



Research Article

NECK AND SHOULDER RELATED MUSCULOSKELETAL DISORDERS AMONG HANDLOOM WEAVERS

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ABSTRACT

The aim of the present study was to assess the occurrence and persistence of two restrictively defined neck – shoulder disorders among handloom weavers and to assess associated factors at baseline for becoming a case and prognostic factors for remaining case when disorders were already present. The subjects at baseline and at 1 and 2 years follow up underwent a clinical examination of the neck and arm and filled in a questionnaire about current musculoskeletal complaints. Clinical criteria for two main neck – shoulder disorders, rotator cuff tendinitis and myofascial pain syndrome were defined. The overall prevalence of myofascial pain syndrome and rotator cuff tendinitis was 15.2 % and 5.8 % among weavers compared with 9.0 % and 2.2 % respectively among controls. The presence of the disorders was strongly associated with a poor perception of poor general health. Although myofascial pain syndrome showed a ‘U’ shaped association with years of work experience, rotator cuff tendinitis was absent among weavers with less number of years of work experience. Besides years of work experience, the risk of having a neck – shoulder disorder at baseline was significantly associated with high stress. Rotator cuff tendinitis showed a higher degree of persistence than myofascial pain syndrome. Both disorders highly influenced the perception of general health.

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INTRODUCTION

Handloom industry plays a vital role in economic development of the rural masses of India. It is estimated that there are about 4.60 million handlooms in the world out of which about 3.9 million are in India.¹ Weaving is acknowledged to be one of the oldest surviving crafts in the world. In present era of mechanization and standardization the handloom sector provides a unique richness of diverse manual skills, representing the cultural and traditional art forms. Handloom industry is one of the largest employment generating industry after agriculture in India and 77.9% of the workforce in this sector is reported to be women.² Weaving is one of the most tedious professions, requiring long hours of static work and can be a high risk occupation for developing musculoskeletal disorders as awkward posture, repetitive movement and contact stress are common.³ The job of weaving involves monotonous, highly repetitive tasks performed in a sitting working posture with upper back curved and head bent over the loom. The work is visually demanding and requires a high degree of concentration and accuracy.

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A high occurrence of musculoskeletal complaints and neck and shoulder disorders have been found in studies of workers performing repetitive industrial work.⁴ The prevalence of persistent neck and shoulder disorders has been found to increase with years of employment.⁵ However, some workers never experience more than slight or moderate symptoms and never develop clinical neck or shoulder disorders despite many years of work. Knowledge of what makes neck and shoulder complaints develop into chronic conditions is sparse. Most epidemiological studies of musculoskeletal complaints and clinically verified musculoskeletal disorders in the neck and shoulders have been cross sectional, thereby describing a mixture of acute and chronic disorders. A few case – control and follow up studies have reported aetiological risk factors⁶ and prognostic risk factors⁷. Cole and Hudak⁸ looked for evidence of prognosis among workers with non – specific work related musculoskeletal disorders of the neck and arms. The only repeated prognostic findings were duration of symptoms and undefined workplace demands. A two year follow up study⁹ including 96 women in the electronic manufacturing industry, showed that previous physically heavy work, high productivity and previous sick leave were predictors of deterioration of symptoms from the cervicobrachial regions during the follow up period.

An important predictor of improvement was reallocation to more varied work and physical activity in spare time. The aim of the present study was to assess the occurrence and persistence of two restrictively defined neck – shoulder disorders among handloom weavers and to assess associated factors at baseline for becoming a case and prognostic factors for remaining case, when disorders were already present. The overall objective was to obtain knowledge about prognosis that might contribute to future counselling of workers or patients with neck – shoulder disorders.

MATERIALS AND METHODS

The study is a two year follow up study. At base – line and at 1 and 2 years follow up of all participants filled in a questionnaire designed in local language about current musculoskeletal complaints and underwent a standardised clinical examination of the neck and arms. Two hundred and fifty nine weavers were identified and 243 agreed to participate. Two hundred thirty nine weavers responded at base line stage. At baseline the mean (SD) age was 38.3 (10.4) and duration of employment was 13.0 (9.6) years. Exclusion criteria were inflammatory rheumatic disease and disorders caused by trauma. The present study was affected with relatively high dropout rate. One hundred and ten participants dropped out on either the questionnaire or the clinical examination during the 2 year period. The reasons given for dropping out were 43 stopped the work because of reduction of orders, 22 had found other job. 6 had withdrawn from the study, 10 had left for reasons of health, and 29 had other or unknown reasons. To retain as many cases in the follow up analysis as possible round 2 and round 3 were combined. Sixty subjects only participated in the baseline examination and therefore only contributed to the cross sectional analysis. The prevalence of neck – shoulder disorders in the drop out groups was not different from the rest of the cohort (17.3 % v 16.4 %) but they were younger mean (SD) age 35 (12) v 39 (10) and had shorter length of service (10 (11) v 14 (9) years.

Control Group

The baseline control group consisted of 357 subjects with varied non – repetitive work. The group consisted of workers with supervisory jobs, service jobs, office workers. Their base line data was used for the study. The mean (SD) age of the control group was 38.2 (9.4).

Questionnaires

On the day of each clinical examination all participants returned a self administered questionnaire about current musculoskeletal complaints. In the symptom questionnaire which was a modified form of the method for grading severity of chronic pain developed by Von Korff et. al.,¹⁰ the same set of four questions was asked for each of eight body regions; neck, low back, shoulders, elbows, wrists and hands. The questions were answered by an indication on a 10 point scale ranging from 0 to 9. The questions combined intensity and limitation in daily activities over a 3 month period. The four questions asked were an indication of – for example right shoulder – (a) worst trouble (pain or unpleasantness) in the past 3 months, (b) average trouble in the past 3 months, (c) interference in daily activities in the past 3 months and (d) trouble in the past 7

days. Asum score for each region could then be made by adding the scores from the four questions (score range 0-36). When self reported complaints and objective clinical findings were combined to define a myofascial pain disorder in the neck – shoulder region, complaints from both neck and shoulder region were included. Previous studies has shown that complaints from the neck and shoulder region are difficult to separate.¹¹ All participants had returned a baseline questionnaire including questions on work exposure, health, personal factors, social relations, lifestyle and physical activity in spare time. General health perception was assessed by a single item from the short form questionnaire 36 items health survey (SF – 36)¹² which also applied to the present study with a single item on physical functioning. The questionnaire included 23 items from the Karasek and Theore job characteristic scale.¹³ The answer to each item was dichotomised and given a raw score of 1 or 0 and three scales were constructed as raw score summations. Job demand (0 – 3), Job control (0 – 14) and Social support (0 – 6). Subsequently a job strain score was constructed by multiplication of job demand and job control scores (range 0 – 42). An overall stress scale (range 0 – 27) was constructed by addition of 27 dichotomised items from the stress profile questionnaire by Setterlind and Larsson¹⁴ behavioural reactions (nine items), emotional reactions (eight items), cognitive reactions (four items) and psychosomatic symptoms (six items). For the multivariate regression models the job strain, social support and stress scales were dichotomised.

Clinical Examination of the Neck and Shoulders and Diagnostic Criteria

All clinical examinations were done by trained physicians. Neck and Shoulder examinations were focused on palpation tenderness, clinical tests and range of motion of the shoulders. Criteria for neck – shoulder diagnosis included self reported pain as well as objective clinical findings.

Rotator Cuff Tendinitis

Self reported pain in the shoulder region Palpation tenderness at the tuberculum majus humeri or sign of subacromial impingement. Shoulder pain on resisted abduction.

Myofascial Pain Syndrome

Pain in the shoulder or neck region, or both. Palpation tenderness graded 2 or 3 (0 – 3 scale) in a minimum of one of the upper neck muscles and upper trapezius muscle; and in a minimum of one of the supraspinatus and infraspinatus muscle in the relevant neck – shoulder region. Neck – shoulder disorders refers to a subject having either one or both of the two defined disorders.

Analysis

In the cross sectional analysis a Cox's proportional hazards model was applied with a constant follow up time (time of baseline examination) to estimate prevalence ratio for a set of independent predicting variables for the presence or absence of a neck – shoulder disorder. Introduction of interaction terms between age and duration of employment and between job strain and stress in the baseline regression model did not

contribute significantly to the model. One way analysis of variance (ANOVA) was applied to test the hypothesis of equal means, and frequency distributions were compared with the chi-square test. A combination of few cases and a high drop out rate made follow up analyses over three rounds meaningless rounds two (R2) and three (R3) were combined, so the change between case and non – case was analysed as a change between round (i.e baseline) and R₂ or R₃. Cox's proportional hazard analysis to estimate relative risks (RRS) was used and adjusted for multiple potential confounders. Significance was defined as $P < 0.05$.

RESULTS

Baseline scores of neck – shoulder complaints and results from the clinical examination of 243 weavers are presented in Table. 1. Table. 1. Baseline distribution of neck – shoulder complaints and clinically verified shoulder disorders in four groups of weavers.

| | ≤ 2 (n = 32) | 2-10 (n = 80) | 10-20 (n = 67) | >20 (n = 59) |
|--|--------------|---------------|----------------|--------------|
| Neck – Shoulder complaints (%)* | | | | |
| None | 22 | 29 | 24 | 12 |
| Light | 50 | 49 | 42 | 40 |
| Moderate or Severe | 28 | 22 | 34 | 48 |
| Subjects with Verified Shoulder Disorder (%) | | | | |
| Myofascial Pain Syndrome | 19 | 7 | 10 | 31 |
| Rotator Cuff tendinitis*** | 0 | 1 | 6 | 15 |

* None = Neck – Shoulder pain score 0, light neck – shoulder pain score 1 -24 , moderate or severe = neck – shoulder pain score ≥ 24.

*** $P < 0.001$, X^2 test for linear trend = 12.85, $df = 1$.

Table. 4 . Bivariate and multivariate prevalence ratios (PRs (95% CIs) for the risk of having a neck – shoulder disorder at baseline

| | Subjects (n) | Risk of having a shoulder disorder PR | 95 % CI | Bivariate PR | Multivariate * 95 % CI |
|------------------------------|--------------|---------------------------------------|---------------|--------------|------------------------|
| Duration of exposure (years) | | | | | |
| ≤ 2 | 34 | 2.50 | 0.81 to 7.75 | 2.44 | 0.72 to 8.23 |
| 2 - 10 | 83 | 1.00 | - | - | - |
| 10 - 20 | 67 | 1.79 | 0.64 to 5.03 | 1.80 | 0.62 to 5.26 |
| >20 | 59 | 4.29 | 1.71 to 10.75 | 4.44 | 1.54 to 12.78 |
| Age (years) | | | | | |
| ≤ 40 | 141 | 1.00 | - | 1.00 | - |
| >40 | 102 | 1.66 | 0.89 to 3.09 | 0.80 | 0.37 to 2.03 |
| Smoking | | | | | |
| No | 126 | 1.00 | - | 1.00 | - |
| Yes | 112 | 1.55 | 0.83 to 2.90 | 1.62 | 0.83 to 3.13 |
| Body mass Index | | | | | |
| <20 | 37 | 0.86 | 0.35 to 2.13 | 0.72 | 0.26 to 1.83 |
| 20 – 25 | 117 | 1.00 | - | 1.00 | - |
| >25 | 85 | 0.74 | 0.37 to 1.50 | 0.71 | 0.34 to 1.47 |
| Living alone with children | | | | | |
| No | 227 | 1.00 | - | 1.00 | - |
| Yes | 16 | 1.78 | 0.63 to 4.99 | 1.35 | 0.37 to 4.95 |
| Job strain | | | | | |
| Low | 144 | 1.00 | - | 1.00 | - |
| High | 95 | 1.11 | 0.59 to 2.08 | 0.88 | 0.45 to 1.71 |
| Social support | | | | | |
| High | 155 | 1.00 | - | 1.00 | - |
| Low | 83 | 1.59 | 0.85 to 2.98 | 1.66 | 0.86 to 3.23 |
| Stress | | | | | |
| Low | 155 | 1.00 | - | 1.00 | - |
| High | 83 | 2.89 | 1.53 to 5.44 | 2.54 | 1.28 to 5.05 |

Duration of exposure as a weaver

Because of missing data for five subjects, a baseline diagnosis of neck – shoulder disorders could be given to only 238 participants.

The baseline prevalence of myofascial pain syndrome among weavers was 15.2% and 9.0% in the control group (Prevalence proportion ratio PPR = 1.7; 95% confidence interval (95 % CI) 1.1 TO 2.6); 5.8 % of the weavers and 2.2 % of the controls had a verified rotator cuff tendinitis (PPR = 2.26; 95 % CI 1.1 to 5.9). Among weavers the prevalence of rotator cuff tendinitis increased by duration of work, where as myofascial pain syndromeshowed a U shaped trend with the highest frequencies with the shortest and longest duration of work. Thus 'U' trend corresponded to the distribution of moderate to severe neck – shoulder complaints in the four groups of duration of work. Among all participants with moderate to severe neck – shoulder complaints in the screening questionnaire, 62.8 % also reported having neck or shoulder problems, or both for more than 3 months within the past year. This percentage was 14.6 % for participants with minor complaints and 2.0 % (one person) for weavers with no complaint. This aspect of chronicity was independent of duration of work.

The occurrence of sickness absence was limited in this group. Among all subjects 17.8 % reported having had at least 1 day absent within the past year because of musculoskeletal problems including neck, shoulder, arms, hands and back of these neck – shoulder problems were the most common cause of sickness absence.

Having had at least 1 day absent due to neck – shoulder problems within the past year was reported by 11.9 %, where as having had 8 days or more absent was reported by 4.7 %. Results related to association between neck – shoulder disorders at baseline and several potential explanatory variables or confounders are presented in Table. 4. There is an exposure response relation between neck – shoulder disorders and years of work experience as weaver, still with the exception of a high prevalence among the newest recruits, when the same analysis was done with the study group divided into two age groups (younger or older than 40 years), the same association was found. In the full baseline model, stress was significantly associated with having a neck – shoulder disorder. To assess the influence of the neck – shoulder disorders on daily living, examples are given in table 5, in which measured isometric shoulder strength and an item of physical functioning and general health are given for cases and non – cases. Table. 5 . Mean isometric shoulder strength by the status of disorder on right and left shoulder compared with a group with no disorder on either side (distribution of the answers to single items on physical functioning and general health). More than 50 % of the participants with a neck – shoulder disorder described some degree of restriction in lifting or carrying daily groceries and 43 % had estimated their general health as fair or poor. To assess prognostic factors for continuing to have a neck – shoulder disorder two groups where all had been cases (n = 28) at baseline were compared. In R₂ and R₃ 16 remained cases and 12 became non – cases. Among the 28 participants who were cases at baseline, 13 had a rotator cuff tendinitis and 15 had myofascial pain syndrome as the only disorder.

DISCUSSION

The cross sectional part of this study (n = 238) showed a ‘U’ shaped association between years as a weaver and myofascial pain syndrome, whereas the association between duration of employment and rotator cuff tendinitis showed a positive linear trend. The follow up part of the study showed rotator cuff tendinitis to be a very persistent disorder. As it is intended to examine the persistence of neck – shoulder disorders which could be of importance to daily activities and work, efforts were made to clear and rather restrictive diagnostic criteria to separate them from more diffuse conditions when compared with workers with non-repetitive work in control group, the prevalence of shoulder tendinitis and myofascial pain syndrome was significantly higher. The significantly lower shoulder strength among the weavers with neck – shoulder disorders and the reporting of widespread restriction in a simple activity such as lifting or carrying daily groceries gave an additional aspect of the consequences of these disorders. Also both disorders highly influenced the perception of general health. The perception of fair or poor general health could be interpreted as a consequence of neck – shoulder disorders because of the relation between them in the cross sectional analysis. The findings of the study support a hypothesis. Myofascial pain problems are frequent in the beginning of the employment period, then decrease in prevalence and progressively return with duration of employment together with an increase in cases of rotator cuff tendinitis, when employment exceeded to 10 years. Ohlsson et al also found a pronounced exposure – response relation for disorders of the neck and shoulders with duration of exposure in the fish processing industry, but only in the group of women below 45 years of age.

In this study, the crucial factor for a poor prognosis was having a rotator cuff tendinitis. The study concentrated on understanding prevalence, incidence and prognosis of two neck – shoulder disorders among a working group with homogenous exposure. The study supports the multifactorial nature of both aetiology and prognosis of these disorders.

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