

ORIGINAL ARTICLE

PREVALENCE AND ASSOCIATED FACTORS OF MUSCOSKELETAL DISORDERS AMONG ARABIC CALLIGRAPHERS LIVING IN SAUDI ARABIA: A CROSS-SECTIONAL STUDY

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Abstract

Musculoskeletal disorders (MSDs) represent a significant occupational problem. Only limited research is available about the impact of MSD on the active Calligraphers. Uncertainty remains about MSD prevalence and associated factors among Arabic calligraphers in Saudi Arabia. A cross-sectional study was conducted among 124 Arabic calligraphers in Saudi Arabia. Data were collected by telephonic interviews using a structured questionnaire that consisted of the validated Standardized Nordic Questionnaire, socio-demographics and working characteristics. A total of 124 completed questionnaires were analyzed. The majority were men (96.8 %), worked for less than 10 hours/week (63.7%). The majority had musculoskeletal pain (59.7%) and about half of them worked for less than 15 years. The most commonly reported MSD was back pain (26.6%) followed by neck pain (21.0%) and shoulder pain (12.1%). In multiple logistic regression the significant predictors in the model were: not exercising (OR=7.1, 95% CI 2.6-19.2), age ≤ 40 (OR=2.8, 95% CI 1.1- 7.3), worked for ≤ 20 years (OR=3.4, 95% CI 1.3 -9.1) and being a professional calligrapher (OR=2.3, 95% CI 1.1 - 6.2). The total model is significant ($p < 0.001$) and the adjusted r^2 square= 0.37. MSDs among Arabic calligraphers in Saudi Arabia is relatively high; further clinical assessment is needed. We recommend that health authority in Saudi Arabia should increase the awareness among calligraphers about MSDs and its prevention.

Keywords: Musculoskeletal disorders, calligraphers, Saudi Arabia

INTRODUCTION

Musculoskeletal disorders (MSDs) represent a major occupational hazard in the contemporary world that expands over a wide range of work sectors.¹ Musculoskeletal impairment ranked first in chronic disabilities in the United States² and chronic musculoskeletal pain is reported by 1 in every 4 people in a survey in developing and developed countries.³ The alarming statistics of MSD have driven an extensive drive to explore the various risk factors that could play a role in the development of MSD in different occupations.^{4,6}

Calligraphy is (Greek: kalligraphía – neat handwriting, from kallós – beauty and grápho – writing), the art of visual, beautiful and legible handwriting.⁷ Arabic Calligraphy has always been intimately linked with Arab and Islamic culture and architecture. The Arabic calligraphers' job involves highly repetitive tasks performed in a sitting posture with upper back curved and forward head during writing. MSD affects the body's muscles,

bones, tendons, ligaments, nerves, and the localized blood circulation system.⁸ The constant loading of the muscles in the neck, shoulder and back may ranges from discomfort, minor aches and pains to more serious and even medical conditions requiring time off work and medical treatment.⁸ Chronic pain is the most common complaint of musculoskeletal disorders. Unlike acute pain, chronic pain is caused by inflammatory process adjacent to the nerves and may be associated with nerve damage. Chronic pain is usually difficult to treat with analgesics and requires long and complex pharmacological and non-pharmacological management.⁹

Most work-related MSDs developed over time and usually with multiple exposure to certain risk factors at work or from the working environment.¹⁰

¹¹ The disability burden brought by MSD has its impact on quality of life: physical, mental, social and financial aspects.¹² Moreover, MSDs also affects the economy of a country by frequent

discontinuing of work¹³ and provided health care cost.^{14 15}

In recent studies, MSDs prevalence rates have been found to be 68% for music teachers in Perth, Australia¹⁴, and 55% and 51.4% for school teachers in Brazil and Turkey respectively.^{16 17} The affected body areas vary with the various risk factors associated with the type of work. The work task of Calligraphy requires concentration and repetitive movements using their wrist joint and maintaining one posture for a long period of time. Inappropriate furniture and gauche position that are commonly adopted during writing are identified as risk factors for MSDs pain. Information about work-related nature of MSDs, specifically among calligraphers is lacking. The aim of this study was to establish the prevalence, possible associated risk factors and impacts of MSD among calligraphers in Saudi Arabia.

METHODOLOGY

Study design and participants

This cross-sectional study was carried out among a universal sampling of 124 calligraphers that live in Saudi Arabia and are members of the Saudi Scientific Association of Arabic Calligraphy. The study was conducted during the period November 2014 to January 2015, which included both males and females.

Research instruments

The questionnaire has three parts. The first part included questions on socio-demographic data such as age, gender, nationality. The second part included questions on MSDs by using a modified Standardized Nordic Questionnaire. The Arabic version is validated and has a Chronbach's alpha (0.87)¹⁸. The scoring system used in this study was a similar to the scoring system used in previous study¹⁸ by describing (%) of pain occurring in a given body area. The third part included questions on the associated factors of MSPs such as the weekly working hours, hours spent in a session of writing, duration of being a calligrapher, Is "Calligraphy" a "Craft" or a "Hobby" and exercise. A worker was considered to have an MSD if he/she had pain in one of the following: neck, shoulder or back. A new variable was created with two options: had MSDs and had no MSDs. The questionnaire was pre-tested on 5 calligraphers to detect any ambiguity in its design.

Data collection

Data were collected using the validated Standardized Nordic Questionnaire over the telephone for 20 to 30 minutes of the interview. Each contributor was informed of the study purpose, the assurance of anonymity and the entitlement to accept or decline participation in the study. Contact numbers of the calligraphers were obtained from the *Saudi Scientific Association of Arabic Calligraphy* (SSAAC).

Statistical analysis

The analysis was performed using Statistical Package for Social Sciences (SPSS) software version 17. Descriptive analysis was conducted to obtain the frequencies, mean, SD and median. All continuous variables were categorized to ease analysis. To assess the relationship between the dependent variables and the categorical independent variables, Chi-square test was conducted to obtain the crude odds ratio and 95% CI. Simple logistic regression analysis was conducted for the variables with more than two categories. Multivariate binary logistic regression analysis was conducted to obtain the adjusted OR. MSDs were recoded as "Yes"=1 and "No"= 0. Factors associated with the dependent variables in the univariate analysis were included in the multivariate analysis. Multicollinearity was checked, and the level of significant was set to be 0.05.

Ethics approval and consent to participate

All patients provided written informed consent and the protocol and informed consent forms were approved by the Committee on Bio Medical Ethics, Faculty of Medicine, Umm Al-Qura University vide letter No.: HAPO-02-K-012-2014-05-45.

RESULTS

A total of 124 participants completed the interview, occupationally professional calligraphers were (43.5%) while non-professional (56.5%), 33.1% of them have worked for more than twenty years and half of them doing calligraphy since more than fifteen years. The majority were men (96.8 %) followed by female (3.2%). The mass worked for less than 10 hours/week (63.7%). Out of all participants, majority were Saudi nationals (63.7%) and non Saudi (36.3%). The majority had musculoskeletal pain (59.7%). Back pain was reported in the most severe (44.6%) followed by neck pain (35.0%) then by shoulder pain (20.4%) (Table 1).

Table 1: Socio-Demographics of Arabic calligraphers and body's distributions of MSD

Variables	Frequency	%
Gender		
Male	120	96.8
Female	4	3.2
Age		
18-40	84	67.7
>40	40	32.3
Nationality		
Saudi	79	63.7
Non Saudi	45	36.3
Occupation		
Professional Calligrapher	54	43.5
Non Professional Calligrapher	70	56.5
How many hours do you spend in calligraphing weekly?		
10 or less	73	58.9
More than 10	51	41.1
What age have you started doing calligraphing?		
20 or less	83	66.9
More than 20	41	33.1
Do you exercise regularly?		
Yes	74	59.7
No	50	40.3
How many years have you been practicing calligraphy?		
15 years or less	62	50
>15 years	62	50
Pain in neck, shoulder or back		
Yes	74	59.7
No	50	40.3
Where is the pain most sever? (total=74)		
Back	33	26.6
Neck	26	21.0
Shoulders	15	12.1
Not applicable	50	40.3

Musculoskeletal pain was significantly higher among those who aged ≤ 40 years ($p=0.004$), those who worked as calligrapher for ≤ 20 years ($p=0.004$) those who did not exercise ($p=0.002$) those who spend more than 2 hours in each session ($p<0.001$) and those who reported calligraphy is an occupation compared to those who said calligraphy is a hobby ($p=0.008$) and those who worked more than 10 hours weekly ($p=0.38$) (Table 2).

In multiple logistic regression the significant predictors in the model were: not exercising ($OR=7.2$, 95% CI 2.6-19.7), age ≤ 40 ($OR=2.8$, 95% CI 1.1- 8.0), worked for ≤ 20 years ($OR=3.1$, 95% CI 1.2 -8.5) and being professionally calligrapher ($OR=2.6$, 95% CI 1.1 - 6.2). The total model is significant ($p<0.001$) and the adjusted r square= 0.37 (Table 3).

DISCUSSION

The findings of this study focused to cover a neglected occupational health area aimed to focus on a class of artists who gain very little attention while they are presenting a unique art, deeply rooted in the ancient Islamic culture as the art of

the Holy Qur'an writing and decoration of heritage places worldwide. Arabic calligraphy developmental stages had connected to the development of the social civilization for centuries. Our findings showed a high prevalence of musculoskeletal pain (59.7%) among Arabic calligraphers. The most common area of musculoskeletal pain was the lower back (26.6%) followed by the neck (21%), and the lowest area of musculoskeletal pain was the shoulder area (12.1%). The prevalence of this study was consistent with those reported among classic musicians (75%) and (64%) among Jazz and Pop musicians.¹⁹ On reviewing the literature, there were no studies on MSDs among painters and sculptors. Musculoskeletal pain among Chinese calligraphers showed different distribution where neck discomfort was the commonest (13.5%) followed by the wrist (10.8%), shoulders (8.1%) and back (8.1%).²⁰ Though, it is hard to compare this study results to Chinese calligrapher study due to different objectives of the later. The body distribution of affected parts with MSDs was very similar to our study of musculoskeletal pain among university students.²¹

Table 2: Factors associated with MSDs among Arabic calligraphers

Variables	Have MSD		OR	95% CI		P-value
	Yes N (%)	No N (%)		LOWER	UPPER	
Age			3.3	1.528	7.326	0.002
18-40	58 (69.0%)	26 (31.0%)				
More than 40	16 (40.0%)	24 (60.0%)				
Nationality			1.1	0.464	2.066	0.956
Saudi	47 (59.5)	32 (40.5)				
Not Saudi	27 (60.0)	18 (40.0)				
How many hours do you spend weekly?			0.4	0.212	0.965	0.038
10 or less	38 (52.1%)	35 (47.9%)				
More than 10	36 (70.6%)	15 (29.4%)				
What age have you started doing calligraphy?			3.1	1.425	6.720	0.004
20 or less	57 (68.7%)	26 (31.3%)				
More than 20	17 (41.5%)	24 (58.5%)				
Hours spent per session			0.2	0.083	0.406	<0.001
2 or less	16 (34.8%)	30 (65.2%)				
More than 2	58 (74.4%)	20 (25.6%)				
Do you exercise regularly?			0.2	0.093	0.487	<0.001
Yes	34 (45.9%)	40 (54.1%)				
No	40 (80.0%)	10 (20.0%)				
Is "Calligraphy" to you a "Craft" or is it a "Hobby"?			0.4	0.171	0.778	0.008
Hobby	34 (49.3%)	35 (50.7%)				
Craft	40 (72.7%)	15 (27.3%)				

The gender difference was reported to be insignificant in this study. There were a small number of female calligraphers in this study compared to males, but there is evidence from the literature that female calligraphers play a role in

mastering this kind of art.²² A study aimed to compare gender MSDs among computer artwork reported female gender to have a higher risk (70%) to develop neck and upper extremities pain compared to male gender (50%).²³

Table 3: Multiple logistic regressions of factors associated with MSDs among Arabic calligraphers

Variables	B	SE	Wald	Adjusted OR	95.0% CI for EXP (B)		P-value
					Lower	Upper	
Age ≤40	1.092	0.50	4.714	2.8	1.1	8.0	0.030
Professional calligrapher	0.948	0.44	4.503	2.6	1.1	6.2	0.034
How many hours weekly? 2(1)	0.629	0.45	1.907	1.9	0.8	4.6	0.167
Working for ≤20 years	1.144	0.50	5.065	3.1	1.2	8.5	0.024
No Exercise	1.976	0.51	14.813	7.2	2.6	19.7	<0.001

In this study, statistically significantly risk factors associated with MSDs were age and years of experience. Younger calligrapher and less years of experience were almost 3-fold more likely to have MSDs compared to more experienced calligraphers. This finding is well explained and described in the ergonomic literature as "Healthy Worker Effect" where those who experience pain tend to leave

the job due to extreme body pain¹⁹ and/or probably the practicing experienced calligraphers get more experience in adapting better postural positions that could minimize their discomfort at work. The healthy worker effect revealed in this study was observed in a study reported MSDs among orchestra musicians²⁴, it also had been shown in other stress related jobs²⁵ where the

workers would terminate their job because excessive physical or psychological load.

Daily hours of work (more than 10 hours) and being a professional calligrapher were significantly associated with MSDs. This was also consistent with findings among classical musicians²⁶ where professional people tend to be overwhelmed by the quality of their artwork if it affects their income²⁷. The effect of exercise in preventing MSDs needs no emphasizes²⁸. This study reported about 7-folds increase of MSDs among calligraphers who are not practicing any kind of physical exercise compared to those who maintain physical activity regularly.

This study focused on Arabic calligraphers as artists who must receive more attention from the perspective health point of view, to maintain and develop an ancient art linked to the Islamic culture and fanned by Muslims around the world. The reported findings provide a basis to direct the attention of occupational health workers toward a neglected area of occupational health. The self-reported survey and limited sources of data gathered were done by personal efforts of the researchers, lack of any kind of financial support from any organization render the study far from dig deeply to the root of the problem and carried out the ergonomic physical assessment. However, the aims of the study were achieved but preclude causality. There was a gap noticed in (95%CI) about exercise question, this is reflecting that most of calligraphers are not exercising regularly and make all responses pooled at one answer and reflected as huge gap in confidence interval.

CONCLUSION

We could conclude that MSDs among Arabic calligraphers in Saudi Arabia is relatively high; further clinical assessment is needed. We recommend that health authority in Saudi Arabia should increase the awareness among calligraphers about MSDs and its prevention.

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CONFLICT OF INTERESTS

The authors declare that they have no competing interests.

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