

ORIGINAL RESEARCH

Risk Factors for Musculoskeletal Symptoms Among Korean Broadcast Actors

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Abstract

BACKGROUND Musculoskeletal diseases (MSDs) are functional disabilities in the musculoskeletal area that occur when continuous damage to the muscles or tissues is caused by performing a repetitive task. These diseases are usually found in the waist, shoulder, neck, arm, and wrist. MSD is also referred to as cumulative trauma disorder, repetitive strain injury, occupational overuse syndrome, and visual display terminal, depending on the country. The condition is now commonly referred to as work-related musculoskeletal disorder.

OBJECTIVES The aim of this study was to develop a prevention plan against musculoskeletal disease and to provide better health care to broadcast actors by understanding the association between musculoskeletal symptoms and working conditions. The results of the study can be utilized to maintain effective systematic resources to treat such diseases.

METHODS A survey was conducted in Seoul between January 1 and May 10, 2014 with broadcast actors working in the South Korean entertainment industry.

FINDINGS Tests with respect to musculoskeletal symptoms indicated that the study participants were likely to experience having musculoskeletal symptoms in the shoulders, waist, neck, leg/foot, hand/wrist/finger, and arm/elbow. Most of the participants reported pain on both sides of their shoulders and in their legs/feet or on the right side of the arm/elbow and in hand/wrist/finger. Pain lasted between 1 and 7 days, with an incidence of 33.8% in the neck, 36% in the shoulders, 33.3% in the arm/elbow, 47.4% in the hand/wrist/finger, 34.7% in the waist, and 39.3% in the leg/foot.

CONCLUSIONS This study should prove useful in determining systematic and effective resources to prevent broadcast actors from developing MSD in the future.

KEY WORDS arm/elbow, broadcast actors, hand/wrist/finger, leg/foot, musculoskeletal disease

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INTRODUCTION

With the frequency of musculoskeletal diseases (MSDs) on the rise, a continuous economic loss has been noted. MSDs are functional obstructions

that usually occur in the areas including the waist, neck, shoulder, arm, and wrist. MSDs occur largely in musculoskeletal parts and are related to posture while working; repetition of motion; weight; force; vibration; speed; and other personal issues.

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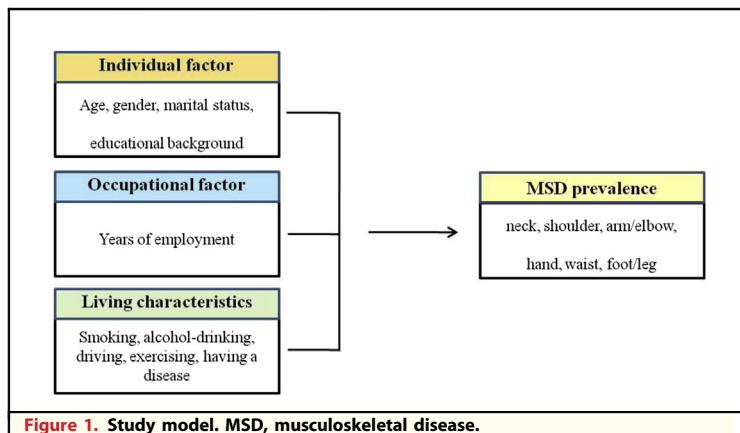


Figure 1. Study model. MSD, musculoskeletal disease.

However, injuries from unexpected accidents, such as a slip, fall, or crash, are not included as causes of MSDs.¹⁻³ In the past, jobs that required simple repetitive work, heavy lifting, machine handling, computer work, assembly, wrapping, and manufacturing were considered to be high-risk positions for MSD. In contrast, the probability of suffering from MSD occurs in a wide range of work environments, such as hospitals, hotels, distribution, office jobs, and service positions. For this reason, the study of MSDs is still an ongoing process.⁴⁻⁶ However, to our knowledge, a study of MSD among broadcast actors has never been conducted.

Because broadcast actors perform repetitive activities at different places and times and in different environments, they have a greater chance of suffering from MSD. One group of researchers⁷ performed a study to determine the source of stress. Their study revealed that the following affected the levels of stress, especially with respect to the accumulation of fatigue and fear of injury: psychological (30.9%), social (27.5%), physical (17.4%), environmental (16%), and other factors (5%). Because actors are highly likely to experience MSDs and stress, there also is a high risk for depression and panic disorders. Thus, it is not surprising that many actors commit suicide.

In current society, people are unwilling to investigate the difficulties of a process but focus only on the outcomes. Therefore, to our knowledge, not a single study has been conducted to determine what it is like to be an entertainer.⁸ To study MSD in this population, it is necessary to investigate their working environments, conditions, and individual lifestyle. Therefore, this study should be useful in helping to maintain systematic and effective resources to prevent broadcast actors from developing possible MSDs in the future.

STUDY METHOD

Study Model. The study model, shown in Figure 1, was designed by considering results of previous studies and the purpose of this study. Its dependent variable was the presence of MSD symptoms, which were divided into 6 body parts, including the neck, shoulders, arms/elbows, hands, waist, and feet/legs. Independent variables affecting the prevalence included 4 individual characteristics: (age, sex, marital status, and educational background); 1 occupational characteristic (years of employment); and 5 lifestyle characteristics (smoking, alcohol consumption, driving, exercising, and the pre-existence of a disease).

Data Collection. The survey was conducted in Seoul, South Korea, between January 1 and May 10, 2014 with broadcast actors working in the South Korean entertainment industry. Of the 250 actors polled, 235 responses were collected for a 94% rate of return. Of these, only 210 were properly answered and could be used for an analysis. The survey was a self-administered questionnaire, and the purpose of the study and how to answer it was explained to the participants. The existence of symptoms was calculated based on the National Institute for Occupational Safety and Health diagnosis standard to understand the existence of actual MSDs for each individual. All participants signed a written informed consent form approved by the

Table 1. Reliability Analysis of the Questionnaire

Division	Classification	Scale	Cronbach- α value
General characteristics	Individual characteristics	Categorical	0.977*
	Occupational characteristics	Categorical	0.932*
Lifestyle characteristics	Lifestyles	Binary	0.872*
	Disease/accident	Binary	0.930*

Interaction effect was determined by a reliability analysis.
* $\alpha > 0.8$.

Table 2. General Characteristics

Variables	Characteristics	Classification	Frequency (%)
Individual factors	Age (y)	20s	72 (34.2)
		30s	93 (44.2)
		>40s	45 (21.4)
	Sex	Male	113 (53.8)
		Female	97 (46.1)
	Marital status	Unmarried	154 (73.3)
Married		56 (26.7)	
Educational background	Junior college graduate	115 (54.8)	
	College graduate or higher	95 (45.2)	
Occupational factor	Years of employment	<5	32 (15.2)
		6-10	68 (32.4)
		>10	110 (52.4)
Lifestyle factors	Smoker	No	126 (60)
		Yes	84 (40)
	Alcohol consumption	No	62 (29.6)
		Yes	148 (70.4)
	Driver	No	34 (16.2)
		Yes	176 (83.8)
	Exercising	No	138 (65.7)
		Yes	72 (34.3)
	Existence of a disease	No	103 (49)
		Yes	107 (50.1)
			210

University of Gyeongsan Institutional Review Board.

Statistical Analysis. SPSS 18.0 (SPSS Inc, USA, Chicago) was used to process the data, and more details of the statistical methodology are included later. First, a reliability analysis was performed to find the interitem consistency, yielding the Cronbach- α value. Second, general characteristics of participants and distribution of musculoskeletal symptoms were described as frequencies and percentages. Third, multiple logistic regression analysis was performed to determine whether the prevalence of MSD symptoms was different according to individual, occupational,

institutional, and lifestyle factors and to verify their direct correlation. To account for confounding, different multiple logistic regression models were fitted using each MSD risk factor. Age and gender should be statistically controlled.

RESULTS

After conducting a reliability analysis to determine the Cronbach- α value to study the interitem consistency, we found that every factor, including the living factors and general features, had values >0.8, and the interitem consistency rate was stable (Table 1). As a result of frequency analysis, the 3 general features of the participants included individual, occupational, and lifestyle factors. Considering age as an individual factors, 42% of the participants were in the 30-year age group, followed by participants in their 20s (34.2%) and 40s (21.4%). Of the participants, 53.8% were men and 46.2% were women, and 73.3% of the sample was married. Furthermore, 54.8% were college graduates, and the rest were and university graduates (45.2%). With respect to occupational factors, the study revealed that 52.4% of individuals worked >10 years; 32.4% for 6 to 10 years, and 15.2% <5 years. In our sample, 60% of participants were smokers,

Table 3. Musculoskeletal Disease Symptoms by Body Part

Body part	Musculoskeletal symptom	
	Frequency	%
Neck	62	29.5
Shoulder	86	40.1
Arm/elbow	15	7.1
Hand/wrist/finger	19	9.0
Waist	98	46.7
Leg/foot	28	13.3
>1 part	107	50.1

Interaction effect was determined by a frequency analysis.

Table 4. Musculoskeletal Disease Symptoms by Site

Body part	Left side		Right side		Both sides	
	Frequency	%	Frequency	%	Frequency	%
Shoulder	22	25.6	29	33.7	35	40.7
Arm/elbow	3	20	7	46.7	5	33.3
Hand/wrist/finger	4	21	9	47.4	6	31.6
Leg/foot	5	26.3	13	46.4	10	52.7

Interaction effect was determined by a frequency analysis.

70.4% consumed alcohol, 83.8% were drivers, 34.3% exercised, and 50.1% had a pre-existing disease (Table 2).

Table 3 shows the outcome of a frequency analysis of musculoskeletal symptoms by body part. Of the respondents, 107 (50.1%) said that they had musculoskeletal symptoms in at least 1 part of the body. Sixty two respondents (29.5%) reported neck pain, 86 (40.1%) shoulder pain, 15 (7.1%) pain in the arm/elbow, 19 (9%) pain in the hand/wrist/finger, 98 (46.7%) pain in the waist, and 28 people (13.3%) reported leg/foot symptoms. Musculoskeletal symptoms were found more frequently in the waist, shoulder, neck, leg/foot, hand/wrist/finger, and arm/elbow, respectively. Table 4 shows the outcome of frequency analysis of musculoskeletal pain location in greater detail; as a result, pain in the shoulder was reported in both sides (40.7%), the right side (33.7%), and the left side (25.6%). In the arm/elbow and hand/wrist/finger, symptoms were mostly found on the right side (46.7% and 47.4%, respectively). In the leg/foot, 52.7% of respondents had symptoms on both sides, 46.4% on the right side, and 26.3% on the left side.

Table 5 charts the frequency analysis of the duration of musculoskeletal symptoms by body part. In the sample population, 33.8% had neck pain, 36%

shoulder pain, 33.3% pain in the arm/elbow, 47.4% in the hand/wrist/finger, 34.7% in the waist, and 39.3% in the leg/foot that was 1 to 7 days in duration. However, frequencies decreased for symptoms lasting >1 week.

Table 6 shows the degree of pain for musculoskeletal symptoms classified by body part. Severe pain was found in the shoulder (2.3%) and in the waist (5.1%), and mild and medium pain was found generally throughout the body.

Table 7 demonstrates how often musculoskeletal symptoms occurred over the course of 1 year. After analysis, the study revealed that the most common frequency was once in a couple of months (26%–34% of respondents). However, 10.7% experienced pain in the leg/foot, 10.5% in the shoulder, hand/wrist/finger, indicating the degree to which the symptoms are spread in general.

The study revealed a 1.921 times higher chance of having MSD in the neck. Women had a 2.021 times higher probability of having MSD in the shoulder, and individuals who consumed alcohol had a 2.175 times higher probability than non-drinkers. Finally, those with a pre-existing disease were 1.691 times more likely to experience musculoskeletal symptoms ($P < 0.05$). Women had a 2.426 times higher risk than men for pain in the arm/elbow. Drivers had a 2.512 higher probability

Table 5. Musculoskeletal Disease Pain Duration by Body Part

Body part	Less than 1 d		1 d-1 wk		1 w-1 mo		1-6 mo		>6 mo	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Neck	16	25.8	21	33.8	13	21	8	13	4	6.5
Shoulder	23	26.7	31	36	16	18.6	9	10.5	7	8.1
Arm/elbow	4	26.7	5	33.3	3	20.0	2	13.3	1	6.7
Hand/wrist/finger	5	26.3	9	47.4	3	15.8	2	10.5	0	0
Waist	24	24.5	34	34.7	20	20.4	15	15.3	5	5.1
Leg/foot	8	28.6	11	39.3	5	17.9	2	7.1	2	7.1

Interaction effect was determined by a frequency analysis.

Table 6. Severity of Pain by Body Part

Body part	Mild		Moderate		Severe		Very severe	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Neck	31	50	29	46.8	2	3.2	0	0
Shoulder	45	52.3	32	37.2	7	8.1	2	2.3
Arm/elbow	10	66.7	5	33.3	0	0	0	0
Hand/wrist/finger	10	52.6	6	31.6	3	15.8	0	0
Waist	57	58.2	30	30.6	6	6.1	5	5.1
Leg/foot	16	57.1	10	35.7	2	7.1	0	0

Interaction effect was determined by a frequency analysis.

of musculoskeletal pain than nondrivers, and those with a pre-existing disease were 1.264 times more likely to have musculoskeletal symptoms ($P < 0.05$). Women were 1.542 times more likely than men, and those with a pre-existing disease were 2.249 times more likely to have musculoskeletal symptoms in the hand/wrist/finger ($P < 0.05$). Individuals with a pre-existing disease were 2.263 times more likely to have musculoskeletal symptoms in the waist ($P < 0.05$). Regarding pain in the leg/foot, women were at a 1.717 times higher risk than men. Also, those with >10 years of work experience were 1.605 times more likely to have musculoskeletal symptoms, whereas smokers were 1.243 times more likely to have a musculoskeletal symptoms in the leg/foot ($P < 0.05$; Table 8).

DISCUSSION AND CONCLUSION

MSDs are functional disabilities in the musculoskeletal area that occur when continuous damage to the muscles or tissues sustained by performing a repetitive task. This disease is usually found in the waist, shoulder, neck, arm, and wrist. MSD is also referred to as cumulative trauma disorder, repetitive strain injury, occupational overuse syndrome, visual

display terminal, etc, depending on the country. The condition is now commonly referred to as work-related musculoskeletal disorder.^{9,10} When employees experience MSD in the waist, arm, or leg because of repetition of the same motion using force, maintaining poor posture, working under vibration, or performing any activities that may harm the body, it is considered an occupational disease.

Currently, MSD is becoming a significant problem for industrial safety because the rate of disease is rapidly increasing. Such diseases are a controversial issue between labor and management in manufacturing industries, such as automobile, shipping, and heavy industry.

MSD has spread throughout all industries, including hospitals, hotels, distribution, and office jobs.^{6,11-13} However, to our knowledge, no studies of MSD in broadcast actors had been conducted, despite this group being highly likely to suffer from musculoskeletal pain due to their unsteady environment. Therefore, this study investigated the interrelationship of MSD for this population. As a result, MSD in the waist was found to be the most common, followed by shoulder, neck, leg/foot, hand/waist/finger, and arm/elbow, in that

Table 7. Frequency of Musculoskeletal Disease Symptoms by Body Part Over the Past Year

Body part	1 time/6 mo		1 time/2-3 mo		1 time/1 mo		1 time/1 wk		Daily	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Neck	13	21	21	33.9	13	21	11	17.7	4	6.5
Shoulder	15	17.4	27	31.4	20	23.3	15	17.4	9	10.5
Arm/elbow	3	20	5	33.3	3	20	3	20	1	6.7
Hand/wrist/finger	4	21.1	5	26.3	5	26.3	3	15.8	2	10.5
Waist	14	14.3	32	32.7	35	35.7	13	13.3	4	4.1
Leg/foot	6	10	27	35.7	7	25	2	7.1	3	10.7

Interaction effect was determined by a frequency analysis.

Table 8. Factors Affecting Prevalence Rate of Musculoskeletal Disease

Site	Variables	Characteristics	Classification	Frequency (%)	B	OR (95% CI)			P value
						OR	LB	UB	
Neck	Lifestyle factor	Pre-existing disease	No	21 (33.9)	1				0.002
			Yes	41 (66.1)	0.702	1.921	1.298	3.466	
Shoulder	Individual factor	Gender	Male	34 (54.8)	1				0.004
			Female	28 (45.2)	0.725	2.021	1.363	2.362	
	Lifestyle factor	Alcohol consumption	No	23 (26.7)	1				0.014
			Yes	63 (73.3)	0.777	2.175	1.173	4.034	
Arm/elbow	Individual factor	Sex	No	31 (36)	1				0.016
			Yes	55 (64)	0.525	1.691	1.112	2.595	
	Lifestyle factor	Driving	No	4 (26.7)	1				0.039
			Yes	6 (73.3)	0.898	2.426	1.022	5.158	
	Preexisting disease		No	6 (40)	1				0.002
			Yes	9 (60)	1.264	3.142	1.411	6.729	
Hand/wrist/finger	Individual factor	Sex	Male	12 (63.2)	1				0.030
			Female	7 (36.8)	0.453	1.542	0.620	2.422	
	Lifestyle factor	Lifestyle	No	5 (26.3)	1				0.020
			Yes	14 (73.7)	0.783	2.249	1.255	3.892	
Waist	Lifestyle factor	Preexisting disease	No	21 (21.4)	1				0.030
			Yes	77 (78.6)	0.821	2.263	1.291	3.463	
Leg/foot	Individual factor	Sex	Male	17 (11.4)	1				0.034
			Female	25 (24.3)	0.546	1.717	0.413	3.110	
	Occupational factor	Years of employment	<5	4 (14.3)	1				0.050
			6-10	8 (28.6)	0.362	1.436	0.274	2.625	
			>10	16 (57.1)	-0.503	1.605	0.219	1.224	
	Lifestyle factor	Smoking	No	10 (35.7)	1				0.027
Yes			18 (64.3)	-0.284	1.243	0.451	1.413		
Pre-existing disease		No	8 (28.6)	1				0.803	
		Yes	20 (71.4)	1					

order. One study¹⁴ found that hairstylists reported pain in the shoulder (61%), waist (53.2%), leg/lap (36.7%), and foot/ankle (34.8%). Members of an orchestra complained of pain in the shoulder (59.6%), neck (43.6%), waist (48.1%), wrist (24.4%), and arm/elbow (23.1%).¹⁵ Such variation is found among occupations because different occupations require the use of different body positions and have different circumstances and working hours. Therefore, pain is felt in different parts of the body. In particular, because broadcast actors are more likely to repetitively perform physical activities like sitting, standing, and moving, they have a greater frequency of pain in the waist and shoulder. A comparison of the duration of pain by body part indicated that 33.8% of the respondents felt pain in the neck, 36% in the shoulder, 33.3% in the arm/elbow, 47.4% in the hand/wrist/finger, 34.7% in

the waist, and 39.3% in the leg/foot lasting between 1 and 7 days.

After studying MSDs with respect to individual factors to determine significant differences between musculoskeletal symptoms around the neck, a study found that women are 2.426 times more likely to have pain in the arm/elbow than men, whereas drivers are 2.512 times more likely to experience MSD than nondrivers. Previous research¹⁶ revealed that MSD in the arm/elbow usually appeared as a pain around the elbow, weakening of the muscles, and limitation of movement.

Although people who consistently exercise have been reported to have a lower prevalence rate of MSD compared with those who do not exercise, this study found that they are more likely to have a greater chance of developing an MSD. Women are 1.542 times more likely to have an MSD in

the hand/wrist/finger than men. Also, women are 1.717 times more likely to have leg/foot pain than men, whereas those with >10 years of work experience are 1.605 times more likely to have MSD than those with <5 years of experience. Additionally, smokers have a 1.243 times higher chance of having MSD than nonsmokers.

The limitation of this study is that there were few respondents because broadcast actors are not willing to reveal their personal information to

others. Another limitation is that there was a deviation in the demographic, which meant that variables such as age, education, sex, and different type of experience were not reflected in this study.

CONCLUSION

This study should prove useful in managing systematic and effective resources that can prevent broadcast actors from developing MSD.

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