

Musculoskeletal Symptoms and Exposure To Knee Flexion Among Dairy Farmers

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Introduction

- Scandinavian studies report musculoskeletal symptoms (MSS) as problematic among dairy farmers (Pinzke 2003; Stål 1996; Gustafsson 1994).
 - 80% of dairy farmers experience MSS
 - low back, shoulder, and knee MSS are the most prevalent
 - Scandinavian studies have associated awkward postures of the knee with dairy farm work (e.g. milking) (Nevala-Puranen 1996).

Introduction cont'd

- ***Little information exists on prevalent MSS and exposure to physical risk factors for MSS among U.S. dairy farmers.***

Purpose

- Determine the 12 – month period prevalence of musculoskeletal symptoms (MSS) among dairy farmers.
 - Evaluate the association between work factors and MSS among dairy farmers.

Stanchion Milking



Parlor Milking



Parlor Milking

[Video Link](#)

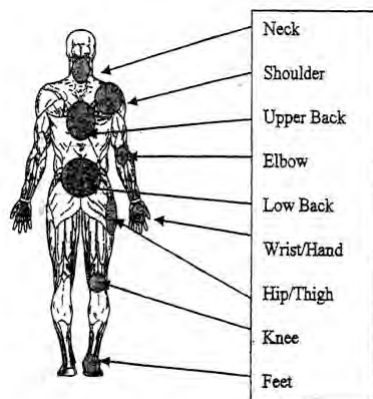
Methods: Prevalence Study

- Cross-sectional study of 813 randomly selected dairy farmers in a 5 county area in Northeast Iowa.
- The dairy farmers were mailed a packet containing five self-administered questionnaires.

Questionnaires

- Demographic and farm exposure assessment questionnaire
 - (e.g. hours milking per year)
- Modified Nordic (Kuorinka, Jonsson et al. 1987)
 - assess health outcome of prevalent MSS
 - “Have you had pain/stiffness/numbness in the last 12 months”

Modified Nordic Questionnaire



- Prevalence (%)
 - “Yes” for pain/total number participants
- Logistic Regression
 - Compare exposure characteristics among farmers who have MSS vs. No MSS

Results: Prevalence Study

- Response rate was fair (44%)
- 70% utilized stanchion milking facility
- Milking
 - 1200 hrs/yr
- Time working
 - 11.4 hrs/day, 51.1 weeks/yr
- Working on dairy farm
 - 65.5 standardized years

Prevalence Estimates

- | | |
|--------------|-------|
| • Low Back | • 67% |
| • Knee | • 60% |
| • Shoulder | • 54% |
| • Neck | • 43% |
| • Wrist/hand | • 40% |
| • Hip | • 38% |
| • Feet | • 34% |
| • Elbow | • 24% |
| • Upper Back | • 23% |

Risk Factors for MSS

- Milking

- No statistically significant association ($p \leq 0.05$) found with MSS

- Type of Milking Facility

- Low Back
 - ($OR_{Adj}=1.71$; 95% CI = 0.99–2.94)
- Knee
 - ($OR_{Adj}=1.80$; 95% CI = 1.04–3.13)

Risk Factors for MSS

- Manually cleaning animal stalls: 1 – 273 hrs

- Upper Back
 - ($OR_{Adj}=2.06$; 95% CI = 1.01–4.20)
- Low Back
 - ($OR_{Adj}=1.90$; 95% CI = 1.05–3.44)
- Hip
 - ($OR_{Adj}=2.42$; 95% CI = 1.24–4.69)
- Knee
 - ($OR_{Adj}=1.98$; 95% CI = 1.03–3.81)
- Wrist/Hand: > 1,275 hours
 - ($OR_{Adj}=1.96$; 95% CI = 1.06–3.63)

Risk Factors for MSS

- Tractor Use 1160 – 1637 hours/year
 - Neck
 - ($OR_{Adj}=2.17$; 95% CI = 1.05–4.50)
 - Low Back
 - ($OR_{Adj}=2.34$; 95% CI = 1.06–5.20)
- Manually Feeding 446 – 727 hours/year
 - Neck
 - ($OR_{Adj}=2.16$; 95% CI = 1.09–4.80)

Risk Factors for MSS

- Working on a dairy farm (≥ 87 standardized years)
 - Upper Back
 - ($OR_{Adj}=2.58$; 95% CI = 1.09–6.13)
 - Hip
 - ($OR_{Adj}=2.97$; 95% CI = 1.32–6.67)
 - Knee
 - ($OR_{Adj}=2.82$; 95% CI = 1.25–6.37)

Limitations

- Temporal, which is first exposure or disease?
- Selective Survival
- Confounding
- Exposure misclassification
 - Differential reporting due to health outcome
 - Exposures that resulted in MSS
- Generalizability

Questions about the
prevalence study?

Introduction cont'd

- Dairy farmers have also been identified as being at an increased risk of developing knee osteoarthritis (OA) compared to other farming groups and occupations
 - Andersen et al., 1989; Holmberg et al., 2002
- Additionally, exposures that may increase the risk for developing knee OA (e.g. squatting, kneeling) have been associated with agricultural work.
 - Andersen et al., 1989; Cooper et al., 1994; McAlindon et al., 1999; Vingård et al., 1991

Purpose

- Estimate the exposure to knee flexion among dairy farmers during milking and feeding tasks.
 - Compare the exposure to knee flexion across tasks and type of milking facility (stanchion and parlor).

Methods: Exposure Assessment Study



- Knee flexion was recorded during stanchion and parlor milking and feeding tasks for 23 dairy farmers.
- Time spent in knee flexion exposure categories of $\geq 70^\circ$ knee flexion and $\geq 110^\circ$ knee flexion using split plot repeated measures ANOVA.

Results

	Percent Time $\geq 70^\circ$ Knee Flexion	Percent Time $\geq 110^\circ$ Knee Flexion
Facility by Task	Mean (SD)	Mean (SD)
Stanchion Milking (%)	22.0 (15) ^A	17.7 (14.7) ^{A, B}
Parlor Milking (%)	1.39 (1.8) ^{A, B}	0.05 (0.15) ^A
Stanchion Feeding (%)	17.3 (14.1)	2.3 (3.7) ^B
Parlor Feeding (%)	19.9 (24.9) ^B	1.0 (1.9)

^A $p \leq 0.05$ across milking facilities; ^B $p \leq 0.05$ across milking and feeding tasks

Limitations

- Magnitude and duration of knee posture were the only estimates of exposure.
 - Other exposures may contribute to knee MSS were not measured (e.g. physical load).
- Only measured one knee
- Exposure misclassification
- Generalizability

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Questions?