



High prevalence of foot problems in the Danish population: A survey of causes and associations[☆]

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ABSTRACT

Objective: To determine the prevalence and severity of foot pain and deformity and the associated risk of leg and low back pain.

Method: A cross-sectional postal survey was conducted among a randomly selected sample of 2100 adult Danish inhabitants (18–80 years of age). Participants reported 1-month period prevalences of foot, lower leg, knee, hip and back pain.

Results: Responder rate was 79.6%. Prevalence of foot pain was 30.4% with a total of 55.9% reporting pain in the foot, leg or back lasting more than 1 day within the previous month. Foot pain lasting more than 1 month was experienced by 16.2% and 11.9% had pain lasting more than 1 year. The prevalence of self-reported pes planus or pes cavus was 17.9%. There was a significant association between foot pain and pain elsewhere in the leg and low back. Self-reported foot deformity was significantly associated with foot pain. Women had a significantly higher prevalence of foot pain and Body Mass Index was associated with foot pain in women but not in men.

Conclusions: Foot pain is highly prevalent and associated with foot deformity and leg and low back pain. More attention should be focused on foot pain and foot deformity. It is suggested that clinical examination of leg and low back pain should include foot examination.

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1. Background

The occurrence of foot problems such as pain, athlete's foot, nail problems, corns, callosities, swollen feet or bunions has previously been reported at 38–83%, increasing with age and most common among women [1–4]. A study on an adult population in North West England found that, among the 63% with foot problems, 9.5% had disabling foot pain and only 16% had received any treatment [2]. The prevalence of foot pain reported in previous studies has ranged from 14% among teenagers to 34% among a group aged over 70 [5,6].

Hitherto the association between foot deformities and leg pain has been studied in athletes and military recruits [7–9], and scientific interest is increasing as diagnostic possibilities improve.

Jogging has become increasingly popular in the general population and more people have a physically active old age. It is well known from military recruits and runners that pes cavus and pes planus can be particular risk factors for leg and foot pain [7,8,10], the most common diagnoses being Medial Tibial Stress Syndrome, fasciitis plantaris, anterior knee pain and bursitis [7,10]. The prevalence of pes planus has previously been shown to be 6% among teenagers [5] and 26% among overweight people of 60 years or older [5,11]. The prevalence of foot pain and foot deformities has not previously been investigated in a randomly selected sample of the general population. It remains unknown whether foot deformities are risk factors for foot and leg pain in the general population with normal activities.

There is little consensus in the literature on how to quantify foot kinematics and the clinically value of these measures. As a consequence of this people's own opinion could be a valuable tool when intervention are directed at the general population based on a low risk prevention strategy.

2. Aims

The purpose of the present study was to investigate the prevalence of self-reported foot deformities, pain in the foot, leg and

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low back in the general population and the possible associations between pain in the foot and lower extremity and foot deformity.

3. Materials and methods

The study was performed with the approval of the local Scientific-Ethical Committee North Denmark Region. The study group ($n=2100$) was randomly selected by a computer from the Danish Civil Registration System. Participants were aged between 18 and 80 years in the Municipality of Aalborg, which has a total population of 157,610 (2005). Aalborg is representative of the Danish population as regards to rural and urban distribution. A total of 1671 responded (79.6%). The responders were representative of the Danish population in all respects apart from self-assessed health (Table 3).

3.1. Study questionnaire

A questionnaire was designed on the basis of interviews with foot patients and healthy individuals and was tested by a pilot study involving 50 participants. The postally-delivered questionnaires were mailed with a stamped and addressed envelope for reply. Non-responders received a second questionnaire after 4 weeks. If they still did not respond, they were finally interviewed by phone (Table 2). The questionnaire was designed to describe prevalence of pain at least 1 day or more during the last month. Self-reported foot posture, body weight, height and physical activity were also recorded (Table 1).

3.2. Statistical analysis

The sample size (2100 participants) was calculated on the basis of answers from a pilot study to attain a statistical significance level at $P=0.05$ with 90% power. Estimates of the relative risk of foot pain were calculated for each of six age–sex specific strata. The primary end points were “foot pain at least 1 day during the last month”, “foot deformity” and “pain in the weight-bearing part of the locomotive system”. The statistical analysis involved comparison of proportions using χ^2 -tests. Logistic regression analysis was carried out with three age strata ($18 \leq 39$, $40 \leq 59$, $60 \leq 80$) and four BMI strata (<20 , $20 \leq 25$, $25 \leq 30$, >30) and was corrected for gender. Corrected odds ratios were calculated by logistic regression. Odds ratios were calculated with a significance level of $P=0.05$. The questionnaires were manually entered into Epidata 3.02, and consistency was randomly controlled. Statistical tests were carried out using SPSS 14.0 for MS Windows.

4. Results

One month period prevalence of foot pain was 30.4% ($n=508$). Foot pain lasting more than 1 month was reported by 270 (16.2%) and pain lasting more than 1 year by 199 (11.9%). Foot pain was significantly more prevalent among women (34%) than men (26%) ($P<0.001$). Limitations in daily activities caused by foot pain were reported by 333 (19.9%). 146 (8.7%) reported that they would have been more physically active without foot pain. Among subjects with foot pain, 213 (42%) had received treatment within the past year: 127 (25%) had consulted their General Practitioner (GP), and 8% had consulted a podiatrist.

The most common locations of foot pain were the forefoot and ankle, with 12.4% ($n=63$) and 11.6% ($n=59$), respectively (Table 4). Tendencies towards more frequent pain in the Achilles tendon among the youngest age group, more frequent pain in the forefoot, midfoot and hindfoot in the middle age group and more frequent toe and ankle pain among the oldest group were observed. The

Table 1
Example of four questions from the questionnaire.





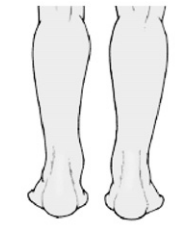

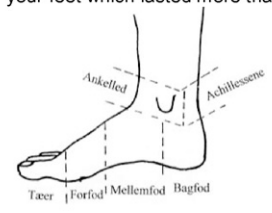
How would you describe your current health status in general?		<input type="checkbox"/> Really good <input type="checkbox"/> good <input type="checkbox"/> moderate <input type="checkbox"/> poor <input type="checkbox"/> very poor
Do you have a cavus foot? (look at the pictures below)		<input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> don't know
Pes Planus	Neutral	Pes Cavus
		
		
Have you within the last month had pain in your feet which lasted more than one day?		<input type="checkbox"/> yes, toes <input type="checkbox"/> yes, forefoot <input type="checkbox"/> yes, midfoot <input type="checkbox"/> yes, hindfoot <input type="checkbox"/> yes, ankle joint <input type="checkbox"/> yes, achilles tendon <input type="checkbox"/> no
		
Have you been restricted in your daily activities because of pain in the feet during the last month?		<input type="checkbox"/> Not at all <input type="checkbox"/> Just a little <input type="checkbox"/> Somewhat <input type="checkbox"/> Quite a lot <input type="checkbox"/> Very much

Table 2
The distribution of responders by mail or phone and the distribution of non-responders by reasons for not responding. The primary reason for not responding was unknown (15.5%) and only 0.2% denied participating.

	Distribution of answers	<i>n</i>	Proportion
Responders	Mail	1429	68.1%
	Phone	242	11.5%
		1671	79.6%
Non-responders	Unreturned	325	15.5%
	Invalid answer	55	2.6%
	Unknown/absent	29	1.4%
	Died	12	0.6%
	Participation denied	5	0.2%
	Incapable of answering	3	0.1%
	429	20.4%	
Total		2100	100%

Table 3
Comparison between present sample and the Danish population (18–80 years). The present sample was not significantly different from the Danish population in general, but the reported health status was significantly (*) poorer.

	Sample ($n=1671$)	Danish population
Men	48.3% (45.9–50.7)	49.7% ^a
Age	46.9 years (46.1–47.7)	46.1 ^a
Self-Ass. health really good or good	73.1% (71.0–75.2)*	77.9% ^b
BMI > 30	11.3% (9.8–12.8)	11.4% ^b
Foreign citizenship	4.68% ^a (3.68–5.68)	5.00% ^a

^a Statistics Denmark.

^b National Institute of Public Health.

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