats and involved in the project.

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Table 1: Overview of the number of JSC's 'Smiltynes Perkela' employees working on the boats and involved in the project

Occupation	Number of employees working on the boats	Number of employees involved in the project	Involvement rate in percent
Captain	13	12	92,0
Mechanic	13	10	76,9
Deckhand	13	9	69,2
Deckhand-operator	11	6	54,5
Total	50	37	74,0

Investigation of working practices applied on the boats and ergonomic risk factors related to these practices were implemented in July 2007. The summer months are the most intensive in terms of the workload.

First stage of the investigation was based on an interview method using a special questionnaire prepared by Kaunas University of Medicine and Vilnius Gediminas Technical University. Questions concerning state of health and health problems, lifestyle and psychosocial factors, working activities and assessment of working conditions were included in the questionnaire.

Results of the interview showed that 2 to 16 percent of different age group workers reported back, waist and articulations pain. Pain was felt more frequently among the older workers. An assumption was made that workers have no knowledge on or do not pay attention to wrong postures and incorrect movements which influence their fatigue and onset of pain. Problems met during the interview were the unwillingness of some workers to fill in the questionnaire. This was driven by their fear to demonstrate that they suffer from pain or other disorders.

During the second stage of the investigation assessment of ergonomic risk factors at the workplaces using REBA (The Rapid Entire Body Assessment), RULA (Rapid Upper Limb Assessment) and other ergonomic test methods was performed.

RULA is a survey method developed to investigate the exposure of individual workers to ergonomic risk factors related to upper limb disorders (McAtamney, 1993). The method is based on the worker's body observation which can be performed without use of special equipment or from photographs and video records and scoring of body postures. Therefore quick assessment of the postures of the upper limbs, neck, trunk and legs along with muscle function and the external loads experienced by the body can be done directly at the workplace without influence to the work process. Investigated risk factors are: number of movements, static muscle work, force, work postures determined by the equipments and furniture and time worked without a break.

Diagrams of body postures and three scoring tables are used to make evaluation of exposure to risk factors. Position of each body part is observed and compared with the relevant diagram. The larger there is deviation from the neutral posture the higher will the score of each body part be. Summary scores are counted separately for the group A, i.e. upper arms, lower arms and wrists, and the group B, i.e. trunk, neck and legs. Then the muscle use and force scores are added to the obtained scores and these groups are combined and transformed to a general postural score ('grand score'). The latter score is compared to tables stating risk on four levels and actions needed as follows:

- Action level I: a score of 1 or 2 – posture is acceptable if it is not maintained or repeated for long periods;

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- Action level 2: a score of 3 or 4 – further investigation is needed and changes may be required;
- Action level 3: a score of 5 or 6 – investigation and changes are required soon;
- Action level 4: a score of 7 – investigation and changes are required immediately.

REBA is a survey method developed to assess posture for risk of MSDs (Hignett, 2000). This method is based on the worker's body observation and scoring of body postures warranting quick assessment of the postures of the neck, trunk, legs and upper limbs along with muscle function and the external loads experienced by the body.

Specially developed data sheet provides a process for the scoring. The data sheet and three scoring tables are used to make evaluation of risk factors. The posture should be assessed for each job task by assigning a score to each body part. Group A (trunk, neck and legs) postures and the Group B (upper arms, lower arms and wrists) postures for left and right are assessed using a posture scoring scale plus adjustment notes for additional considerations presented in the data sheet. Then the load / force and coupling factors and, finally, the activity are totaled. The REBA score is the sum of the totals obtained using the data sheet and three scoring tables. Degree of the risk is determined from the REBA Decision scale:

- REBA score 1 – risk level negligible;
- REBA score 2-3 – risk level low;
- REBA score 4-7 – risk level medium;
- REBA score 8-10 – risk level high;
- REBA score 11-15 – risk level very high.

Results of the assessment showed that REBA score of 2-3 meaning low risk level and RULA score of 1-2 meaning postures acceptable from the ergonomic viewpoint (straight trunk) had been determined only for 30% of workers. Trunk of other 70% workers was stooped at 15-20° angles when working. REBA score of 8-10 indicated high-risk level and RULA score of 5-7 showed that changes are required immediately for these at risk workers. Wrong postures had been found for workers of all occupations (captain, mechanic, deckhand and deckhand-operator). Such postures and most of the movements done by workers working in these postures should be considered as ergonomically wrong. Investigation of the intensity of physical work indicated normal physiologic workload and physiologic regeneration.

Final conclusion of the second stage was: a large percent of workers is at high risk and immediate measures are required.

Results of the investigation apparently showed that company's intention to raise workers' awareness regarding musculoskeletal problems and their solution is reasonable.

With reference to these results and striving to achieve possibly better outcome of the project the management decided to accomplish a special theoretic and practical training course as soon as possible. For this purpose program of theoretic course for ergonomic training titled 'Handworks performed on the floating devices and boats' was prepared. Authors of the program used relevant ergonomic training and boat workers training program. Duration of the course is 12 hours. Main topics included in the program are:

- Fundamentals of ergonomics, legal aspects of ergonomic risk assessment at an enterprise, practice of ergonomic risk assessment in EU states, indicators of occupational health (duration: 2 hours);

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- Risk factors and their influence on workers' health, fundamentals of the anatomy of the body, MSDs and measures for their prevention (duration: 3,5 hours);
- Safe working practices (from the ergonomic viewpoint): practical recommendations for prevention of musculoskeletal disorders (duration: 4 hours);
- Ergonomic risk assessment at the particular workplace, a workplace fitting for the employee (duration: 1,5 hours);
- Test and certification (duration: 1 hour).

The programme was approved by the director of the Lithuanian Labour Market Training Authority thus showing importance of the course.

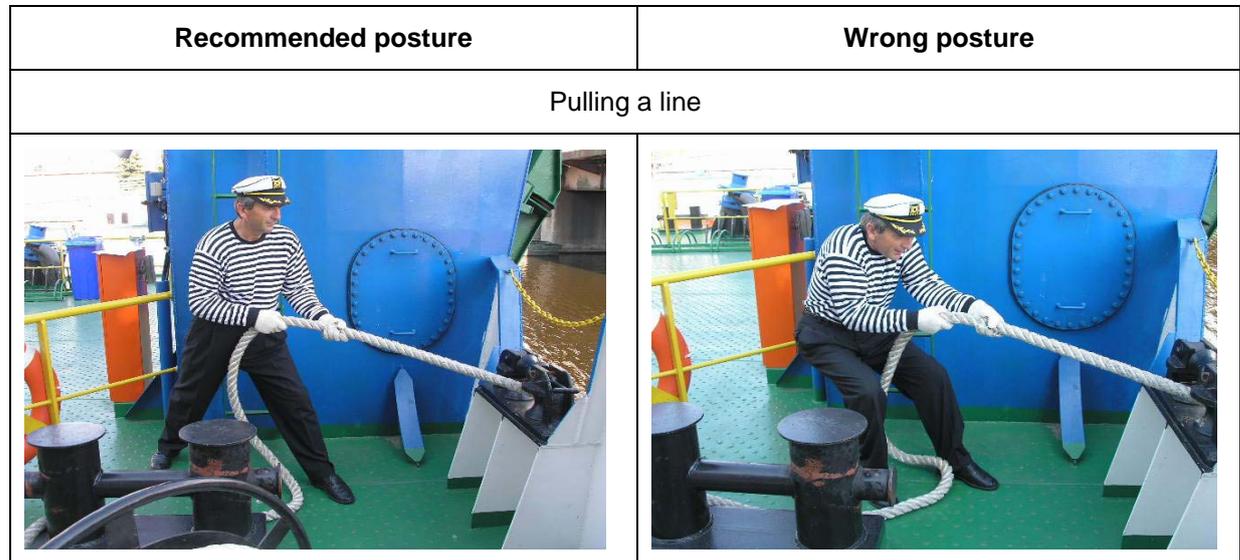
Trying to make the course more effective the project's working group developed a training material titled 'Prevention of MSDs on the floating devices and boats'. First, an ergonomic training material developed by Kaunas University of Medicine and Vilnius Gediminas Technical University was adapted to a shipping company needs with reference to the results of the investigation. Then it was improved by the material of the 'Lighten the load' campaign and NAPO films and illustrated with a set of photos titled 'Practical recommendations aimed to avoid back injuries with examples of proper performance of the works done on the boats'. Each set of photos illustrated recommended and wrong worker's postures when doing particular work normally performed on the boat (see Figures 1 and 2). Wrong postures were picked out from the results of the investigation.

Figure 1: Example of recommended and wrong deckhand-operator's postures when doing works normally performed on the boats (Source: State Labour Inspectorate of the Republic of Lithuania, 2009)

Recommended posture	Wrong posture
Maintenance of equipment	
	

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Figure 2: Example of recommended and wrong deckhand's postures when doing works normally performed on the boats (Source: State Labour Inspectorate of the Republic of Lithuania, 2009)



2.4. What was achieved?

Ergonomic training was accomplished in the end of August 2007. All 50 boat employees attended the course. Shift work on the boats enabled the management to organize sessions in such a way that workers could attend them being in service.

At the beginning of the course all trainees once more were familiarized with the investigation results.

Examples of these results also were useful when delivering material of the course. At the end of theoretic training the trainees' knowledge was tested using a questionnaire. A person that failed the test had to repeat it after 2 weeks.

Practical part of the course was carried out at the workplace where an employee had to apply the obtained knowledge in practice. The process was observed by the course tutor who helped the employees advising them on correct postures and correcting their mistakes.

Problems faced at this stage of the project were related to employees' habit to work in wrong postures that formed during their employment on the boats. They always started working in correct postures but after some time unconsciously changed to the wrong ones. It became obvious that altering of these habits would take a long time.

On the other hand, employees quickly understood the importance of the course and were willing to train for and use the practical skills.

Trying to evaluate effectiveness of the course ergonomic investigation and assessment of ergonomic risks was repeated two weeks after its practical part had been finished. Methods of investigation were used the same as before the course.

The results were good. Almost all workers were attempting to work in the correct posture (straight trunk) and do movements in ergonomically correct way.

Much better ergonomic indicators had been determined for almost all workers: REBA score of 2-3 (low risk level) and RULA score of 1-2 (postures acceptable from the ergonomic viewpoint).

It meant that fatigue during such improved work was 45% less than before training. Even those workers which met the training with hostility were convinced to alter their working habits and started using the correct working practices.

2.5. Success factors

The suggested method was a combination of ergonomic investigation, development of good quality illustrated ergonomic training material and theoretical training of employees to raise their awareness regarding musculoskeletal problems and their solution. This method was combined with sound practical training.

The training course was based on the results of the investigation, therefore enabling the management to fit their intervention to the shipping company needs. Workers involvement in the investigation and development of the training material and their familiarization with the results of the investigation stimulated motivation to attend the course and try to improve working practices.

An important role falls to collaboration between the company's management, representatives of the trade union, employees and safety experts and the latter skills.

2.6. Further information

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2.7. Transferability

This method could be successfully transferred to each economic sector in order to find solutions for prevention of musculoskeletal disorders.

3. References, resources:

Hignett, S., McAtamney, L., 'Rapid entire body assessment (REBA)', *Applied Ergonomics*, No. 31, 2000, p. 201-205.

McAtamney, L., Corlett, N., 'RULA: a survey method for the investigation of work-related upper limb disorders', *Applied Ergonomics*, No. 24 (2), 1993, p. 91-99.

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