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Musculoskeletal disorders among Irish farmers

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Background Farming is an occupation that predisposes individuals to health problems including musculoskeletal disorders (MSDs). There is limited research regarding MSDs among farmers especially in Ireland.

Aims To establish the prevalence of MSDs, identify the most commonly affected body regions and to explore what factors may influence the development of the most common MSDs among farmers in Ireland.

Methods A questionnaire survey of Irish farmers was conducted. The study sample comprised 600 farmers (100 farmers from each of the six main farm enterprise systems in Ireland).

Results Of the 600 farmers, 56% had experienced a MSD in the previous year. The most commonly experienced MSDs were back pain (37%) and neck/shoulder pain (25%). Other MSDs experienced in the previous year included knee pain (9%), hand–wrist–elbow pain (9%), ankle/foot pain (9%) and hip pain (8%). Overall, MSDs were more common in farmers working longer hours ($P < 0.05$). Back pain was more prevalent in full-time farmers ($P < 0.05$), while prevalence of hip pain was greater in farmers who were older ($P < 0.01$), full time ($P < 0.05$), farming for longer ($P < 0.01$) and working for longer hours ($P < 0.01$). Farm enterprise was not a factor in influencing the development of MSDs.

Conclusions These findings suggest that the number of hours worked by farmers, rather than enterprise specific tasks render farmers more susceptible to MSDs. Further investigation is needed to explore risk factors in the development of MSDs.

Key words Farm enterprise; farmers; low back pain; musculoskeletal disorders; risk factors.

Introduction

Farming is generally perceived, by both farmers and the general public, as a healthy outdoor occupation. The reality, however, is that farming is a hazardous activity [1] which presents a range of threats to health [2]. A number of studies have classified farming as a risky occupation. Because of the nature of farm work, farmers and farm workers are at particular risk of developing musculoskeletal disorders (MSDs) [1–3]. MSDs are defined as a group of disorders that affect the musculoskeletal system including the nerves, tendons, muscles and supporting structures such as intervertebral discs [4]. MSDs affect millions of people around the world and are the most common cause of severe long-term pain and physical disability. In addition to their physical effects, MSDs affect the psychosocial status of individuals and impact on their families and carers [5].

A survey of 15 European countries showed that agriculture is one of the industries with the most exposure to heavy physical loads [6]. Examples of some of the physical hazards that farmers face include lifting and carrying heavy loads, working with the trunk frequently flexed, risk of trips and falls on slippery and uneven walkways, risk of accidents caused by the unpredictable actions of livestock and exposure to vibration from farm vehicles and powered hand tools [3]. The results of a limited number of studies concerned with the occupational health of farmers and farm workers confirm this analysis. A Swedish study found that the odds of reporting musculoskeletal problems were 51% higher among farmers than non-farmers [7]. In a survey of Southeast Kansas farmers [8], nearly 60% of the respondents reported that they experienced a farm work-related MSD symptom during the last 12 months, while a survey of self-reported work-related

illness in Britain during 1995 found that 43 000 or 7% of the agriculture workforce ascribed MSDs to their work [9]. Given the widespread occurrence of MSDs, it is surprising that more research has not been undertaken to analyse the factors associated with the development of MSDs among farmers and farm workers and to evaluate the anatomical regional distribution of these injuries. Of the research studies that have been undertaken, most have focused on particular activities giving rise to MSDs, e.g. use of snowmobiles and other all-terrain vehicles [10] or the impact of milking [11]. What is missing from the body of research concerned with the incidence of MSDs among farm workers is a reflection of the specialized and diverse nature of contemporary agriculture. As farms are highly heterogeneous workplaces [12], farm workers are exposed to different types of health risk depending on the type and level of farming activity. As a consequence, it may be expected that the incidence and nature of MSDs will vary between farm workers.

There are 104 800 farms in Ireland [13] and no research on the health status or prevalence of MSDs among farmers in Ireland has been published to date. The aim of this research, using data collected from 600 farmers in Ireland, is to first establish the prevalence of MSDs among Irish farmers. Secondly, this study aims to identify the most commonly affected body regions and thirdly to evaluate factors that may influence the development of the most common MSDs among farmers in Ireland.

Methods

In advance of undertaking this study, approval was given by University College Dublin Research Ethics Committee as it involves a survey of the health status of farmers in Ireland. A questionnaire survey of farmers was conducted. The questionnaire was designed with discrete sections to gather the following data:

- socio-demographic and occupational data,
- farmers' health status,
- annual prevalence of MSDs,
- point, annual and lifetime low back pain (LBP) prevalence and
- factors associated with MSDs.

The questionnaire was developed by drawing together questions from the National Farm Survey (NFS) [13] and the Survey of Lifestyle, Attitudes and Nutrition in Ireland (SLÁN) [14]. The questionnaire was piloted among 30 Irish farmers for usefulness of content, readability and face validity. Minor amendments were made following the pilot study. In the questionnaire, MSDs were defined as any bone, joint or muscle problems lasting ≥24 h in the last year. The Nordic back pain questionnaire [15] definition of LBP: 'By Low back pain is meant ache, pain or discomfort in the lower back whether or not it extends from there to one or both legs' was utilized and was accompanied by a mannequin diagram to define the low back region. Back pain refers to a combination of upper back pain and LBP. Quota sampling was used to access a minimum of 100 farmers from each of the six NFS farm enterprise systems namely dairy, dairy and other, cattle rearing, cattle other, mainly sheep and arable. Questionnaires were distributed at events where groups of farmers were gathered together. These included farm walks, farm safety training courses and other educational or training events. Data were entered onto the Statistical Package for the Social Sciences (SPSS V.14). These data were analysed using descriptive statistics to establish MSD prevalence and the most commonly affected body regions. Subgroup comparisons were then conducted. Chi-square tests were used to explore if MSDs were more prevalent among full-time farmers than part-time farmers and to compare MSD prevalence between farm enterprise groups. *t*-Tests for equality of means were used to explore the relationship between MSD prevalence and age, years farming, farm size and hours worked.

Results

Six hundred and seventy-six questionnaires were returned with representation of the enterprise groups as follows: 110 dairy, 127 dairy and other, 114 cattle rearing, 100 cattle other, 103 mainly sheep, 100 arable and 19 others. In order to ensure equal distribution between the groups, 100 questionnaires were randomly selected from each of the six enterprise groups where >100 surveys were collected. Respondents were aged between 18 and 85 years (median = 46) and farmed a median of 53 ha of land. Full-time farmers accounted for 65% (n = 372) of the population. Respondents were also predominantly male (92%, n = 551).

Of the respondents, 585 answered the question on MSD prevalence. Fifty-six per cent (n = 325) of farmers had experienced some type of MSD in the previous year. The most commonly experienced MSDs were back pain (37%) and neck/shoulder pain (25%). Other MSDs experienced in the previous year included hand–wrist–elbow pain (10%), knee pain (9%), ankle/foot pain (9%) and hip pain (8%) (Table 1). Comparative analysis

Table 1. MSD prevalence in Irish farmers (n = 585)

MSD	n (%)
Any MSD pain	325 (56)
Back pain	214 (37)
Neck/shoulder pain	146 (25)
Hand–wrist–elbow pain	59 (10)
Knee pain	55 (9)
Ankle/foot pain	54 (9)
Hip pain	47 (8)

of farmers with and without an MSD found no significant difference in the MSD prevalence between age, years farming, farm enterprise or working off-farm (Tables 2 and 3). Of these factors, only the mean number of hours worked was found to be significantly higher among those with an MSD ($P < 0.05$) (Table 2). Farmers reporting hip problems were significantly older ($P < 0.01$), had farmed over a longer period ($P < 0.01$), had worked longer hours ($P < 0.01$) and comprised of significantly more full-time farmers ($P < 0.05$) (Table 4).

A detailed assessment was undertaken of whether the back and neck/shoulder problems, which account for 62% of all reported MSDs, were associated with age, years farming, hours worked, farm enterprise and working off-farm. Back pain prevalence was found to be significantly higher among full-time farmers ($P < 0.05$) (Table 4). No significant differences were found among the other risk factors.

Discussion

This study found that 56% of Irish farmers had experienced some type of MSD in the previous year and that back pain was the most common complaint. This is the only Irish study to establish prevalence of MSDs and explore factors that may influence the development of MSDs among Irish farmers. Although this survey was based on recall by the respondents, quota sampling ensured representation of all Irish farm enterprise groups, while integration of questions from established national surveys (NFS and SLÁN) and accepted definitions of MSD and LBP enhanced validity of the survey questionnaire and interpretation of results. Thus, these results provide a backdrop for future research both nationally and internationally.

MSD prevalence finding is similar to a Kansas study, where 60% of farmers reported MSD symptoms during the preceding 12 months [8], but lower than 69% reported by multiple male occupational groups in Ireland [16]. Many factors explored here, such as age, years farming or farm size, were not associated with higher prevalence of MSDs and unexpectedly no difference in prevalence was found between farm enterprise groups, despite varying physical demands. Factors that could impact on prevalence of MSDs is the widespread practice of off-farm employment. In 2008, 42% of all farmers in Ireland were reported to undertake off-farm work due to limited economic returns from smaller farms [13]. Many of these work as manual labourers in the construction sector [17] with its attendant risk of MSDs [18], but we did not find a significantly higher prevalence of MSDs in this group. However, it was established, that farmers who worked longer hours per day in any type of work had a significantly higher prevalence of MSDs, suggesting fatigue or greater length of exposure, arising from longer hours worked, rather than enterprise specific tasks, were factors in developing MSDs. It also suggests that a study focusing on specific farm work exposures as a cause of MSDs would be worthwhile.

In our study, 32% of farmers experienced back pain in the previous year compared with 16% ($n = 1658$) of the general Irish population [14] and 22% of the Irish working population [19]. However, as with all health surveys of occupational groups, the healthy worker effect needs to be acknowledged as farmers with more severe MSDs who are no longer farming will not have been captured in the study. Our results are consistent with a study of Iowa farmers [20] where 31% experienced back pain in the previous 12 months compared with 18.5% of the general working population. Unfortunately, no comparison could be made with the general Irish population for other MSDs as such data are unavailable. We found that back pain prevalence is significantly higher among full-time farmers. Though little research has been undertaken exploring this issue, one could speculate that full-time farmers are exposed to greater repetitive back strain than their part-time counterparts. It is important to note that the definition of back pain used in our study differs to that used by Wadsworth *et al.* [21], highlighting the need for careful consideration of case definitions when comparing ostensibly similar MSD studies, as results will vary depending upon this factor.

With a lifetime prevalence of 50%, LBP was the most common MSD. This is unsurprising as many reports have

Table 2. Factors associated with MSDs

	MSD, mean (SD)	No MSD, mean (SD)	Significance
Years farming	26.32 (12.8)	25.74 (12.8)	NS[a]
Farm size (acres)	167.53 (143.6)	163.55 (124.4)	NS[a]
Hours worked mean	8.53 (3.6)	7.73 (3.6)	$P < 0.05$[a]

[a]*t*-Test for equality of means.

Table 3. Enterprise type and work factors associated with MSDs

	MSD, *n* (%)	No MSD, *n* (%)	Significance
Full time/part time			
Full time	213 (59)	147 (40)	NS[a]
Part time	101 (50)	98 (49)	NS[a]
Farm enterprise			
Dairy	62 (62)	37 (37)	NS[a]
Dairy and other	55 (57)	40 (42)	NS[a]
Cattle rearing	52 (52)	47 (47)	NS[a]
Cattle other	50 (52)	46 (47)	NS[a]
Mainly sheep	56 (56)	44 (44)	NS[a]
Tillage	50 (52)	46 (47)	NS[a]

[a]Chi-square test.

Table 4. MSD prevalence and factors associated with back, neck/shoulder and hip problems

	Age, mean (SD)	Years farming, mean (SD)	Farm size, mean (SD)	Hours worked, mean (SD)	Full time, *n* (%)	Part time, *n* (%)
Lifetime prevalence						
LBP						
Yes	46.0 (11.4)	26.0 (12.2)	178.7 (148.2)	8.1 (3.6)	179 (51)	88 (46)
No	44.8 (12.5)	25.8 (13.6)	156.2 (123.5)	8.1 (3.6)	166 (48)	103 (53)
P	NS[a]	NS[a]	NS[a]	NS[a]	NS[b]	
Annual prevalence						
Back pain						
Yes	46.0 (10.9)	26.3 (12.5)	171.6 (134.7)	8.5 (3.5)	130 (35)	52 (26)
No	45.3 (12.5)	25.8 (13.0)	161.2 (129.0)	8.0 (3.6)	232 (64)	147 (73)
P	NS[a]	NS[a]	NS[a]	NS[a]	$P < 0.05$[b]	
Neck/shoulder pain						
Yes	46.5 (11.6)	25.5 (12.8)	157.2 (106.1)	8.5 (3.8)	77 (21)	38 (19)
No	45.3 (12.0)	26.1 (12.8)	166.5 (136.4)	8.1 (3.5)	285 (78)	161 (80)
P	NS[a]	NS[a]	NS[a]	NS[a]	NS[b]	
Hip pain						
Yes	52.1 (10.5)	32.5 (12.3)	178.5 (190.3)	9.6 (3.1)	37 (10)	8 (4)
No	44.9 (11.8)	25.4 (12.7)	163.4 (124.5)	8.0 (3.6)	325 (89)	191 (96)
P	0.001[a]	<0.001[a]	NS[a]	<0.01[a]	<0.01[b]	

	Enterprise					
	Dairy, *n* (%)	Dairy and other, *n* (%)	Cattle rearing, *n* (%)	Cattle other, *n* (%)	Mainly sheep, *n* (%)	Tillage, *n* (%)
Lifetime prevalence						
LBP						
Yes	54 (56)	46 (51)	42 (44)	44 (46)	45 (46)	46 (50)
No	42 (43)	44 (48)	52 (55)	50 (53)	52 (53)	46 (50)
P	NS[b]					
Annual prevalence						
Back pain						
Yes	36 (36)	34 (35)	29 (29)	29 (30)	30 (30)	31 (32)
No	63 (63)	63 (64)	70 (70)	67 (69)	70 (70)	64 (67)
P	NS[b]					
Neck/shoulder pain						
Yes	22 (22)	22 (22)	16 (16)	20 (20)	23 (23)	15 (15)
No	77 (77)	75 (77)	83 (83)	76 (79)	77 (77)	80 (84)
P	NS[b]					
Hip pain						
Yes	8 (8)	11 (11)	7 (7)	8 (8)	6 (6)	7 (7)
No	91 (91)	86 (88)	92 (92)	88 (91)	94 (94)	88 (92)
P	NS[b]					

[a]Chi-square test.

[b]*t*-Test for equality of means.

noted the high prevalence of LBP among farmers [7,22]. The risk factors explored here were not found to be associated with a history of LBP. However, further exploration of other risk factors including heavy work, lifting, bending, twisting, pulling, pushing [5], whole body vibration [23,24] as well as some personal factors [25] may reveal an association between these tasks and the development of LBP among farmers.

This research also established the extent of other MSDs including neck and shoulder, hip, knee and hand–wrist–elbow problems. Twenty per cent of farmers experienced neck and shoulder problems in the previous year. Studies have found that farmers have a higher prevalence of neck and shoulder problems compared with non-farmers [7,26]. Previously [11], neck pain in middle-aged farmers was found to be positively associated with the area of arable land formerly farmed, whereas this was not seen in our study.

We found that 8% of the farmers studied experienced hip problems in the previous year. While our study did not investigate types of hip problems, international research findings indicate that farmers may have higher rates of

osteoarthritis of the hip compared with other occupational groups [3,7] especially if they have farmed for over 10 years [27]. It has been estimated that as many as one in five farmers may eventually require hip replacement [27]. Walker-Bone *et al.* [3] state that 'the precise cause of hip osteoarthritis in farmers has not been defined, but potential risk factors include regular heavy lifting, prolonged standing and walking over rough ground and vibration from tractor driving'. We found that age, years farming, hours worked and being a full-time farmer were factors significantly associated with hip problems. However, it is important to acknowledge that age and years farming are interrelated as risk factors.

This study also established that 9% of farmers surveyed experienced knee problems in the previous year. This compares with 30.3% [7] and 23.6% [8] reported internationally. The variation between results of this research and those of other studies is thought to be associated with differences in case definitions. Holmberg *et al.* [7] established that dairy farmers report significantly more knee problems than other farmers and cattle raisers report less but this was not the case here. International research suggests that the heavy physical activity associated with farming is the primary cause of knee osteoarthritis [18,28].

Finally, this study found that 10% of farmers experienced hand–wrist/elbow problems in the previous year. This result is broadly similar to the findings of other research on this topic where 12% of farmers report hand–wrist pain MSDs, while 5.8% report elbow pain [8]. Once again, however, case definitions varied. A Swedish study found that farmers had significantly more hand and forearm problems than non-farmers [7]. Although the risk factors we explored were not associated with hand–wrist–elbow pain, some studies have indicated a higher risk of forearm problems among milkers [29,30].

Overall, this study established a high prevalence of MSDs in Irish farmers. Only number of hours worked on the farm was associated with a higher risk of MSDs and there was no relationship with type of farming enterprise. These results suggest that there may be a basic set of activities in which farmers engage, which expose them to a higher risk of MSD.

Key points

- This paper establishes the prevalence of musculoskeletal disorders among Irish farmers.
- It identifies the most commonly affected body regions and evaluates factors that may influence the development to musculoskeletal disorders among farmers.
- It also provides a backdrop for future research both nationally and internationally.

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Conflicts of interest

None declared.

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