

MECHANICAL OVERLOAD OF THE UPPER EXTREMITY AND EXPOSED WORKERS

SOVRACCARICO MECCANICO DELL'ARTO SUPERIORE E LAVORATORI ESPOSTI

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 **Parole chiave:** elettromiografia di superficie (SEMG), disturbi dell'arto superiore, forza muscolare

Abstract

Background: Many diseases of the upper limbs have a high correlation between micro traumas awkward postures of upper limbs and activities performed with continuous and repetitive rhythms.

Objectives: Aim of the study is to assess the presence of upper limb's symptoms correlated with repetitive movements and muscle strain.

Methods: A clinical-anamnestic questionnaire was administered to a group of workers. The differences between the averages were evaluated through the Student T test. The frequency of the single variables was compared using Yates' Peason Chi Square test, using the Solo BMDP Statistical Software Program.

Results: Automotive industry workers showed a higher incidence of diseases than white collar. Significant difference was also evident between the parameters recorded before the work shift and the ones recorded at the end of the work shift only among the workers.

Conclusions: The presence of specific symptoms seems to suggest that the upper limb's diseases and the activities characterized by repetitiveness, incongruent postures and strength are correlated.

Abstract

Introduzione: Molti disturbi e patologie degli arti superiori presentano un'elevata correlazione con la frequenza di microtraumi e l'assunzione di posture incongrue a carico degli arti superiori, dovute ad attività eseguite con ritmi continui e ripetitivi.

Obiettivi: Scopo dello studio è valutare la presenza di sintomi a livello dell'arto superiore correlati con i movimenti ripetitivi e la tensione muscolare.

Metodi: E' stato somministrato un questionario clinico-anamnestico ad un gruppo di lavoratori. Le differenze tra le medie ottenute sono state valutate mediante il test t di Student e la frequenza delle singole variabili è stata poi confrontata usando il test del Chi-quadrato di Peason di Yates, utilizzando il programma Solo BMDP Statistical Software.

Risultati: Gli operai hanno mostrato una maggiore incidenza di malattie rispetto agli impiegati. E' stata notata inoltre una differenza significativa tra i parametri registrati prima del turno di lavoro e quelli registrati alla fine tra gli operai, ma non tra gli impiegati.

Conclusioni: Dai risultati ottenuti si evidenzia che lo svolgimento di attività richiedenti uno sforzo fisico elevato e caratterizzate da ripetitività e assunzione di posture incongrue può effettivamente portare allo sviluppo di sintomi a livello degli arti superiori.

Background

Since the beginning of the '80s occupational diseases of the upper limbs, known in literature as WMSDs (Work Related Muscle Skeletal Diseases), have become a widely studied phenomenon (1, 2).

According to INAIL tables, reported in GU n. 134,10/06/2004, there are many diseases with a high correlation between micro traumas awkward postures of upper limbs and activities performed with continuous and repetitive rhythms for at least half of the work shift (3, 4).

Surface electromyography (SEMG) can help Occupational Physician (5). Surface technique seems favorable because it shows moment, duration and importance of muscle activation during the same activation or when an indication of the overall activity of one or more muscles is necessary.

Objectives

Aim of the study is to assess the presence of upper limb symptoms correlated with repetitive movements and muscle strain.

Methods

A clinical-anamnestic questionnaire with particular attention to upper limb symptomatology (6), the familiarity and the carpal tunnel syndrome story was administered to 39 automotive industry workers and 17 white collars employed in the same company.

From the initial group, 12 production line workers and 13 white collars, comparable for age, seniority, smoking habit, coffee consumption and BMI were selected. They were asked to indicate through a score from 1 to 10 the muscle strain for every performed action according to Borg CR10 (7).

The differences between averages were evaluated through the Student T test.

The frequency of the single variables was compared using Yates' Peason Chi Square test, realizing a 2x2 table, using the Solo BMDP Statistical Software Program. 6 random selected subjects between the production line workers and 6 controls underwent SEMG. Recording was carried out during 20 sec of maximal contraction, during the work shift, at the beginning and at the end.

Results

The number of workers with wrist pain, nocturnal and diurnal paresthesia, right or both hands pain resulted significantly higher ($p < 0.001$) than the number of white collars, as well as the number of laborers with right or both hands weakness ($p < 0.01$) and shoulder pain ($p < 0.05$).

The comparison of answers obtained at the Borg scale showed a higher average score in automotive industry workers compared with white collars ($p < 0.0001$); strain perceived by white collars was scored between 0 and 5 (absent-high), while production line workers' one was scored between 5 and 10 (high-maxim).

As for SEMG, before the work shift there was no difference between the groups, while there were differences at the end of the work shift ($p < 0.01$). The comparison of data resulting from the questionnaire did not show a higher prevalence among the workers: neck and trapezius pain or discomfort by the left or right side, left and right elbow pain; however a significant difference was evident between the parameters recorded before the work shift and the ones recorded at the end of the work shift among workers and not among white collars.

Conclusions

The presence of specific symptoms among workers suggest that these diseases and the activities characterized by repetitiveness, incongruent postures and strength are correlated.

The effort of assembly line workers is higher than the effort of white collars.

Statistically significant results between values recorded by SEMG at the beginning and at the end of the work shift among the group of workers confirm the presence of upper limb muscle strain, which mainly involves forearm muscles according to the kind of movement and its frequency.

On the contrary, this strain is not recorded among white collars, because no significant difference appears in the 3 recordings.

From these results we infer that the airbag production activity requires a strain perceived from "high" to "maximal"

(5 and 10 according to Borg scale) and that can lead to developing upper limb symptomatology, with particular regard to the district-hand wrist.

Due to SEMG, it was possible to highlight how, performing their duties, assembly line workers really present muscle strain in the recording performed at the beginning and at the end of the work shift, which doesn't occur among white collars.

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