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PREVALENCE OF TENOSYNOVITIS AND OTHER OCCUPATIONAL INJURIES OF UPPER EXTREMITIES IN REPETITIVE WORK

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ABSTRACT

Diseases of the upper extremities have become an occupational health problem in Finland during the last few years. The relationship between the diseases and work has not been clearly defined.

The purpose of this investigation was to determine the prevalence of soft tissue diseases in the neck, arms and hands of workers doing repetitive tasks. Shop assistants of the same sex and age formed the reference group.

The 152 factory women and 133 female shop assistants were interviewed about symptoms and given a clinical examination of the neck and upper extremities. The work was ergonomically analysed. The factory work consisted of extremely wide finger positions and movements, which averaged about 25 000/day, and of static muscle work by the arms. The shop assistants' work consisted of variable movements.

The tension neck syndrome was common in both groups and there was no significant difference between them with respect to the neck area. In the shoulders, arms and hands the number of different syndromes was significantly higher for the factory workers than for the shop assistants. The relationship between some work load factors and diseases of the upper extremities is highly probable.

During the past several years diseases and complaints of the upper extremities have increased and have become an occupational health problem in Finland, especially in chemical, textile and food production, which are typical semimechanised industries. The physical work load of the jobs involved is fairly light, but the proportion of repetitive manual tasks is high.

The situation is not only peculiar to Finland. The existence of similar problems has also been reported in investigations concerning cash register operators[3] and assembly plant workers[2] in Japan, telegraphers in Australia[1], and tea packers in the U.S.S.R.[4].

The relationship between the complaints and work load factors has not yet been clearly defined since most investigations have been made without a proper reference group.

The purpose of this investigation was to compare the health status of the neck and upper extremities between two occupational groups: assembly plant workers in a food production factory and shop assistants with variable tasks.

We also analysed the characteristics of assembly-line work in order to define the relationship between work load factors and upper extremity symptoms.

SUBJECTS AND METHODS

The subjects were 152 female assembly line workers, whose average age was 39 (S.D. ± 9.3 years). As a reference group 133 female shop assistants from the same town were examined. Their average age was also 39 years (S.D. ± 10.9 years). Full time cashiers were excluded. No persons with rheumatoid arthritis or connective tissue disease, or those who had experienced a trauma to the hand within the last two years, were accepted to the study. The average length of employment of the assembly-line workers was 5.7 years, and of the shop assistants 13.5 years.

The methods used in this investigation will be described in detail elsewhere and therefore they are only briefly outlined in this paper. A specially trained physiotherapist performed the clinical examinations by palpation and different test movements. She recorded the results, and the diagnosis was made afterwards, according to predetermined criteria.

The work load factors were ergonomically analysed at the workplace by a group comprising a foreman, a worker, a labour safety representative and an occupational physiotherapist and from a videotape by a work study engineer and a physician.

RESULTS

Assembly-line work

In the food production factory the work alternated between manual and mechanical phases. The workers rotated tasks daily and worked for 0.5–2 hours in each phase of the tasks, so that theoretically every worker had to do all the jobs in her department.

Some common overloading factors were found in most tasks: arms and hands had to be repeatedly used at the pace of the machines, fingers and hands were used in extreme positions, much of the muscle work was static etc. In addition work movements averaged 25 000/day. The weight of loads lifted varied from 200 g to 27 kg, the average amount lifted daily being about 5 000 kg. The lifting heights varied from 19 cm to 160 cm.

Another hazard which loaded the workers was gloves that were too large and made grasping more difficult. Furthermore the workers were sometimes transferred temporarily to other production departments, where they had to do unfamiliar jobs and perform untrained work movements.

Shop work

The shop assistants worked in different shops of a big department store chain where they served the public. They had to stand during their work, which was physically light. The movements of hands varied and were non repetitive.

Clinical examination

In the analysis of the results of the clinical examination, the syndromes were divided into three groups: those of (a) the neck, (b) the shoulders and arms, and (c) the hands.

Tension neck syndrome was found in 57 (37%) of the factory workers and 38 (29%) of the shop assistants (Table 1). There was no significant difference between the two occupational groups. The total number of other neck diseases was insignificant.

TABLE 1
Syndromes of the neck region.

Diagnosis	Factory workers (N = 152)	Shop assistants (N = 133)
Tension neck	57	38
Scalenus anticus syndrome	5	–
Radiculitis	1	3
Total	63	41

p = N.S.

The prevalence of syndromes in shoulders and arms was significantly ($\chi^2 = 10.80$; $p \approx 0.001$) higher for the factory workers than for the shop assistants (Table 2). Of the total of 27 syndromes, 23 were found in factory workers and 4 in shop assistants. Sixty-five per cent of the factory workers' syndromes appeared on the right side.

TABLE 2
Syndromes of shoulders and arms.

Diagnosis	Factory workers (N = 152)	Shop assistants (N = 133)
Disease in the shoulder	9	1
Epicondylitis lateralis/medialis	8	3
Pronator teres syndrome	2	–
Carpal tunnel syndrome	4	–
Total	23	4

$\chi^2 = 10.80$; $p \approx 0.001$

The tendomuscular mechanism of the hands formed an object of interest. The symptoms included peritendinitis and tenosynovitis of the hand and finger extensor tendons, the extensor pollicis brevis, and abductor langus tendons, as well as similar symptoms on the flexor side and in the muscular trunk. Because of the similarity and coexistence of the symptoms and the difficulties in locating them exactly, they have been combined in the results.

Affections of the tendomuscular mechanism of the hands were found in 85 factory workers and 18 shop assistants (Table 3). The difference is highly

TABLE 3
Affections of the tendomuscular mechanism of the hands.

Affected hand	Factory workers (N = 152)	Shop assistants (N = 133)
Right hand	38	3
Left hand	22	14
Both hands	25	1
Total	85	18

$\chi^2 = 53.41$; $p = 0.001$

significant ($\chi^2 = 53.41$; $p < 0.001$). The right hand of the factory workers was affected in 45% of the cases, and both hands in 29%. The shop assistants had more symptoms in their left hand.

Altogether 197 different symptoms were registered in the factory workers. Of these 96 (49%) were in the thumb region, 53 (27%) on the II – V finger extensor region, and 48 (24%) on the flexor side. The shop assistants had a total of 44 hand symptoms, of which 22 (50%) occurred in the thumb, 14 (32%) in the II – V finger flexors, and 8 (18%) in the extensors.

During the last year 42 factory workers and 4 shop assistants have been treated for tenosynovitis by a physician ($\chi^2 = 30.23$; $p < 0.001$).

CONCLUSIONS

The factory workers with repetitive work tasks had significantly more syndromes in their upper extremities than the shop assistants. On the contrary, neck symptoms were almost equally common in both occupations. As the women live in the same town and under fairly similar conditions, it seems highly probable that the repetitive asembly-line work played some role in the aetiology of the symptoms and syndromes. Due to the work task rotation no single load factor could be established as a cause of illnesses. The diseases and affections seem to be the sum of the fast repetition work movements, the extreme positions needed for the fingers, and the quantity of static muscle work. From the ergonomic point of view the problem was largely due to the improper production methods, machines and work sites.

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