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Self-reported musculoskeletal disorders in podiatrists at work

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Key words
Musculoskeletal disorder; occupational health; podiatrist

Summary
Objective: *The objective of the study was two-fold: 1) to ascertain the prevalence of musculoskeletal disorders in podiatrists in Spain, and 2) to identify relationships between intensity and duration of pain and socio-demographic variables.* **Methods:** *Epidemiological analysis of Spanish self-employed or salaried podiatrists who had at least 1 year's experience, worked at least 20 hours per week, and had five patients per working day. The survey consisted of: 1) identification of musculoskeletal disorders using the Standardized Nordic questionnaire for analysis of musculoskeletal symptoms; 2) assessment of perceived pain using the Borg CR-10 scale; and 3)analysis of specific socio-demographic variables. We used basic descriptive statistics to analyse the socio-demographic characteristics and perceived pain. Chi squared, Student's t-test, and ANOVA were used to determine differences between variables.* **Results:** *The sample consisted of 274 women (65.08%) and 147 men (34.92%), for a total of 421 podiatrists. The females were older and reported a higher pain score compared to the males, however neither values showed statistical significance. When combining genders, pain intensity was significantly related to marital status (p=0.006, IC 95%).The most frequently reported locations for musculoskeletal symptoms during the previous 7 days were the lower back, upper back and neck (33.02%, 21.85% and 21.62% respectively). They were also the most frequently reported locations for the previous 12 months (21.38%, 13.06% and 13.54% respectively). Female podiatrists and younger podiatrists reported more musculoskeletal complaints in the previous 7 days and younger podiatrists during previous 12 months.* **Conclusion:** *There is a significant prevalence of musculoskeletal complaints in daily podiatry work and the most affected body areas are the lower back, upper back and neck. The most affected demographic classes seem to be the younger age groups, females and married podiatrists.*

Riassunto
«Disturbi muscolo-scheletrici riportati da podologi durante l'attività lavorativa». **Obiettivo:** *Lo studio si prefiggeva due obiettivi: 1) determinare la prevalenza di disturbi muscolo-scheletrici nei podologi spagnoli, 2) identificare le relazioni tra l'intensità e la durata del dolore e le variabili socio-demografiche.* **Metodi:** *Si è condotto uno studio epidemiologico su podologi spagnoli liberi professionisti o dipendenti, che avessero almeno un anno di esperienza, che lavorassero almeno 20 ore alla settimana ed avessero cinque pazienti per ogni giorno lavorativo. L'indagine consisteva in: 1) misurazione dei disturbi muscolo-scheletrici, utilizzando il questionario nordico standardizzato per l'analisi dei sintomi muscolo-scheletrici, 2) misurazione del dolore percepito utilizzando la scala*

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CR-10 di Borg, 3) analisi delle variabili socio-demografiche specifiche. Abbiamo usato statistiche descrittive di base per analizzare le caratteristiche socio-demografiche e il dolore percepito. Per determinare le differenze tra le variabili sono stati utilizzati il test del Chi quadro, lo student-test T e ANOVA ad una via. **Risultati:** *Il campione era composto da 274 donne (65,08%) e 147 uomini (34,92%), per un totale di 421 podologi. Le donne erano più anziane e hanno riportato un livello di dolore più alto rispetto agli uomini, anche se entrambi i valori non possono essere considerati statisticamente significativi. L'intensità del dolore era significativamente correlata allo stato civile (p=0,006, IC 95%) nell'analisi combinata di maschi e femmine. La parte inferiore e superiore della schiena e il collo (rispettivamente 33,02%, 21,85% e 21,62%) sono stati i punti di dolore muscolo-scheletrico più frequentemente riportati negli ultimi 7 giorni. Questi stessi punti erano stati riportati con maggior frequenza anche nei 12 mesi precedenti (rispettivamente 21,38%, 13,06% e del 13,54%). I podologi più giovani e di sesso femminile hanno riportato più disturbi muscolo-scheletrici nei 7 giorni precedenti; i podologi più giovani li hanno lamentati anche nei 12 mesi precedenti.* **Conclusione:** *Vi è una significativa prevalenza di disturbi muscolo-scheletrici in presenza di un lavoro quotidiano come podologo. Le zone del corpo più colpite sono la parte bassa della schiena e la parte superiore della schiena e del collo. La fascia demografica più colpita sembra essere quella dei giovani podologi e delle podologhe sposate.*

Introduction

Musculoskeletal disorders have become a significant issue for health care providers (3, 21). They are a common cause of work-related disability among workers, with substantial financial consequences due to workers' compensation and medical expenses (3, 21). Numerous musculoskeletal disorders have been cited in the scientific literature. Epidemiological studies commonly characterize each of the disorders by frequency, duration and intensity of pain (3, 21). These investigations have demonstrated that the prevalence and location of pain and other symptoms may be influenced by posture and work habits, as well as other psychological and demographic factors (9, 11, 26, 38).

Several studies have been conducted examining the epidemiology of musculoskeletal disorders in nurses, nursing assistants, X-ray technicians (8), dentists (28), social workers (24), surgeons (39), and other healthcare professionals. However, there are no known published research articles concerning musculoskeletal disorders in podiatrists.

The podiatry profession requires good visual skills, concentration, precision and also maintaining fixed postures for long periods of time combined with repetitive movements of the arms and hands (35). The authors hypothesize that podiatrists are exposed to five main risk factors on a daily basis: poor posture, repetition, force, duration and psychosocial factors (14, 35).

Piggot et al. (31) conducted a survey on musculoskeletal problems in podiatrists and podiatry students. They found that podiatrists had a general susceptibility to musculoskeletal problems, with low back and neck pain being the most common complaints. The participants perceived their musculoskeletal problems to be associated with lack of proper equipment during home and hospital consultations. Safe and comfortable posture is not always possible during these visits due to the absence of sophisticated clinical equipment, i.e. patient and operator chairs and adequate source of light (30, 31).

Another study on musculoskeletal complaints was conducted on podiatry students at Salford University (34, 35). The authors reported that complaints of pain increased after the first year of training. Again the most commonly affected areas were the neck, upper back and knees (35). They also found that gender differences exist in the range of movements and discomfort.of the wrist. A similar study also found a higher perception of pain in the hands in UK podiatrists (34).

Due to the lack of evidence concerning musculoskeletal disorders in podiatrists the aim of this study was to determine the prevalence of muscu-

loskeletal disorders in Spanish podiatrists and identify the relationships that exist between the intensity and duration of pain and socio-demographic variables.

Methods

Study population

We distributed questionnaires via email to podiatrists across Spain. Contact information for this sample was available from a database created for podiatrists who voluntarily provided contact details to receive information concerning meetings, courses, and so on. We collected 421 questionnaires between April 2010 and May 2010 from the 1083 podiatrists that were contacted (response rate: 38.9%). The data were collected via the following link: https://spreadsheets.google.com/viewform?formkey=dFJuN1k5V0FmS3BmYjJWY1B1VXh6U2c6MA

There were no penalties or rewards for participation, and the participants were free to answer the questions to the best of their ability. Due to the sensitive nature of the issues raised in the survey, each podiatrist was asked to respond anonymously to the questionnaire. We obtained informed consent from each participant via a form included in the on-line survey. In order to maintain privacy and confidentiality, we did not collect details of names or addresses. Prior to data collection, we obtained approval from the Ethical and Research Commission (Podiatry Section) of the Asociación Española de Medicina y Salud Escolar y Universitaria (Spain).

Eligibility

To be eligible for participation, subjects had to be a podiatrist working in Spain, self-employed or salaried, with at least 1 year of experience, working at least 20 hours per week, and having at least five patients per working day. This criterion was chosen to exclude podiatrists who were not practising full time and therefore not susceptible to repetitive overuse-related musculoskeletal disorders.

Variables

Musculoskeletal symptoms were obtained using the Standardized Nordic questionnaire for the analysis of musculoskeletal disorders (20) This questionnaire consists of nine anatomical regions with specifically shaded areas to describe symptoms over the previous 12 months and the previous seven days.

Body sites were divided into nine body regions, based on the results of previous research examining the musculoskeletal symptoms of podiatrists (30, 31, 34, 35).

Another component of the survey asked specific questions concerning socio-demographic variables and about pain intensity. Perceived pain was rated on the day the questionnaire was completed using the Borg CR-10 scale category ratio (CR). This is a numerical scale range from 0 to 10, with 10 being the most intense pain and 0 being no pain at all (6) This scale has previously proved to be highly reliable (7).

Statistical analysis

We analysed the data using PASW (Predictive Analytic Software Statistics version 17.0; SPSS Inc, Chicago, Illinois). Basic descriptive statistics (means, standard deviations, percent distributions) were calculated for the podiatrists socio-demographic characteristics (sex, age and marital status) and perceived pain. Student's t-tests and one-way ANOVAs with Bonferroni post hoc analysis were performed in order to determine statistically significant differences between the Borg 10-scale and the socio-demographic variables.

The results from the Standardized Nordic questionnaire for analysis of musculoskeletal disorders are reported as the absolute value and percentage for each of the responses to the questions (tables 2 and 3). Each of the grouping variables – sex (female, male) and age (≤30, 31-45, ≥46) – were cross-tabulated against each of the nine anatomical areas reported in the Standardized Nordic questionnaire for analysis of musculoskeletal disorders and Pearson's Chi squared test. Significance was set at $P<0.05$ for all analyses.

To facilitate interpretation of these rather extensive cross-tables, we also indicate which cells have the largest differences between observed and expected frequencies under the null hypothesis.

Results

A total of 421 out of 1083 podiatrists responded correctly to the questionnaire. The sample consisted of 274 women (65.08%) and 147 men (34.92%), for a total of 421 podiatrists. The mean age was 31 years (95% confidence interval [CI], 23–58 years). The marital status of the sample was almost the same number of married and unmarried people (57.24% married and 42.76% unmarried). The score of the the Borg pain scale ranged from 5 to 10 points in 246 participants and between 4 and lower in the remaining 175 subjects (table 1).

Table 1 - Characteristics of the sample

No.= 421		Frequency	%
Sex			
Female		274	65.08
Male		147	34.92
Age			
≤ 30		246	58.43
31-45		155	36.82
≥ 46		20	4.75
Marital Status			
Married		241	57.24
Unmarried		180	42.76
Borg CR-10 scale			
0	Absence of pain	0	0
0.5	Extremely slight	0	0
1	Very slight	5	1.19
2	Slight	34	8.08
3	Moderate	88	20.90
4		48	11.40
5	Intense	89	21.14
6		80	19.00
7	Very intense	64	15.20
8		8	1.90
9		5	1.19
10	Extremely intense	0	0

Using multivariant analysis for each of the variables, females had a higher pain score (5.09±1.715) compared to males (4.19±1.598) however the difference was not statistically significant. Pain intensity was not statistically significant and was very similar for all age groups. In the under 30 years old group it was 4.73±1.683, in the 31-45 years old group it was 4.85±1.827, and in the 46 years and older group it was 4.80±1.508. When grouped by marital status pain intensity was statistically significant (p=0.006, IC 95%) with the singles group having less pain (4.47±1.730) compared to the married group (5.18±1.643).

All 421 podiatrists described having pain in the previous 7 days, and 56.53% (238 individuals) also described having pain in some part of the body in the last 12 months.

All of the 421 respondents reported musculoskeletal symptoms within the previous 7 days. The most frequently reported musculoskeletal symptoms during this time frame were lower back, upper back and neck pain (33.02%, 21.85% and 21.62% respectively) (table 2). Only 238 respondents of the total 421 reported musculoskeletal symptoms in the previous 12 months, which were predominately localized in the lower back, upper back, and the neck (21.38%, 13.06% and 13.54% respectively) and none of the respondents reported pain in the elbows or hips over the previous 12 months (table 3).

Most of the self-reported symptoms were over-represented among younger female podiatrists when referring to the previous 7 days (table 2); differences were statistically significant (table 2). Younger podiatrists also presented more symptoms during the previous 12 months, however there were no statistically significant differences between genders (table 3).

Discussion

To our knowledge, this is the first study to describe musculoskeletal disorders occurring in Spanish podiatrists. Only one previous study described musculoskeletal disorders that occurred in podiatry students. Other research also described

Table 2 - Responses to the Standardized Nordic questionnaire. All 421 participants reported musculoskeletal disorders with symptoms during the previous 7 days

Respondents		Neck	Shoulders	Elbows	Wrist/ Hands	Upper back	Lower back	Hips	Knees	Ankles feet	
Nr		91	4	4	26	92	139	4	28	33	P
Percentage		(21.62%)	(0.95%)	(0.95%)	(6.18%)	(7.84%)	(33.02%)	(0.95%)	(6.65%)	(7.84%)	Value*
Sex	n ♀=	57	4	4	13	63	96	4	9	18	,023
	n ♂=	34	0	0	13	29	43	0	19	15	
Age	N ≤ 30 =	59	0	4	8	45	93	0	9	28	
	N 31-45=	28	0	0	14	47	38	4	19	5	,000
	N ≥ 46=	4	4	0	4	0	8	0	0	0	

* *P* values are from χ^2 tests of cross-tabulations between the category variables and the response variables (the level of significance was set at $p<0.05$)

Table 3 - Responses to Standardized Nordic questionnaire. Of the 421 respondents 238 reported musculoskeletal disorders with symptoms during the previous 12 months.

Respondents		Neck	Shoulders	Elbows	Wrist/ Hands	Upper back	Lower back	Hips	Knees	Ankles feet	
Nr		57	4	0	5	55	90	0	13	14	P
Percentage		(13.54%)	(0.95%)	(0%)	(1.19%)	(13.06%)	(21.38%)	(0%)	(3.09%)	(3.33%)	Value*
Sex	n ♀=	42	4	0	5	34	68	0	9	9	NS ,285
	n ♂=	15	0	0	0	21	22	0	4	5	
Age	N ≤ 30 =	36	0	0	0	28	69	0	4	14	
	N 31-45=	17	0	0	5	27	13	0	9	0	,000
	N ≥ 46=	4	4	0	0	0	8	0	0	0	

* *P* values are from χ^2 tests of cross-tabulations between the category variables and the response variables. NS, not significant with a 95% confidence interval (the level of significance was set at $p<0.05$)

musculoskeletal disorders in other healthcare providers such as medical doctors, nurses, physiotherapists, etc. In contrast, our study focused on practising podiatrists and found evidence of several musculoskeletal disorders that commonly occur and the associated level of pain.

The results of our study demonstrated that the most frequently reported pain and discomfort among Spanish podiatrists was low back pain. This occurred for both of the time periods, which were the previous seven days and twelve months with respect to the time the questionnaire was completed. The upper back and neck were also commonly affected regions of the body for the previous seven days and twelve months time period.

This is in agreement with previous findings describing musculoskeletal disorders in podiatry students. These studies found that pain and discomfort were predominately localized in the lower back and the neck (30, 35).

The results of our study also found a similar frequency of low back and neck pain among Spanish podiatrists compared to other healthcare providers such as dentists (26, 32, 33) and nurses (36, 37). Interestingly, forestry workers, including manual workers, machine operators, and administrative workers, had a lower reported frequency of lower back and neck pain compared to podiatrists (16).

Our data demonstrated a high percentage of upper back pain during the previous 7 days and 12

months. This disagrees with previous findings which found upper back pain to rank sixth on the list of complaints in student podiatrists. However, this finding referred to the first year as a student. The authors suggest that neck and upper back pain may become more common in later years due to accumulative exposure to work-related stress (35).

Using multivariate analysis to examine several of the demographic variables, the females demonstrated a higher mean pain score compared to males, however it was not statistically significant, with a IC of 95%. The mean pain intensity was also similar for the three age groups studied.

When examining pain intensity separately for married and single podiatrists, there was a statistically significant difference between 0the two groups. Podiatrists who were single had a lower mean pain score compared to the married group. Married individuals may experience more stress due to the number of dependent family members, marital disagreement, family violence and financial difficulties. The associated stress and tension that may occur during married life can be a cause of increased musculoskeletal disorders (10, 41).

In regard to gender, age, and musculoskeletal symptoms, there was a significant interaction between gender and age. We found that females and younger podiatrists reported a higher frequency of musculoskeletal disorders and greater pain intensity during the previous seven days and twelve months .

There have been many studies relating musculoskeletal problems with gender. The prevalence of neck pain and its relation to occupation and occupational activities in the general population was previously investigated by Palmer et al. who demonstrated a strong association between neck pain and occupational physical activities for woman, specifically female nurses with work that involved using their hands above shoulder height and stretching their arms (29). Other studies on computer workers showed that musculoskeletal symptoms were more prevalent for the upper extremities in women compared to men (17, 19).

In general women have been shown to report more muscular problems than men. Differences in muscular strength were suggested but recent research has demonstrated that they do not predict musculoskeletal disorders (4, 5, 18, 40, 42). However, it has been demonstrated that female workers may be more vulnerable to musculoskeletal disorders compared to males due to biological differences that may interact with workplace characteristics to affect health (13, 27).

In addition, work overload and multiple role conflicts in women caused by changing occupational roles without concomitant changes in home and family situations can contribute to stress which has been linked to musculoskeletal disorders (23).

Females were also found to have higher rates of lower back pain in the literature. Ghaffari et al. found an 8.5% and a 7% higher prevalence of back pain in females compared to males during the previous 7 days and 12 months (15). In another study examining gender and low back pain among workers, the authors also found a higher incidence and severity of low back pain in women even though they had less exposure to known occupational risk factors. The results indicate a preponderance of these risk factors among female workers. They suggest that proper lifting techniques should be established and uncomfortable working positions avoided (2).

Previous studies demonstrated an association between musculoskeletal problems and age. Cromie et al. investigated the prevalence and severity of musculoskeletal disorders in physiotherapists. They found that younger therapists reported a higher prevalence of musculoskeletal disorders in most areas of the body, which may have been due to inexperience (12).

Similarly we found an increased prevalence of symptoms among younger podiatrists, which can be attributed to various factors, including inexperience. Our data on younger podiatrists are also similar to those of the study conducted in podiatry students (35). These groups were similar because all participants were young, inexperienced in their level of practice, and were under psychophysiological stress that can lead to bad postures, and muscular tension during physically demanding tasks (25).

The literature also indicates that additional research is needed to identify similar ways to alleviate

stress, bad postures, muscular tension, physical demands and acute or chronic musculoskeletal disorders among healthcare providers (22).

Methodological considerations

Our general impression is that the Nordic questionnaire provided a reliable picture of the health status of the nine most prevalent body areas with musculoskeletal pain and can be used as an effective screening instrument. A physical examination or an extended questionnaire might be recommended for disorders of the elbow and wrist/hand regions, where the sensitivity of the Nordic questionnaire is not as high as Åkesson et al. reported (1). Physical examinations for specific diagnosis can provide more detailed information about state and prognosis and could be useful for preventive interventions.

Several limitations were identified in this study. First, there was a moderate response rate for completion of the questionnaire. Second, there may have been a possible selection bias favouring podiatrists who had long-term musculoskeletal disorders. However, we feel that a diversified population of podiatrists was achieved to represent an adequate population that minimized bias. A third limitation of this study was the reliance on self-reported data. With all self-reported data, there is a possibility that individuals with symptoms will tend to overestimate the frequency of pain or disorder locations. Lastly, a thorough investigation of the literature revealed the presence of additional factors associated with musculoskeletal disorders that were not evaluated in the present study. Future research should contemplate a larger sample size and a prospective cohort study design to provide additional insight into these associations. Also an intervention study may be required to demonstrate that correcting posture can decrease the prevalence of low back pain in podiatrists (32).

Conclusions

Our study is the first to provide evidence concerning musculoskeletal disorders in podiatrists. Our data demonstrated that there was a high prevalence of musculoskeletal disorders related to daily podiatry work. The most affected areas of the body were the lower back, upper back and neck during the previous 7 days and the lower back, neck and upper back during the previous 12 months. The results of this study also indicate that particular attention should be given to younger, female and married podiatrists due to the higher frequencies of pain and musculoskeletal disorders.

Consequently, adoption of specific strategies may prevent potentially disabling conditions and reduce occupational exposure and health risks related to podiatry work.

Further investigation is needed to develop preventive measures that safeguard the musculoskeletal health of workers in a profession devoted to the promotion and re-establishment of foot health.

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