



Original Article

Psychosocial Factors and Musculoskeletal Pain Among Rural Hand-woven Carpet Weavers in Iran



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ABSTRACT

Background: Musculoskeletal pain (MSP) is a common and disabling problem among carpet weavers and is linked to physical and psychosocial factors of work. This study aimed to determine the prevalence of MSP, its psychosocial risk factors, and association of pain in each pair of anatomical sites among carpet weavers.

Methods: A cross-sectional study was performed among 546 hand-woven carpet weavers in rural small-scale workshops of Iran. Data were collected by using parts of a standardized CUPID (Cultural and Psychosocial Influences on Disability) questionnaire focused on MSP in 10 body sites, including the low-back, neck, both right and left shoulders, elbows, wrists/hands, individual, physical and psychosocial risk factors. Statistical analysis was performed applying logistic regression models.

Results: Prevalence of MSP in at least one body site was 51.7% over the past month. The most common sites were low back and right shoulder pain 27.4% and 20.1%, respectively. A significant difference was found between the mean number of painful anatomical sites and the level of education, age, physical loading at work, time pressure, lack of support, and job dissatisfaction. In pairwise comparisons, strongest association was found between pain in each bilateral anatomical site (odds ratio = 11.6–35.3; $p < 0.001$).

Conclusion: In home-based workshops of carpet weaving, psychosocial factors and physical loading were associated with MSP. This finding is consistent with studies conducted among other jobs. Considering the preventive programs, the same amount of attention should be paid to psychosocial risk factors and physical loading. Also, further longitudinal studies are needed to investigate the relationship of psychological factors.

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1. Introduction

Musculoskeletal pain (MSP) is regarded as a major health problem worldwide [1–4], and associated with reducing both work ability [5,6], and quality of life; also, sickness absence and enormous direct and indirect economic costs for individual and society are related to this problem [5–7]. In Iran, Disability Adjusted Life Years (DALYs) indices are almost 307,772, 291,305, and 872,633 for

low back pain, knee arthritis, and other kinds of musculoskeletal disorders (MSDs), respectively [8]. In a previously conducted study in the UK, it was found that 2% of the working population between the years of 2009 and 2010, which is almost 572,000 workers at that time, have MSDs; on average, 13.4 days of sickness absence for each worker were reported [9,10]. In addition, MSDs were the main reason of disability in nearly 25% of the 2.5 million workers who were being paid disability benefit [10]. Furthermore, it is reported

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that the resultant disabilities from MSP increased by 45% from 1990 to 2010 [11]. Neupane et al [12] showed that work related disabilities increased from 15% to 22% in 4 years, and the total of pain sites observed among the workers raised as well. Therefore, identification of the risk factors of MSP can be very helpful in developing prevention strategies. In the majority of studies, physical load (excessive repetition, awkward postures, and heavy lifting), and psychosocial factors (job demands, decision latitude, time pressure, job satisfaction, and job control) have been unanimously found to be the main risk factors of work related MSDs [13–15]. In addition, the occurrence of multisite MSP among different jobs and cultures widely differs [15].

Hand-woven carpet weaving, which is usually done at home in small-scale workshops, is a common job in Iran, China, Pakistan, Nepal, Turkey, Russia, India, Egypt, and Afghanistan [2]. In a comparative study conducted by Awan et al [16] on children selected from 10 villages in Pakistan, it was found that working children (628 carpet-weaving workers) have significantly greater odds in developing joint pain, neck/shoulder disorders, dry cough, and cuts/bruises than nonworking children (292 nonworking children). Chakrabarty et al [17] concluded that there is a positive association between child labor in the Indian carpet production and adult earnings.

It is noteworthy that hand-woven carpets are one of the most valuable goods produced mostly in Iran, and are indeed worthy of being exported to other countries. In fact, the incomes earned from selling such products is valuable, considering the ways by which the country's economy and employment can benefit from them [2].

The time when carpet weaving in Iran was taken as a profession goes back to the ancient times: taking archeological findings as an example, the 2,500-year-old Pazyryk carpet is proven to be from around 500 BC. Hand tying or hand knotting is indeed an art. In order for the workers to produce a carpet, one or more weavers work on a loom. In fact, the number of required workers depends on the size of the carpet.

A loom is a frame within which the carpet is made, and also the warp is tightened. Looms are applied to hold the warp threads under tension so as to facilitate the interweaving of the weft threads. A vertical rather than horizontal loom, is more comfortable for workers and reasonably the most used. It should be mentioned that this kind of loom was used by the carpet weavers who participated in the present study. Weavers sit on a bench next to each other and create individual knots row after row. The designs upon which the carpet is shaped are chartered out on a graph by which a map reader or another weaver instructs the graphic designs to the workers who are knotting the carpet. Required tools in this process are scissors, iron rod, levers, and comb beaters. When the carpet is made, it is taken off the loom and then the designs and patterns are trimmed by scissors.

Based on the previously conducted research, high rates of MSP in Iranian carpet weavers have been indicated [1,2,18,19]. In addition, poor design of hand-tools and workstation (e.g., seat, weaving heights, and loom), awkward posture of the neck, shoulders arms, wrists, and knees for long periods, and repetitive movements are the main known risk factors of MSP found among carpet weavers [1,18] (Figs. 1–4).

Appropriate light and air quality of the home-based workshops are highly important: in other words, these two factors could affect the prevalence of self-reported MSP [20].

In a study conducted by Choobineh et al [2] on 1,439 carpet weavers, 15,368 days of reported sickness absence, due mainly to the MSP, were recorded; 3.76% of the participants were not able to get to their work during the previous 12 months. Based on the results of this study, 2.2 million of Iranian carpet weavers are suffering from musculoskeletal problems, also, these problems are



Fig. 1. A woman weaving at a vertical loom with cross-legged on the seat because the seat is low.

considered to be the main reason for 23,496,000 working days being lost [2].

The present study was undertaken because: (1) few studies have been conducted in which home-based hand-woven carpet weavers are taken into account; and (2) almost all the studies in Iran are limited to physical and ergonomic factors. Therefore, it can be implied that there is a great uncertainty about the psychosocial risk factors of MSP.

The aims of this study were: (1) to assess the prevalence of MSP among female rural hand-woven carpet weavers in the north east of Iran; (2) to explore possible work related psychosocial risk factors of MSP among study participants; and (3) to determine the association of pain in each body site with the other sites.

2. Material and methods

A cross-sectional study was performed on 546 female hand-woven carpet weavers who had worked for at least 1 year in home-based workshops; these workshops were located in the villages of Torud, Satveh, and Bidestan, in the Torud Rural District, with an area of 24,800 km², and located at the Central District of Shahroud County at the northeastern border of the Great Salt Kavir of Iran.

The female workers of the abovementioned villages were selected for the present study because most of them had carpet looms in their homes and carpet weaving was a part of their daily activities as well as a basic source of their family incomes.

In these areas, the selected 563 women who came from 769 families spend 6 d/wk working as carpet weavers. The carpet weavers were informed about the study by local health staff through public notices in rural health center and also at few workshops.



Fig. 2. A woman sitting on a wooden flat; there is not adequate space in front of her legs for free leg movements.

The participants were briefed about the study; then, those who gave their verbal consent were included in the study.

Since female carpet weavers only receive primary health care from rural health centers and specific facilities for their workshops, only 3% of them did not participate in this study; it was because of

either sickness or being in travel at the time of data collection. The characteristics of these workers did not differ significantly from those who participated in this study.

2.1. Data collection

The study was conducted from February 2012 to April 2012. The research group spent every business day of each week, Saturday–Thursday, to collect the required data (Friday, in accordance with the Persian calendar, is the weekend, and was thus excluded from our schedule). Also, we set up a time frame for each day to collect the data, starting from 07.30 to 14.00.

Trained local healthcare workers collected the data through four parts of a standardized CUPID (Cultural and Psychosocial Influences on Disability) questionnaire [21] with few additional questions asked at interview held in the rural health center of each village. Only women, as a tradition, weave carpet in these areas.

The original questionnaire included seven sections, of which we used four in this study. The first section had to do with individual factors, including age, level of education (categorized as: illiterate, < 12 years, and \geq 12 years) because of low education of the study population, height, work h/wk, marital status, years in main jobs, number of children, cesarean delivery, background disease of family, and ownership of a carpet loom. The second section covered the issue of pain in each one of 10 body sites (namely low back, neck, both right and left shoulders, right and left elbows, right and left wrists/hands, and right and left knees) occurred and lasted for \geq 1 day over the past month and past 12 months [22]. Physical loading at work was the third section of the applied questionnaire (repeated movements of the wrist or fingers for > 4 hours, lifting weights of \geq 25 kg by hand, working with the hands above shoulder height, and repeated bending and straightening of the elbow and kneeling or squatting for > 1 hour in an average working day). These cases were graded based on how many of these four activities have been done on the basis of a previous study [23]. Psychosocial risk factors of work were the fourth section (time pressure at work, whether it is working under pressure to complete tasks within a fixed time or a target number of tasks to be finished

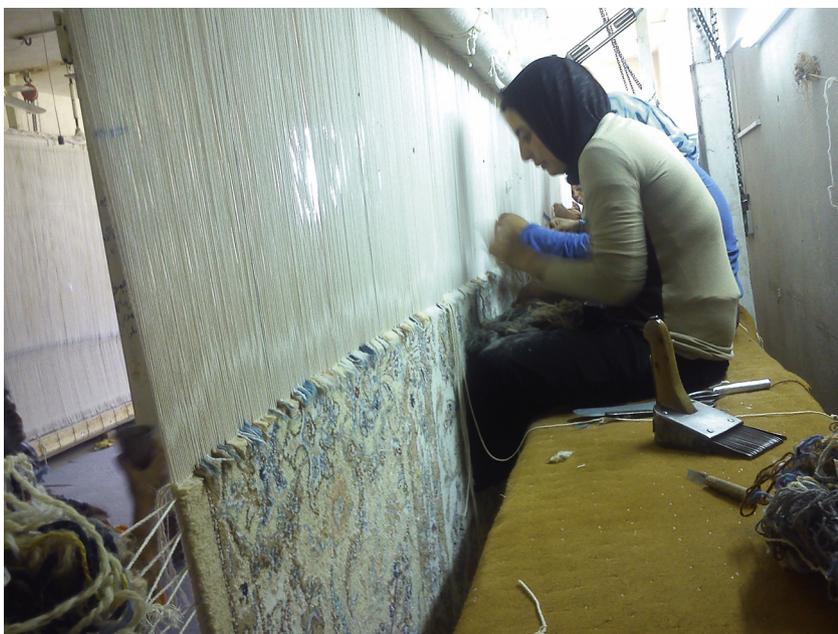


Fig. 3. A girl weaving at a vertical loom with an awkward back posture; weaving comb uses in carpet hand weaving.



Fig. 4. Women weaving at a vertical loom on low padded seat without back support.

in the working day on basis of a previous study [23], lack of support from colleagues and/or supervisor at work, job dissatisfaction, lack of control, and job insecurity).

The original CUPID questionnaire was translated from English into Farsi, and back translated into English and the required revisions were done; then the prepared questionnaire piloted among oil field workers [24]. Finally, the questionnaire was used for the study among computer office workers and nurses [25,26]. For this study, the applied questionnaire was piloted among 30 carpet weavers who participated in this research. The reason is the lower level of education of the participants. Finally, extra questions (relating to the level of education, number of children, cesarean delivery, ownership of the loom, accident, etc.) were added.

When the data were collected and entered into the computer, it was found that 2% of questionnaires had missing data included demographic factors. Hence, these ones were sent back to participants in order to fill the missing data.

2.2. Statistical analysis

Student's *t*-test and one-way analysis of variance were used to compare mean difference between-group of the multisite MSP. The simple association of dependent and independent variables was investigated using Pearson's moment correlation coefficient. Also, the association between pains in each pair of anatomical sites was assessed by binary logistic regression models. In each model, one of the pain sites was considered as dependent variables while the other sites were taken as independent by controlling age.

A *p* value < 0.05 was taken to be significant. Statistical analysis was carried out with STATA/SE version 10 (Stata Crop LP, College Station, Texas 77845, USA) and SPSS version 18 (SPSS Inc., Chicago, IL, USA) software.

Ethical approval for this research received from the Research Committee of Shahrood University of Medical Sciences, Shahrood, Iran.

3. Results

For this study, 546 female carpet weavers aged 12–63 years were asked to participate. Overall response rate was 97%, although 30 of them were excluded because of having pain from unrelated events, such as an accident. Therefore the statistical analysis was performed on the collected data from 516 participants.

Table 1 indicates the demographic characteristics of the participants. The mean time in the occupation was 14.55 ± 9.8 years; the mean time the weavers spent working was 42.37 ± 10.3 h/wk; 54.1% of the participants were married; and 12.6% were illiterate.

Based on the results, 51.7%, 33.3%, and 21.5% of the participants complained of having pain in at least one body site, two body sites, and more than two sites, respectively, during the past month. It was found that the most common sites are the low back (27.4%), right shoulder (20.1%), left shoulder (17.6%), right wrist/hand (17.6%), left knee (13.4%), right knee, left wrist/ hand, neck, and right and left elbows (data not shown).

Table 2 shows the univariate comparisons of the risk factors with the number of painful anatomical sites recorded in the past month. Based on the results, a significant association was found between some of the risk factors and the number of painful anatomical sites. The risk factors were the years of being a carpet weaver (Pearson's correlation coefficient = 0.33), level of education (the number of pain sites tended to decrease with higher level of education, $p < 0.001$), age (the number of painful sites showed an increasing trend with ageing, $p < 0.001$), physical loading at work

Table 1
Characteristics of the study population, rural hand-woven carpet weavers in north-eastern Iran, 2012

Variables	Mean ± SD
Years in main occupation	14.55 ± 9.77
Time in main job (h/wk)	42.37 ± 10.34
Height (cm)	157.13 ± 6.17
Categories	Frequency [n (%)]
Marital status	Single 237 (45.9) Married 279 (54.1)
Education (y)	Illiterate 65 (12.6) < 12 380 (73.8) ≥ 12 71 (13.8)
Age (y)	≤ 18 82 (15.9) 19–28 209 (40.5) 29–38 111 (21.5) ≥ 39 114 (22.1)
No. of times physically loaded at work	≤ 2 113 (22.0) 3 115 (22.3) 4 234 (45.3) 5 54 (10.5)
Psychosocial factors	
Time pressure	Yes 415 (80.4) No 101 (19.6)
Lack of support	Yes 93 (18.0) No 423 (82.0)
Job dissatisfaction	Yes 208 (40.3) No 308 (59.7)
Job insecurity	Yes 21 (4.1) No 495 (95.9)
Lack of control	Yes 14 (2.7) No 502 (97.3)

(most of the painful anatomical sites were reported by the participants who had the highest physical loading at work, $p < 0.001$), time pressure ($p < 0.001$), lack of support ($p < 0.001$), and job dissatisfaction ($p = 0.001$). However, job insecurity and lack of

Table 2
Univariate comparisons of risk factors with the number of painful body sites, rural hand-woven carpet weavers in north-eastern Iran, 2012

Variables	Number of painful body sites in the past 1 month
Demographic factors	r p
Years in main occupation	0.334 < 0.001
Hours per week in main job	0.015 0.734
Height (cm)	-0.060 0.174
Categories	Mean ± SD p
Marital status	Single 0.81 ± 1.31 < 0.001 Married 1.92 ± 2.28
Education (y)	Illiterate 2.28 ± 2.54 < 0.001 < 12 1.42 ± 1.92 ≥ 12 0.57 ± 1.19
Age (y)	≤ 18 0.61 ± 0.99 < 0.001 19–28 0.98 ± 1.50 29–38 1.87 ± 2.51
No. of times physically loaded at work	≥ 39 2.31 ± 2.23 < 0.001 ≤ 2 0.74 ± 1.26 3 1.09 ± 1.65 4 1.07 ± 2.15 5 2.24 ± 2.48
Psychosocial factors	
Time pressure	Yes 1.54 ± 2.16 < 0.001 No 0.87 ± 1.25
Lack of support	Yes 2.12 ± 2.30 < 0.0001 No 1.25 ± 1.87
Job dissatisfaction	Yes 1.78 ± 2.24 0.001 No 1.16 ± 1.74
Job insecurity	Yes 1.86 ± 2.20 0.292 No 1.39 ± 1.97
Lack of control	Yes 1.50 ± 2.03 0.870 No 1.41 ± 1.98

control at job did not seem to have a significant influence on the number of painful sites ($p > 0.05$).

The association of pain in each of the body sites with the pain in other sites, by odds ratios (ORs) and 95% confidence intervals, is shown in Table 3. The odds of low back pain among the participants who have pain in their right shoulder and left knee increases by 2 times and 2.76 times, respectively. Also, odds of neck pain among the subjects who have pain in their right shoulder, left shoulder, and left knee increases by 3.05 times, 3.25 times, and 1.92 times, respectively. The strongest association was found between every bilateral site (ORs = 35.4, 27.4, 15.3, and 10.4 were found for right and left shoulders, right and left elbows, right and left wrists/hands, and right and left knees, respectively).

Right shoulder pain was related to left shoulder pain in the bilateral, right elbow in adjunct, and right wrist/hand with ORs = 4.22, 35.4, and 2.62, respectively. Left shoulder pain was related to left elbow pain in adjunct with OR = 6.34. Right elbow pain was associated with left elbow in bilateral with OR = 27.4, right wrist/hand in adjunct with OR = 5.93, and right knee pain with OR = 3.72; also, left elbow pain was associated with left wrist/hand in adjunct with OR = 10.6, and left knee pain with OR = 4.7.

The confidence intervals of ORs, for right and left elbow pains, found in this study increased widely; the reason is due to the small number of participants in the analyzed strata.

4. Discussion

Based on the results, the prevalence of MSP found in at least one, two, and more than two body sites during the past month was 51.7%, 33.3%, and 21.5%, respectively. The most common sites, in order of their prevalence, were low back, right shoulder, left shoulder, right wrist/hand, left knee, right knee, left wrist/hand, neck, right elbow, and left elbow. Figs. 1 and 2 show a female carpet weaver who had to sit in a cross-legged position due to the inefficient height of and inadequate space in front of her legs for free leg movements. Figs. 3 and 4 show the women sitting before a vertical loom with awkward back posture without any support.

Considering the problems approached in this study, the results showed that our findings, in numerical terms, are lower than those reported in the other studies conducted on Iranian carpet weavers [1,2]; this could be due to differences in the age, work experience, and level of education of the participants as well as their ergonomic situation at workstations with the study groups being worked with in the previously conducted studies. In the present study, range and mean ± standard deviation (SD) for the participants' age were 12–63 years and 29.03 ± 10.44 years. The corresponding amounts reported in the other two studies were 13–81 years and 31.21 ± 11.22 years, and 13–70 years and 35 ± 13.943 years [1,2]. Range of work experience and mean ± SD in our study were 1–45 years and 14.55 ± 9.8 years, respectively, while the corresponding factors reported in the other studies were, respectively, 1–60 years and 20.53 ± 14.82 years, and 1–75 years and 16.83 ± 12.78 years [1,2]. Considering the education level of the carpet weavers, 12.6%, and 13.8% of our study group were respectively illiterate and received diploma or higher degrees, in comparison with 21.7% illiterate and 5.9% diplomas and higher level of education among the participants in another study. In a study conducted by Motamedzade and Moghimbeigi [1], 74.4% of carpet weavers had either primary school literacy or no formal education at all.

Furthermore, as mentioned above, all of the looms used by the participants in this study are vertical, which is safer than horizontal looms in terms of body posture. However, in a study conducted by Choobineh et al [2], 14% of the looms were horizontal. Also a different prevalence of MSP among carpet weavers in these studies could be related to the differences in psychosocial or psychological

Table 3
Prevalence of musculoskeletal pain in the past month at ten anatomical sites and estimated logistic regression coefficients for association between pain at pairs of sites among rural hand-woven

Anatomical site	Prevalence* of pain in past month (%)	Odds ratios (95% confidence intervals)																		
		Low back	Neck	Right shoulder	Left shoulder	Right elbow	Left elbow	Right wrist/hand	Left wrist/hand	Left wrist/hand	Right knee									
Low back	27.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Neck	10.3	1.79 (0.83–3.87)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Right shoulder	20.1	2.01† (1.03–4.03)	3.05† (1.15–8.13)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Left shoulder	17.6	1.87 (0.92–3.84)	4.25† (1.60–11.3)	35.40† (16.9–73.9)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Right elbow	8.6	0.61 (0.24–1.54)	4.22† (1.42–12.50)	0.67 (0.21–2.18)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Left elbow	5.8	1.81 (0.67–4.96)	0.68 (0.39–3.91)	0.37 (0.10–1.33)	6.34† (1.79–21.90)	27.40† (8.40–89.90)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Right wrist/hand	17.6	1.64 (0.86–3.14)	0.94 (0.37–2.39)	2.62* (1.15–5.96)	1.29 (0.54–3.08)	5.93† (2.26–15.50)	0.27 (0.08–1.06)	—	—	—	—	—	—	—	—	—	—	—	—	—
Left wrist/hand	11.9	0.97 (0.46–2.04)	1.99 (0.76–5.27)	0.94 (0.35–2.52)	0.94 (0.34–2.55)	0.77 (0.24–2.41)	10.6† (3.32–34.10)	15.3† (7.60–30.70)	—	—	—	—	—	—	—	—	—	—	—	—
Right knee	12.8	1.59 (0.79–3.21)	2.11 (0.87–5.13)	2.46 (0.90–6.67)	0.49 (0.17–1.41)	3.72† (1.31–10.60)	1.92 (0.57–6.44)	1.44 (0.61–3.42)	0.63 (0.23–1.71)	—	—	—	—	—	—	—	—	—	—	—
Left knee	13.4	2.27* (1.16–4.43)	2.92* (1.22–6.98)	0.55 (0.19–1.51)	1.62 (0.59–4.47)	0.24 (0.05–0.86)	4.70† (1.30–17.10)	1.31 (0.51–2.89)	1.48 (0.56–3.94)	10.40† (4.98–21.70)	—	—	—	—	—	—	—	—	—	—

* Withdraw participants (n = 30) due to history of accident.

† Odds ratios adjusted for age.

‡ p < 0.05.

factors, and environmental factors (lighting and air quality of the home-based workshops).

Choobineh et al [2] assessed the MSP among 1,234 carpet weavers from nine provinces of Iran. Their study indicated that the most common sites are shoulders (46.9%), low back (42.2%), wrists (36.5%), knees (33.4%) and neck (32.1%) in the previous 12 months [2]. Based on their result, shoulders and low back were recognized as the two common sites found among the participants, which is in line with the findings of the present work. Moreover, in a study conducted by Motamedzade and Moghimbeigi [1] on upper extremity MSDs in 626 female carpet weavers from three provinces of Iran, the most prevalent pains were in the shoulders (71.4%), wrists (43.8%), elbows (29.9%), and forearms in the past year [1].

In another study on carpet weavers in Tabriz, neck, lower back, and ankle feet were found to be the most reported areas of which the workers suffered from pain [20]. Based on a study by World Health Organization in a sample of rural population of Iran, the most prevalent MSDs during the past 7 days were knee pain, low back, and shoulder pains [27].

Afshari et al [19] indicated that not only poor design of workstation, but also awkward posture of the trunk, low height of the seat, and speed of arms could be the highest risk factors for back and shoulder pains among carpet weavers.

The other studies among carpet weavers in Iran have pointed to the ergonomic risk factors as the cause of MSP, including loom and seat type (ill-designed weaving workstations), weaving style (e.g., Turkish weaving style in which the weaving combs weights 300–1,380 g, compared with Persian weaving style with 1,700–2,000-g combs), working posture, design of carpet-weaving hand tools and working Hours per day, and work experience. In addition, there are other individual factors causing MSP, including marital status and age [1,18]. It is noteworthy that psychosocial risk factors were not investigated in these studies.

From the statistical point of view, the results showed that the number of painful musculoskeletal sites is correlated with the following factors: the years one spends working as a carpet weaver, level of education, age, physical loading at work, time pressure, lack of support, and job dissatisfaction; however, job insecurity and lack of control at work did not show significant associations with the pains. This could be due to the high number of work places and ever increasing demand for employing carpet weavers in these villages.

In general, our findings showed that, similar to the causes of work-related pain among the workers of large scale industries, psychosocial risk factors and physical loading are associated with the number of MSP in home-based small scale workshops.

Previous studies among carpet weavers have focused only on the role of physical workload factors. Therefore, due to the lack of study in this area, we could not find any similar study to compare our results with. However, a study among nurses, office workers, and other workers revealed that both physical activity at work and psychosocial factors have a stronger association with the number of anatomical sites, in comparison with the other factors [23].

Sembajwe et al [28] indicated that an important factor for multisite MSP among nurses is managerial support. In a study conducted by Haukka et al [29] on the kitchen workers, low job control and low managerial support were found to be the predictors of multisite pain after 3 months. Time pressure, job dissatisfaction, and job insecurity in some of the considered jobs have been reported as significant risk factors for developing MSDs, while in the other studies these factors were found to be insignificant [7,9,30]. In a survey on 404 workers selected from 29 jobs and 23 companies with medium-to-large workplaces in South Australia, it was found that job dissatisfaction and medium (vs. large) size of work place (OR = 1.80) are associated with MSP [30].

Significant association of age, level of education, marital status, and years of being in the occupation with MSDs found in the present study are in line with the findings of other studies [1,31–36]. A study in an urban informal settlement (i.e., slum) population in India showed rheumatic MSDs are more prevalent in the illiterate participants (31.1%) than in those with upper secondary education and graduates joined (5.9%) [37]. Another study in Iran indicated that MSDs among the workers of petrochemical industries are significantly associated with their educational level [38]. It seems that the workers, who have higher education, pay more attention to their health as well.

A clear explanation for the association of multisite pains with marital status can be explained via considering and assessing the life style of the married women in Iranian culture. In other words, the roles of couples are traditionally defined; in fact, women take care of household works while men are responsible for bringing income and taking care of outside problems. Considering this, once a woman becomes involved with another job, carpet weaving in this case, she has to take care of both of her careers. This could put a lot of pressure on these female workers. Regarding the pair-wise comparisons, a strong association was found between pain in each pair of bilateral and adjunct anatomical sites, which is consistent with the results of another study [23]. It seems that these sites might share etiological factors.

To the best of our knowledge, the association of the physical load and psychosocial risk factors with MSP among carpet weavers in Iran has never been studied, and the present work is the first one in which this approach is taken. In addition, using a standard questionnaire that received high response rates can be considered as another point of strength in this study. The present work is a questionnaire-based study without clinical examination, which could be its limitation.

To prevent abovementioned problems regarding the main issue of the present study, ergonomic intervention strategies with the purpose of reducing the risks of the monotony of tasks should be taken into consideration; besides, making sure of ergonomic work load (neither too much nor too little) deadlines and demands, good communication, job satisfaction, and problems being reported, monitoring and control overtime working, and providing appropriate training are highly recommended.

Finally, the authors suggest that both psychosocial work factors and physical loading factors in developing future preventive programs should be taken into account. Also, further longitudinal studies are needed to investigate the relationship of psychological risk factors with MSDs among carpet weavers.

Conflicts of interest

All contributing authors declare no conflicts of interest.

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