Musculoskeletal Complaints in Broadcasting- and Sound-recording Engineers: Role of Ergonomic Factors and Work Organization

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Why musculoskeletal complaints in broadcasting and sound-recording engineers?

- The rates of musculoskeletal disorders are increasing, including in white collar workers.
- The musculoskeletal complaints are the earliest symptoms of musculoskeletal disorders, often preceding their development with more than a decade and it is important that work-related musculoskeletal disorders are preventable.
- It is well known that the injuries of the musculoskeletal system have a multifactorial etiology, but ergonomic factors and variety of organizational factors as high demands and low control are discussed in relation to increase in frequency of musculoskeletal complaints and disorders.
- The tasks of broadcasting and sound-recording engineers in radio production are mainly mental, pose high demands, require operation with technical equipment with mainly sitting work posture.

The aim of the study was to follow the rates and determinants of musculoskeletal complaints and disorders in broadcasting and sound-recording engineers.
Subjects and Methods

• The study included 168 broadcasting and sound-recording engineers (81 males and 87 females) with mean age $48 \pm 9.9$ yrs. and length of service $24.1 \pm 10.4$ yrs., working different shift work schedules.

• Job analysis and ergonomic evaluation of the workplaces was carried through observation, interviewing and chronometry of the basic workplaces. A questionnaire for the self-ratings of the employees for the work posture and workplace (work surface, work chair, leg space, etc.) was filled.

• The self-reported working conditions, psychosocial factors (21 questions), stress and strain sources (23 questions) were studied.

• The incidence and localization of musculoskeletal complaints was followed with the standardized Scandinavian questionnaire. The diagnosed by physician musculoskeletal diseases were reported, too.

• Statistical analysis was carried with SPSS.
An ergonomic assessment of the workplace

- The employees had no permanent work stations, but in both, sound-broadcasting and recording production they had to change two or more workplaces during the shifts, and in fact, there was no possibility for adaptation of the employees to a workplace in relation with their specific needs and requirements.

- Although there is sound-mixing panel at the workplace, the whole work is done on the computer configuration for sound-broadcasting and sound recording (with one or two monitors).
An ergonomic assessment of the workplace

• The postures of sound – broadcasting and sound – recording during sound montage with two monitors were often non-ergonomic.

  On the base of self-ratings according to 35% of the employees the size of the workplace is not enough. 34% of the respondents considered that the space for the legs under the plot is insufficient, 25% that it is impossible to adjust the height of the work chair, and 42% that it is impossible to adjust the height and tilt of the chair back.
Work characteristics

- The work requires intensive concentration – 92.3 %;
- Contact with a lot of people – 77.9 %;
- Continuous work in one posture – 83.9 %;
- Intensive work and insufficient breaks – 38.7 %;
- Work in unergonomic work posture and insufficient space – 23.8 %.

Sources of stress and strain – 8.1 ± 4.4

The most distributed were the following:

- Inadequate payment for the carried work (84.8 %);
- Poor condition of the air (70.9 %);
- Working with a lot of people (66.7 %);
- Noise at work place (65.5 %);
- Being not content with the shift work schedules (63.6 %);
- Working in inconvenient work posture (57.7 %);
- Lack of recognition for a well done job (56.4 %);
- Time pressure (46.1 %);
- A lot of responsibilities (43.2 %);
- Low latitude for decision making (38.8 %).
Health complaints – 8.5 ± 4.5

- Pains in the bones, joints and muscles - 70.1%
- Pains in the back - 65.2%
- Sleep disorders - 62.8%
- Anxiety - 62.2%
- Frequent fatigue - 57.3%
- Dizziness - 55.5%
- Burning and tearing eyes - 54.9%
- Pain in the chest - 48.8%

Mentally exhausted after work - 61.9%
Physically exhausted after work - 47.6%
Musculoskeletal complaints by location

Only 25.3% of the inquired subjects have no complaints, 14.7% have one complaint, 18.2% two complaints and 41.8% - three or more musculoskeletal complaints.

The rates of musculoskeletal complaints were higher in females (p=0.000) in comparison with males and in aging employees (p=0.067) in comparison to younger ones.

- The number of musculoskeletal complaints was significantly related to the sources of stress and strain (r=.38, 0.000).
- The higher number of musculoskeletal complaints was associated with higher subjective ratings of fatigue (r=.17, p=0.03).
35.1% of the employees reported diagnosed by physician musculoskeletal disorders as follows:
- 18.5% one diagnosed musculoskeletal disorder,
- 10.7% two disorders,
- 11% more than 3 disorders.

The rates of musculoskeletal disorders were significantly higher with the aging employees (p=0.033), but no significant gender differences were found.
Stepwise multiple regression analysis for the musculoskeletal complaints and disorders

<table>
<thead>
<tr>
<th>Variables</th>
<th>Predictor</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Number of musculoskeletal complaints</strong></td>
<td>Insufficient time for work breaks</td>
<td>.740</td>
<td>3.926</td>
<td>0.004</td>
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<tr>
<td></td>
<td>Specialized length of service</td>
<td>.555</td>
<td>3.138</td>
<td>0.014</td>
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<td>( r^2 ) for the model = 73.50 %, ( F = 11.195 ), ( p = 0.003 )</td>
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<tr>
<td><strong>2. Pains in the neck and shoulders</strong></td>
<td>Height and tilt of the chair back</td>
<td>.688</td>
<td>3.518</td>
<td>0.004</td>
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<td></td>
<td>Insufficient time for work breaks</td>
<td>.522</td>
<td>2.670</td>
<td>0.02</td>
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<td>( r^2 ) for the model = 49.70 %, ( F = 7.913 ), ( p = 0.006 )</td>
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<td><strong>3. Musculoskeletal disorders</strong></td>
<td>Non-ergonomic work posture</td>
<td>.673</td>
<td>5.675</td>
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<td></td>
<td>Strain by shift work schedules</td>
<td>.640</td>
<td>5.281</td>
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<td>Control</td>
<td>.319</td>
<td>2.858</td>
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<td></td>
<td>Decision making</td>
<td>-.304</td>
<td>-2.366</td>
<td>0.028</td>
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<tr>
<td>( r^2 ) for the model = 72.50 %, ( F = 16.826 ), ( p = 0.000 )</td>
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Conclusions

• The ergonomic assessment determined a number of inadequacies at the workplaces in relation to its equipment and organization - unsuitable chairs and work surfaces, inconvenient work postures, problems in arrangement of the workplaces, insufficient breaks during work, etc.

• More than 50% of the employees considered that are working in non-ergonomic posture and were not content with organization of shift work schedules, 46.1% worked often under time pressure, 43.2% had a lot of responsibilities, 38.8% low latitude for decision making, 38.7% considered that their work was intensive and the breaks insufficient.

• The found ergonomic and work organization problems, the non-ergonomic work posture, the insufficient work breaks and the age of the studied group are the most probable reasons for the considerable number of musculoskeletal complaints and disorders.
To reduce health risks of broadcasting and sound-recording engineers the following measures were proposed to the employer, some pointed to reduce the risks for musculoskeletal system:

- To improve workplace ergonomics and work conditions;
- Increase of the staff to provide sufficient breaks during work;
- Changes in the shiftwork schedules;
- Management of stress;
- Training of employees;
- Regular medical checks;
- Special attention for aging employees and the staff with chronic diseases, etc.

Thank you!