

Laser -Doppler Perfusion Monitoring and Myotonometry as a Objective Methods to Test the Effect of the of the Physical and Balneological Agents on the Musculoskeletal Overuse Syndroms on Industry Workers.

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Background

Work related musculo-skeletal diseases (MSD) affecting the upper body and limbs are now recognized as one of the leading causes of worker pain and disability. The Fit for Work Europe study (2011) indicated that MSDs reduce the work capacity of at least half of the workers in Estonia. In 2009, the work capacity of 59 % of workers aged 15 - 64 was limited due to long-term problems with hands, legs, back or neck. In Estonia, MSDs constitute 80 % of all occupational diseases and are, therefore, one of the frequent causes of permanent loss of work capacity.

Centre of Excellence in Health Promotion and Rehabilitation by Tallinn University Haapsalu College promote the research based rehabilitative methods of the working-age population.

Aims

The paper is aimed at the methods how to test the need and measure the effect of physical and balneological therapies on the musculoskeletal overuse syndroms by way of example of industry workers in Haapsalu in Estonia.

Methodology

There are different methods to map the functional status and the environmental situation at the workplace.

1. Personal health status - Work Ability Index (WAI), Standardised Nordic questionnaires (incl. VAS) for the analysis of musculoskeletal symptoms. ENMG was included to diagnose the carpal and cubital tunnel syndroms.

2. Microcirculation (MC) of the extremities - crossed molecular beams'(CMBs), velocity and the quantitative analysis of post-occlusive reactive hyperaemia (PORH) measured with **laser-Doppler perfusion monitoring** on extremities .We used it to measure microcirculation before and after heat and balneological therapies in 2 groups. Mud (8 persons, an average age 53, the length of service 20,8 years) and local heat (8 persons, an average age 55, the length of service 19 years),

3. Muscle functions - **myometric method** to evaluate muscle conditions was used on 18 persons, an average age 50,6, the length of service 21,3 years, the average work day length 7,65 hours. All of them declared 2 or more topic pain , avarage pain was 4,75/10, 71% had pain more than 30 days.

4. Work place risk evaluation (furniture, indoor climate, noise, carbon dioxide concentration etc.).

Results

The post reactive hyperemia test (PORH) method showed positive reaction of MC on the extremities -the differences between rest and peak flow (RF-PF %) increased at the end of the treatment. In the local heat group after the first procedure RF-PF % was 67,02 % and after the last procedure 87,28%. In the hole body mud group RF-PF percentage was 29,10% and at the end of the treatment 38,54%. We found differences between mud and local heat group- velocity increased and CMBs decreased in the mud group and velocity decreased and CMBs increased in local heat group measured on the hands. Temperature 42 °C is a strong stressor on the MC but the individual variability for this reaction is very high even the rest flow is normal and the post occlusion peak flow is higher than rest flow on the individual.

Myometric method. We found the stiffness on the right hand- m. abductor pollicis brevis 33 % , m adductor pollicis 16% and m. trapezius stiffness 61,1% of the workers in this study.



Conclusions

PORH is a valuable method testing the microcirculation reactions. MC changes due to the balneological agents showed individual reactions that could be valuable planning futher rehabilitation incl. balneological agents (local heat , whole body mud).

Myometer allows the determination of the basic indicators of the skeletal muscle condition (stiffness and elasticity). The data are valuable for the early diagnosis of health disturbance possible caused by work and plan the rehabilitative treatment in early stage of overload caused MSD.

MSD questionnaires, objective methods and environmental measurements are useful to plan prevention and early rehabilitation before the disability appears.

Further research is necessary to understand the individual reactions to balneological agents measured by laser doppler.



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