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# BACK SYMPTOMS IN CONCRETE REINFORCEMENT WORKERS

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## ABSTRACT

In a cross-sectional study, 223 male Finnish concrete reinforcement workers, engaged in heavy physical work including prolonged stooping, aged 19–64 years, were interviewed about back symptoms on an ordinary working day. Ache was reported by 51%, fatigue by 47%, stiffness by 41% and sharp pain by 13% of the workers. The occurrence of stiffness ache and sharp pain increased by age, while fatigue was most common in the middle age groups. Fatigue was clearly associated with stiffness ($p < 0.001$) and ache with sharp pain ($p < 0.005$). The common occurrence of back symptoms and their increased incidence towards the last hours of the working day suggest that concrete reinforcement work exerts an adverse effect on the back.

The reinforcement of concrete structures consists of the preparation and assembly of steel rods to form skeletons, upon which concrete is later poured by other workers. The reinforcement work is very demanding for the back tissues. It involves dynamic loads from lifting and pulling long steel rods, as well as static loads from tying rods together in fore-bent and bent-double postures[8].

## SUBJECTS AND METHODS

In this paper we present the results on back symptoms from a cross-sectional study of 223 male Finnish reinforcement workers, aged 19 to 64 years. The workers were interviewed by a physiotherapist about the symptoms related to the locomotor organs before a clinical examination. They were requested to consider the last four weeks and were asked whether or not they had experienced "fatigue", "stiffness", "ache" or "sharp pain" in the back during an ordinary working day. Fatigue was defined as a feeling of weakness or slight discomfort in the back; stiffness as a subjectively recognized diminished range of back movement or slowness of movement; ache as a dull pain in the back, slow in appearance and often slow in fading away; and sharp pain as a sudden, often strong, pain in the back[9]. The workers were also asked about their experience of any of these four symptoms during the different hours of the day[10].

## RESULTS

The occurrence of some back symptom during an ordinary working day reached a peak during the last hours of work (67%) and the hours immediately after that. Back symptoms during the night were reported by 17% of the men; the symptoms were more common in the morning before work than during the forenoon work shift (Fig. 1).

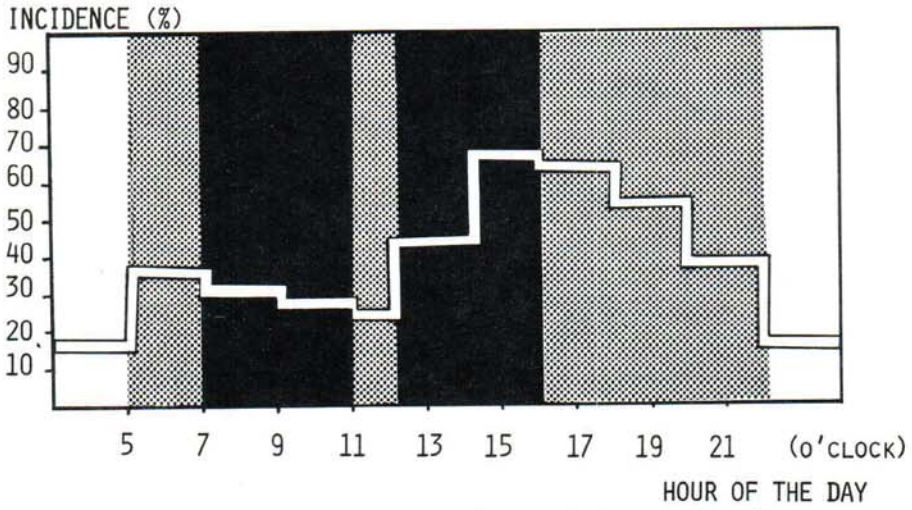


FIG. 1 – Back symptoms before, during and after a working day.

Of the four back symptoms investigated, ache (51%), fatigue (47%) and stiffness (41%) were reported clearly more commonly than sharp pain (13%). Twenty-five per cent of the men did not report any of the four symptoms. The occurrence of ache, stiffness and sharp pain increased with age, while fatigue was reported most commonly in the middle age groups (Fig. 2).

TABLE 1
Relation between fatigue and other back symptoms.

| Symptom | Per cent of men | | Significance |
|---|---|---|---|
| | With fatigue (N = 104) | Without fatigue (N = 119) | |
| Stiffness | 61 | 24 | $P < 0.001$ |
| Ache | 55 | 47 | NS |
| Sharp pain | 18 | 9 | $P < 0.05$ |

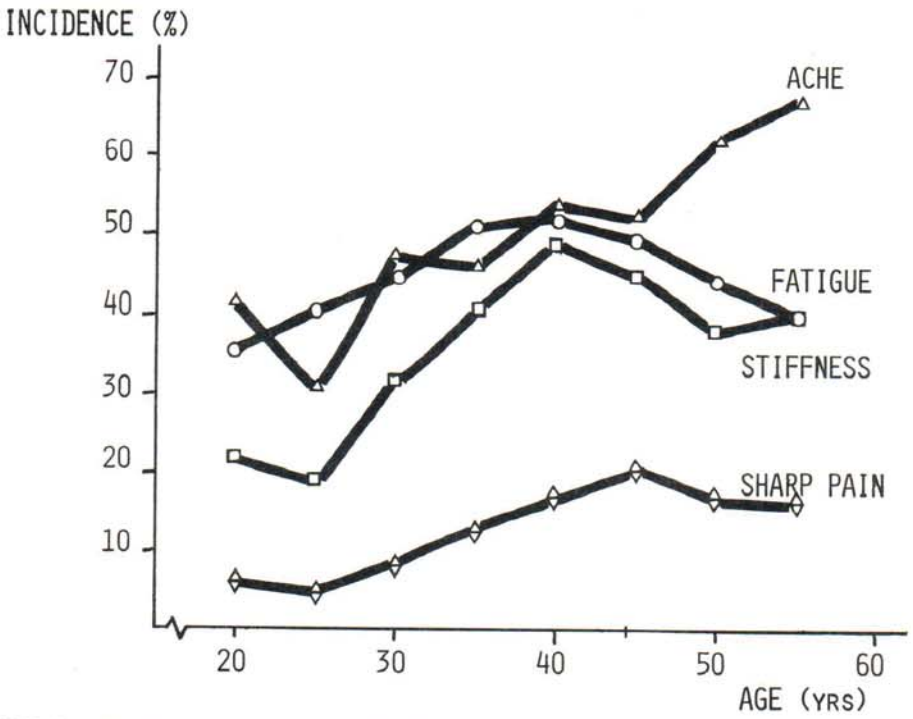


FIG. 2 – Incidence of various back symptoms during a working day by age.

The relations between the four back symptoms were analysed by comparing the occurrence of other back symptoms in men with and in men without a certain symptom. Fatigue was found to be strongly related to stiffness ( $\chi^2 = 31.5$, $p < 0.001$). Sharp pain was related to fatigue ( $\chi^2 = 3.88$, $p < 0.05$), stiffness ( $\chi^2 = 5.29$, $p < 0.05$) and ache ( $\chi^2 = 9.37$, $p < 0.005$). The other relations were statistically nonsignificant (Tables 1, 2, 3 and 4).

TABLE 2.
Relation between stiffness and other back symptoms.

| Symptom | Per cent of men | | Significance |
|---|---|---|---|
| | With stiffness (N = 91) | Without stiffness (N = 132) | |
| Fatigue | 69 | 31 | $P < 0.001$ |
| Ache | 57 | 46 | NS |
| Sharp pain | 20 | 9 | $P < 0.05$ |

TABLE 3
Relation between ache and other back symptoms.

| Symptom | Per cent of men | | Significance |
|---|---|---|---|
| | With ache (N = 113) | Without ache (N = 110) | |
| Fatigue | 50 | 43 | NS |
| Stiffness | 46 | 35 | NS |
| Sharp pain | 20 | 6 | $P < 0.005$ |

TABLE 4
Relation between sharp pain and other back symptoms.

| Symptom | Per cent of men | | Significance |
|---|---|---|---|
| | With sharp pain (N = 30) | Without sharp pain (N = 193) | |
| Fatigue | 63 | 44 | $P < 0.05$ |
| Stiffness | 60 | 38 | $P < 0.05$ |
| Ache | 77 | 47 | $P < 0.005$ |

## DISCUSSION

The occurrence of low-back pain has been investigated both in general populations[2,3] and in specific occupational groups[1,4,7]. In most studies the concept of "low-back pain" has been used. In an attempt to shed further light on the occurrence of back symptoms we decided to use four specific symptoms, which we chose according to our previous experience. The entities used were easily understood by the investigated workers; if necessary the questions were further explained according to the definitions given above.

As many as half of the concrete reinforcement workers reported experience of fatigue, stiffness and ache in the back during an ordinary working day. This result may be tentatively compared to 40-59-year-old Danish males, 26% of whom reported experience of low-back pain during the previous 12 months[2]. The occurrence of back symptoms in reinforcement workers was found to increase towards the end of the working day. This is probably an indication of the demands on the back both from maintaining upright postures throughout the day, as from the physical demands of reinforcement work.

In eight occupational groups studied by Magora unexpected, sudden maximal physical efforts[6], weight-lifting and bending[5] were most commonly incriminated as causes of low-back pain. Low-back pain was more common in persons who had to keep the same posture throughout the working day than in persons able to sit down briefly now and then[7].

There is some evidence that psychological factors contribute to the occurrence of back symptoms, but it is evident that the psychological factors are

less important than the physical ones in the etiology of low-back pain for occupational groups engaged in heavy physical work[9].

It is known that the incidence of low-back pain syndromes reaches a peak at the age of 40 to 45 years. After this the syndromes appear less commonly even if the prevalence of radiologically detectable lumbar disc degeneration increases. Among the concrete reinforcement workers only the symptom of fatigue showed maximal occurrence in the middle age groups. Stiffness, ache and sharp pain all became more common with rising age, even from 45 years onwards. It is probable that the older men now exposed to the physical demands of reinforcement work, would experience fewer symptoms in lighter work.

To our knowledge a relationship between various back symptoms in occupational groups has not been previously reported. This is probably due to the difficulties in discerning clear entities among the various subjective sensations in the back.

The data gathered in our study show a clear relationship between the sensations of fatigue and stiffness. Fatigue was 2.2 times more common in men with stiffness than in men without, while stiffness was 2.6 times more common in men with fatigue than in men without. The "pain" symptoms, ache and sharp pain, were clearly related to each other, but this relation was not as strong as that between fatigue and stiffness.

It is possible that these associations may give some clues to the mechanisms behind low-back symptoms, but it is not yet possible to draw any clear conclusions.

## REFERENCES


1. *Anderson, J.A.D. and Duthie, J.J.R.* Rheumatic complaints in dockyard workers. Ann. Rheum. Dis., **22** (1963) 401–409.
2. *Gyntelberg, F.* One-year incidence of low-back pain among male residents of Copenhagen aged 40–59. Dan. Med. Bull., **21** (1974) 30–36.
3. *Kellgren, J.H., Lawrence, J.S. and Aitken-Swan, J.* Rheumatic complaints in an urban population. Ann. Rheum. Dis., **12** (1953) 5–15.
4. *Lawrence, J.S. and Aitken-Swan, J.* Rheumatism in miners. Part 1: Rheumatic complaints. Br. J. Ind. Med., **9** (1952) 1–12.
5. *Magora, A.* Investigation of the relation between low-back pain and occupation. III. Physical requirements: sitting, standing and weight lifting. Ind. Med., **41** (1972) 5–9.
6. *Magora, A.* Investigation of the relation between low-back pain and occupation. IV. Physical requirements: bending, rotation, reaching and sudden maximal effort. Scand. J. Rehabil. Med., **5** (1973) 186–190.
7. *Magora, A.* Investigation of the relation between low-back pain and occupation. Scand. J. Rehabil. Med., **6** (1974) 81–88.
8. *Saari, J. and Wickström, G.* Loads on back in concrete reinforcement work. Scand. J. Work Environ. Health, **4** (1978) suppl. 1, 13–19.
9. *Wickström, G., Hänninen, K., Lehtinen, M. and Riihimäki, H.* Previous back syndromes and present back symptoms in concrete reinforcement workers. Scand. J. Work Environ. Health, **4** (1978) suppl. 1, 20–28.
10. *Wickström, G., Nummi, J., Wükeri, M. and Riihimäki, H.* Betoniraudoittajat. Osa 2: Kliininen tutkimus. Työterveyslaitoksen tutkimuksia No 98, Helsinki 1975, p. 86. (In Finnish)