

Back complaints and findings in transport workers performing physically heavy work

by Klaus Undeutsch, MD,¹ Karl Heinz Gärtner, MD,² Tuulikki Luopajarvi,³ Raimund Küpper,¹ Martti J Karvonen, MD, PhD,¹ Ingeborg Löwenthal, MD,² Joseph Rutenfranz, MD, PhD¹

UNDEUTSCH K, GÄRTNER KH, LUOPAJÄRVI T, KÜPPER R, KARVONEN MJ, LÖWENTHAL I, RUTENFRANZ J. Back complaints and findings in transport workers performing physically heavy work. *Scand j work environ health* 8 (1982): suppl 1, 92-96. Transport work at an airport promotes the appearance of back diseases because of the lifting, carrying, pulling, and pushing of loads in limited spaces. To clarify the nature of back disorders in such a group, a standardized interview for detecting subjective previous and present back symptoms was made of 366 transport workers, and 134 were given a clinical orthopedic examination for detecting objective findings. Sixty-six percent of the interviewed workers reported current back symptoms; these symptoms correlated significantly positively with height, age, and length of transport work experience. Eighty-three percent of the workers with present back symptoms also complained of former back pain. Validity tests between the interview and the clinical examination showed a sensitivity of 86% and a specificity of 31%. The results of our study suggest (i) that according to the high sensitivity the used interview is a valuable screening method for detecting back disorders, and (ii) that selection of workers according to the criteria of our results may be expected to lower the prevalence of back complaints.

Key terms: back symptom, individual factors, screening methods.

Transport work at airports can be considered heavy physical work. In spite of all mechanization this work is characterized by frequent bending and the lifting and carrying of loads, which often have to be done under a very low ceiling in awkward positions. The work load and strain, the isometric muscle strength, and the musculoskeletal health of a group of transport workers at a large airport have recently been subjected to a series of studies (4, 8); the present study belongs to that series.

Subjective health was determined with a standardized interview and objective health with a clinical orthopedic examination of the musculoskeletal system. Furthermore, one of the aims of the study was to compare the two methods and determine the validity and the reliability of the used interview.

Material and Methods

Subjects

At a large airport about 800 men were engaged in loading and unloading the aircraft flying passenger and cargo routes. More than 50% of these men were foreign workers coming mainly from Turkey, Yugoslavia, Italy, Spain, and Greece. Nearly half of this population served as subjects in the study. The mean age of the 366 workers participating in this study was

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36 a (SD $\pm$ 8), and the age range was 19–61 a. The median age was identical to the mean age. We had data about the work experience in the present occupation; the mean experience was 6.2 a with a range of 1–22 a.

Interview

The transport workers were interviewed by two physicians using a structured interview in accordance with Wickström et al (9) for detecting previous and present orthopedic complaints. A priority in this interview was given to back trouble. The main questions in the present study were as follows:

a Previous back symptoms: "Have you ever had back trouble?" "When was the first time, when the last time?" "Have you ever had lumbago or sciatica, first time, last time?" "Have you been absent from work because of back symptoms during the last 12 months? How long?"

b Present back symptoms during ordinary workdays (of the last four weeks): "Do you experience the following symptoms: Fatigue? Stiffness? Ache? Sharp pain? Lumbago? Sciatica?" "At what time of the day do you feel these back symptoms: continuously during work and rest, during workhours, during rest?" "Are there factors which increase or decrease your back symptoms such as: work itself, day off, changing body position, vibration, coughing, bending, weight lifting?"

The questions were easily understood. If necessary, they were explained further.

Clinical orthopedic examination

For 134 transport workers a standardized clinical orthopedic examination was performed. It was carried out by a specialized physical therapist and two physicians. The following functional examination methods were used: observation, assessment of active and passive movements, some special test movements, isometric muscle contraction against resistance, muscle stretching, and palpation for muscle tone, hardening, and sore spots.

Statistical methods

For various comparisons chi-square and linear regression were applied, using the SPSS (Statistical Package for the Social Sciences) program.

Results

Interview

Previous back syndromes. Back complaints at some time in life (previous back syndromes) were reported by about 56 % of the transport workers. The prevalence of previous back symptoms increased significantly from the age of 45 on ($p = 0.02$). There was a significant positive correlation between the prevalence of back symptoms and height ($p = 0.048$). The previous back complaints were classified in the syndromes of back insufficiency, lumbago, and sciatica. Table 1 presents the prevalence of these back syndromes and their combinations by age groups.

The average age of the workers at first appearance was 32 a for back insufficiency, 33 a for lumbago, and 35 a for sciatica. The

Table 1. Prevalence (%) of previous back syndromes and their combinations by age of 366 transport workers.

Back syndrome	Age groups (a)			
	≤ 24	25–34	35–44	≥ 45
Back insufficiency (N = 182)	46.9	46.0	51.3	56.9
Lumbago (N = 63)	12.5	16.1	17.7	21.6
Sciatica (N = 33)	3.2	8.9	9.5	12.0
Back insufficiency & lumbago (N = 47)	9.4	14.5	12.7	11.8
Back insufficiency & sciatica (N = 24)	0	6.5	7.0	10.0
Lumbago & sciatica (N = 8)	0	0.8	3.2	4.0
Back insufficiency, lumbago & sciatica (N = 8)	0	0.8	3.2	4.0

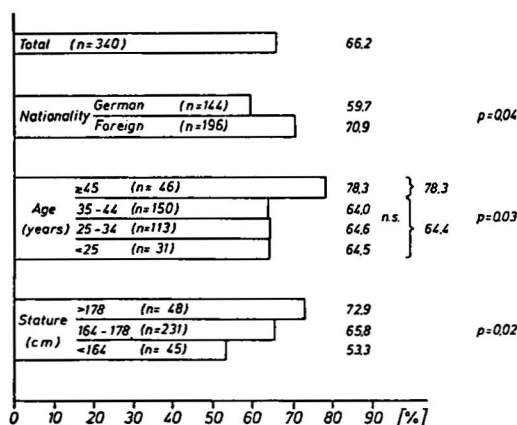


Fig 1. Prevalence (%) of present back complaints (usually present during an ordinary workday). [The percentages relate to each subpopulation ($n \leq 100\%$)]

Table 2. Prevalence (%) of objective back findings at the examination.

Findings	%
Anatomic	
Scoliosis of thoracic spine	34
Lordosis of lumbar spine	25
Kyphosis of thoracic spine	21
Scoliosis of lumbar spine	21
Functional	
Symmetric mobility when bending to side	38
Painful palpation in interspinal space	23
Symmetric mobility bending forward	22
Painful palpation over spinal process	18
Painful palpation in SI-joints	15
Bending to side	13
Bending forward painful	10
Painful palpation paraspinally	9
Bending to side painful	9
Bending forward Th XII — S I	1

association between duration of transport work and prevalence of previous back syndromes was — when age was controlled — not significant.

Present back symptoms. During ordinary workdays of the last four weeks 66 % of the interviewed workers experienced back symptoms (fig 1). The prevalence of these symptoms did not show any important differences for the age groups until the age of 45; but it increased markedly thereafter ($p = 0.03$). According to height the prevalence increased significantly; 53 % of the persons with a stature of less than 164 cm showed present back symptoms, as did 73 % of the persons with a height of more than 178 cm. The 225 workers with present back symptoms commonly reported the occurrence of symptoms when they lifted loads (75 %) and in bended body positions (61 %). Changing body position (71 %) and absence of work (one or more days) were relieving factors for back symptoms. Sixty-one percent felt the back symptoms during work, 4 % during rest, and 35 % during both work and rest. Vibration was an aggravating factor for 10 %, coughing for 15 %.

The data on present back symptoms were analyzed as the data on previous back syndromes for a possible effect of transport work through comparison of workers of similar age but different lengths of experience in transport work. The association between length of transport work and occurrence of back symptoms was significant ($p = 0.035$).

Twenty-four percent of the interviewed workers reported sick leave due to back disorders during the past 12 months: 9 %

Table 3. Present and previous back pain reported in the interview and functional back findings at examination ($N = 98$).

Examination	Interview		Total
	Back complaints negative	Back complaints positive	
Back findings absent	9 (31 %) (true negatives)	20 (69 %) (false positives)	29 (100 %)
Back findings present	10 (14 %) (false negatives)	59 (86 %) (true positives)	69 (100 %)
Total	19	79	98

less than one week, 31 % between one and two weeks, 39 % between two and four weeks, and 21 % more than four weeks.

Status

The list of the examined anatomic and functional back signs of the clinical orthopedic examination and their prevalences is presented in table 2 for 134 transport workers. Subjects with anatomic anomalies (for example: scoliosis and kyhposis) had no more functional findings than the other subjects.

For 98 transport workers complete interview data were also available. Age, nationality, height, weight, and experience in present occupation showed no significant associations with the back findings. Seventy-five percent of the workers who reported back trouble (previous and present) also had positive back findings in the clinical orthopedic examination; 25 % did not.

Assessment of validity

The uncertainty of information collected by interview stimulated us to use the clinical examination as a more objective method for assessing the validity of the interview. The sensitivity and specificity of the interview are shown in table 3.

From table 3 it can be seen that the interview was a relatively sensitive test, ie, most of the workers with present back findings in the examination had subjective back complaints. However, many workers with absent back findings were mistakenly identified as subjects with positive back complaints (poor specificity). In addition it is clear from table 3 that transport workers with positive back complaints in the interview also had a positive back finding in the orthopedic examination three times as often as a negative finding.

Assessment of the reliability of the interview

According to the arguments of Carmines & Zeller (1) and Nunnally (6) the coefficient alpha approach is the best for estimating reliability. This technique requires only a

single test administration. The value of alpha depends on the average interitem correlation and the number of items in the scale. Specifically, as the average correlation among items increases and as the number of items increases, the value of alpha increases.

There is still discussion about what level of reliability is satisfactory. It is difficult to specify a single level that should apply in all situations. As a general rule, many authors believe that reliabilities should not be below 0.75 for widely used scales. At that level, correlations are attenuated very little by random measurement error. The interview questions on the back resulted in an alpha of 0.796.

Discussion

The methods and criteria presented in this paper are intended as screening methods for use in epidemiologic surveys of musculoskeletal disorders. These methods are not intended as a substitute for the clinical examination of patients with manifest symptoms. The nature of the screening principle and the procedure limits the number and type of tests and examinations that can be applied in this kind of survey. The diseases and disorders included in this survey have been selected on the basis of a known or anticipated relation to work. Therefore inflammatory diseases such as rheumatoid arthritis were not included.

In our group back complaints were more prevalent than in some occupations studied by Magora (5). On the other hand the prevalence was lower than that of the concrete reinforcement workers studied by Wickström et al (9), especially for lumbago and sciatica.

According to our anthropometric results, tall stature was a risk factor for back symptoms. Three epidemiologically oriented studies by Hult (3), Rowe (7) and Chaffin & Park (2) revealed no specific risk in back syndromes for fat or thin and tall or short subjects. For special jobs the situation may be different. Airport transport workers do their job in a low, narrow space. Therefore it is no wonder that, in our study, the taller subjects had

a higher prevalence of back symptoms. Another finding of significance in our study was the increasing frequency of present back symptoms with longer experience in present job, independent of age. Age also played an important role for the prevalence of previous back syndromes and present back symptoms. We observed a marked increase in the prevalence for workers 45 and older.

The results of the clinical orthopedic examination showed that the interview and status gave congruent information ($p = 0.03$). In contrast to the interview, individual factors such as nationality, height, weight, age, and years of experience in transport work did not play an important role.

The assessment of validity of the interview resulted in 86 % true positives and 14 % false negatives. Therefore the interview is a suitable method for screening workers with clinical back findings. But if one wishes to detect all subjects with back trouble, one must apply the interview and examine the clinical orthopedic status.

The reliability of the interview was at a level of 0.8. This level is satisfactory. The interview provides a valuable epidemiologic tool.

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