

## Effects of a Self-Stretching Exercise Program on Musculoskeletal Symptom for Care Workers

This study was carried out to identify how a self-stretching exercise program affects pain for each body area, pain relief and job satisfaction for care workers. 20 of 40 care workers with musculoskeletal symptom were randomly selected and participated a self-stretching exercise program consisting of 15 motions. The intervention was done five times or more per weeks for 8 weeks and 1 session lasted within 15 minutes. 'Musculoskeletal symptom survey table' of the Korea Occupational Safety and Health Agency(KOSHA) and JDI(Job Descriptive Index) was used for pain on the musculoskeletal symptom and job satisfaction. Survey were done twice before and after the program. The result of this study showed that self-stretching exercise program group(SSPG) relieved from pain significantly in the shoulders( $p < .01$ ) and lumbar( $p < .05$ ), comparing to the non self-stretching exercise program group(NSPG). Although no significant difference on variations in the JDI appeared in SSPG, the significant reduction appeared from the colleague relationship and organization in NSPG( $p < .05$ ). SSPG showed the significant increase on variations in JDI from the job and organization comparing to NSPG. Especially, the improvement on satisfaction for the organization was shown( $p < .05$ ). Accordingly, the self-stretching exercise program for care workers can be said to positively affect the overall pain relief and increase on the JDI.

Key words: *Care Workers; Self-Stretching; Musculoskeletal Symptom; JDI*

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## INTRODUCTION

The elderly with difficulties in their daily life are increasing due to chronic diseases, stroke, fractures and dementia among others along with the rapid increase in the aged population for the recent improvements on the medical quality and increased average lifetime as well as the aged society. In addition, the long term care for the elderly with difficulties in their daily life has emerged as a very important issue in the society. In order to solve this problem in terms of the government, a new labor force called 'Care workers' was developed together with the establishment of the 'Act on the Long Term Care Insurance for the Elderly' in July 2008(1).

'Care workers' refer to persons who have acquired

qualifications for nursing and care, which are granted by the government. They also refer to persons to provide the physical, mental, psychological, emotional and social care for recipients on the long term care benefits according to instructions by doctors or nurses(2). Currently, total 833 hospitals and their related facilities for the elderly have been established in our country(3). Care workers employed in the long term care institutions for the elderly were estimated to reach 210,000 persons as of the end of April 2010(4).

However, in contrast to the increase of care workers working for the care related institutions for the elderly, it is true that they show a low level of job satisfaction in terms of their perception on the job(5).

Job satisfaction refers to how much a worker is satisfied on the job, which is thought to be an important

element to drive an organization's services in a positive way(6). The higher the JDI(Job Descriptive Index) of employees, the higher the customer satisfaction(7). As it is also a preceding determinant for the organizational commitment(8), the service quality increases with the increasing job satisfaction of care workers(9, 10). In addition to their low job satisfaction, the frequency of musculoskeletal disorders increases due to the physical burden while they are caring for the aged patients necessary for many helps, who have difficulties in the independent daily life including the walking, dining and bathing.

Accordingly, persons having disasters during their job relating to care keep increasing since 2008, an increase by 247% in 2010(11).

These musculoskeletal disorders refer to diseases accompanied with pain around the muscle, tendon and nerve among others due to the repeated, continued or unnatural posture(12). 69.2% of diseases on the job appeared to be musculoskeletal disorders as of 2008, causing the increase of medical payments about 25.4 times more than those in 2000(13).

Consequently, the increase of musculoskeletal disorders can increase disaster on the job, resulting in social problems like conflicts between labor and employer.

Among exercises to relieve persons with these musculoskeletal disorders from pains, self-stretching exercises become ways for flexibility exercises which can be done without any help by a partner or an instrument. They affect the scope of elasticity and plasticity for the joint tissues(14) and recover the scope of mobility for the stiffness joints after any damage to the bone, muscle, ligament and tendon, effectively resulting in posture corrections, prevention of injuries and pain relief(15). They are very useful for pain controls and improvements due to musculoskeletal disorders because anyone can easily practice them due to no great restriction on time and space among others. The principles on self-stretching exercises include the inducement of light contraction motions for muscles to increase the inner pressure of muscles with effects to smooth the blood circulation by accelerating blood flows in veins along with the rhythmical contraction and light pressure around muscles. They also improve the distribution of blood while playing a role in removing fatigue substances(16) and are effective in the self-management for disorders in various muscles, bones and nerve roots(17).

Accordingly, this study carried out a self-stretching exercise program(SSEP) for care workers working for care institutions for the elderly to identify how SSEP

affects each body area, as well as pain relief in musculoskeletal disorders, impacts on the JDI and pain complaints for each body area.

Although many studies have been done for care workers since 2008, most of them have analyzed factors on the characteristics of working conditions, job stress and/or job satisfaction(18, 19) and no study has been done on improvements of job satisfaction through the prevention and control of musculoskeletal symptom in the body. Therefore, this study attempts to suggest an exercise program to prevent musculoskeletal symptom, relieve pains and improve the JDI for care workers working for care hospitals for the elderly.

## METHODS

### Subjects

This study was carried out for 40 persons with musculoskeletal symptom among care workers working for hospitals for the elderly, which is located in Gyeonggi-do, Korea for eight weeks from October 2 to November 21, 2011 to identify effects of SSEP on the alleviation of pain from musculoskeletal disorders and JDI. All the participants in the study had a 'Certificate of a care workers' who agreed to take part in this study. The study was carried out in the separated wards for both the self-stretching exercise program group(SSPG) and non self-stretching program group(NSPG).

The degree of physical burden for works which have been currently carried out by those participants in this study was composed of 1 points for 'Not difficult at all', 2 points for 'Endurable', 3 points for 'A little difficult' and 4 points for 'Very difficult', which will be converted into a 4 points scale. General characteristics of participants in this study are shown in Table 1.

### SSPG

20 care workers working for hospitals for the elderly and complaining about musculoskeletal disorders were selected and then SSEP was practiced for them.

### NSPG

20 care workers working for hospitals for the elderly and complaining about musculoskeletal disorders were selected and then they were asked to carry out their daily job without SSEP.

**Table 1.** General characteristics

(Mean±SD)

Characteristics		SSPG(n=20)	NSPG(n=20)
Gender(persons)	Male	3	4
	Female	17	16
	Age(yrs)	56.20±3.58	54.50±3.50
	Service Career(months)	30.05±39.80	47.70±35.04
	Daily Working Hour(hr)	23.60±1.79	21.00±6.21
	Degree of Physical Burden(points)	3.10±.97	2.55±.95

## Measurement

This study used a structured questionnaire to identify how SSEP affects musculoskeletal symptoms and JDI for care workers working for hospitals for the elderly, which is located in Gyeonggi-do, Korea. It compared and analyzed variations in measurements at the survey before and after the practice of SSEP for eight weeks.

### Musculoskeletal symptom

In order to evaluate subjective symptoms of musculoskeletal disorders for each body area, the 'Musculoskeletal symptom survey table' of the Korea Occupational Safety and Health Agency(KOSHA) was used with the direct description method through a direct interview(20). A four point scale was used for the degree of subjective pains such as 4 points for 'Very severe pain', 3 points for 'Severe pain', 2 points for 'Medium pain', and 1 points for 'Weak pain'. Musculoskeletal symptom was judged on the basis of criteria by the U.S. National Institute for Occupational Safety and Health(NIOSH), such that symptoms exist if they are suffering for not shorter than a week when they have pains once or more a month (21).

### JDI

The tool used for identifying the level of job satisfaction was the JDI developed by Smith et al.(22), whose confidence interval showed, 86 which was high as a result of a study with 408 workers in a workplace by Ryu(23). It consists of 36 items in total under a five-point scale, meaning higher job satisfaction for a higher point.

### SSEP

An exercise program was designed to be done at the standing and sitting posture in consideration of

occupational characteristics for care helpers, SSEP consists of 15 motions in total, including 8 motions at the standing posture and 7 motions at the sitting posture(24, 25).

An exercise guideline was distributed, where descriptions on each exercise motion were included, after participants in this study had a time to learn the exercise program accurately. Each motion was kept for 15 seconds without pains and repeated twice within 15 minutes in total once a day, five times or more a week for eight weeks.

SSEP included the wrist bending to the floor, wrist bending to the palm, holding a wall and turning to the back, holding and pulling an elbow, holding and pulling an elbow to the back, knees flexion and hip flexion, ankles straightening and toes bending, holding and pulling an ankle while one leg standing, ankle dorsiflexion, head and neck bending to the front, head and neck bending to the back, head and neck pulling to sides, body rotation, body bending to sides, and body bending to the front.

## Data Analysis

The data collected in this study were analyzed with significance level at .05 using a statistics processing program SPSS ver. 18.0.

Frequency and percentage were calculated using statistical techniques to identify general characteristics for participants in this study. The paired t-test was carried out before and after exercises to compare SSPG's JDI with NSPG's JDI. In addition, the independent t-test was also carried out to compare variations on pains from musculoskeletal symptom before and after exercises, as well as JDI between groups.

## RESULTS

This study analyzed and compared effects on pains for each body area and variations on the JDI through survey before and after exercises for 20 care workers with SSEP and 20 care workers without SSEP out of 40 care workers with pain.

### Variations on Pains from Musculoskeletal symptom between Groups

Variations on pains at the survey before and after exercises between SSPG and NSPG were analyzed.

As a result of this study on pains for each body area with complaints about musculoskeletal symptom by care workers at the survey before exercise, shoulder showed the highest value at 77.5%, sequentially followed by leg/foot at 47.5%, lumbar at 45%,

hand/wrist/finger at 37.5%, and arm/elbow and neck at 30%.

Comparing SSPG with NSPG in the findings, pain around shoulders decreased from  $2.21 \pm .43$  to  $1.67 \pm .65$  as the most significant reduction ( $p < .01$ ), while pain area the lumbar significantly decreased from  $2.07 \pm .62$  to  $2.00 \pm .63$  ( $p < .05$ ). Although pains area arm/elbow, hand/wrist/finger, and leg/foot did not show any significant difference, pain appeared to decrease. There was no significant difference in NSPG at all (Table 2).

### Variations on JDI in Groups

In the JDI for care workers, satisfaction on the job, supervision, pay, transfer/change of occupation, colleague relationship and institution was examined, while variations on the JDI for both SSPG and NSPG were analyzed.

**Table 2.** Variations on pains from musculoskeletal symptom between groups (Mean±SD)

Area	Group		Participants complaining about pains(%)	Severity of pains	Variations on pains	t	p
Neck	SSPG	Before	8	12(30)	$1.75 \pm .71$	$.44 \pm 1.74$	.788
		After	8		$2.25 \pm .46$		
	NSPG	Before	4		$1.50 \pm 1.00$		
		After	3		$1.67 \pm 1.16$		
Shoulder	SSPG	Before	14	31(77.5)	$2.21 \pm .43$	$1.00 \pm 1.34$	4.944
		After	12		$1.67 \pm .65$		
	NSPG	Before	17		$1.82 \pm .81$		
		After	17		$2.06 \pm .66$		
Arm/elbow	SSPG	Before	5	12(30)	$2.20 \pm .45$	$.75 \pm 1.89$	-
		After	4		$2.00 \pm .00$		
	NSPG	Before	7		$1.71 \pm .76$		
		After	7		$1.71 \pm .76$		
Hand/wrist/finger	SSPG	Before	6	15(37.5)	$2.50 \pm .55$	$1.00 \pm 2.16$	.828
		After	6		$1.83 \pm .75$		
	NSPG	Before	9		$1.78 \pm .44$		
		After	10		$1.70 \pm .48$		
Lumbar	SSPG	Before	14	18(45)	$2.07 \pm .62$	$1.17 \pm 1.17$	2.329
		After	11		$2.00 \pm .63$		
	NSPG	Before	4		$2.50 \pm 1.00$		
		After	6		$2.00 \pm .89$		
Leg/foot	SSPG	Before	11	19(47.5)	$2.09 \pm .70$	$.17 \pm 1.33$	-
		After	11		$2.00 \pm .00$		
	NSPG	Before	8		$1.50 \pm .54$		
		After	8		$1.50 \pm .54$		

\*:  $p < .05$ , \*\*:  $p < .001$

As a result of this study, there was no significant difference although the JDI for the job, supervision and institution increased at the examinations before and after exercises. In the JDI for NSPG at the examinations before and after exercises, colleague relationship showed a significant decrease from 17.75 ± 2.67 to 16.95 ± 1.67 by -.80(p<.05), while institution appeared to significantly decrease from 15.45 ± 3.58 to 14.50 ± 3.02 by -.95(p<.05). Job, supervision and pay showed a decrease although it was not significant (Table 3).

NSPG in the findings, SSPG showed a significant increase by 1.20 ± 2.61 for job(p<.05) and by .80 ± 1.99 for institution, resulting in the most significant increase for the JDI(p<.01). There was no significant difference although there was an increase by 1.20 ± 3.65 for supervision. No significant appeared in pay, transfer/change of occupation and colleague relationship as well (Table 3).

### DISCUSSION

This study aims at practicing SSEP for 40 care workers with musculoskeletal symptom among other care workers working for hospitals for the elderly and identifying its effects on the alleviation of pains for each body area and JDI. The musculoskeletal

### Variations on JDI between Groups

Variations on the JDI at the survey before and after exercises between SSPG and NSPG were analyzed.

Comparing to NSPG in variations on the JDI at the survey before and after exercises for both SSPG and

**Table 3.** Variations on the JDI (Mean ± SD)

Item	Group		Satisfaction	t	p	Variation	t	p
Job	SSPG	Before	14.85 ± 2.70	-2.058	.054	1.20 ± 2.61	-2.197	.040*
		After	16.05 ± 2.37					
	NSPG	Before	15.45 ± 3.25	1.000	.330			
		After	15.35 ± 3.03					
Supervision	SSPG	Before	23.00 ± 4.10	-1.470	.158	1.20 ± 3.65	-1.884	.073
		After	24.20 ± 4.15					
	NSPG	Before	21.85 ± 4.59	1.710	.104			
		After	21.45 ± 3.91					
Pay	SSPG	Before	14.10 ± 3.14	.357	.725	-.20 ± 2.51	.000	1.000
		After	13.90 ± 1.89					
	NSPG	Before	13.50 ± 3.72	1.073	.297			
		After	13.30 ± 3.23					
Transfer/change of occupation	SSPG	Before	9.40 ± 2.11	.000	1.000	-.00 ± 2.97	.000	1.000
		After	9.40 ± 2.52					
	NSPG	Before	8.80 ± 3.56	-	-			
		After	8.80 ± 3.56					
Colleague relationship	SSPG	Before	20.10 ± 2.15	.000	1.000	-.00 ± 1.89	-1.520	.137
		After	20.10 ± 1.74					
	NSPG	Before	17.75 ± 2.67	2.557	.019*			
		After	16.95 ± 1.67					
Institution	SSPG	Before	17.20 ± 2.82	-1.798	.088	.80 ± 1.99	-3.037	.004**
		After	18.00 ± 2.73					
	NSPG	Before	15.45 ± 3.58	2.594	.018*			
		After	14.50 ± 3.02					

\*: p<.05, \*\*: p<.01



symptom survey table was used to identify effects on pain relief for each body area with the use of a JDI survey in evaluating the JDI in terms of evaluation tools, while the survey before and after exercises were carried out.

The area with pains per body area of care workers in this study sequentially appeared 77.5% for shoulder, 47.5% for leg/foot, 45% for the lumbar, 37.5% for hand/wrist/finger, and 30% for arm/elbow and neck, respectively. Most of them had symptoms over one or more areas. The distribution of pain per body area of workers complaining about pain from musculoskeletal disorders for 16,506 employees in workplaces in the preceding study by Yang and Park showed 36.18% for the lumbar, 24.21% for shoulder, 11.12% for wrist, 5.3% for the neck, and 4.19% for knee(26). As a result of survey for areas with musculoskeletal disorders for 277 care workers in the study by Lee, they sequentially showed 71.5% for the neck, 70.4% for shoulder, 61.4% for the lumbar, 47.7% for hand/wrist/finger, 44.0% for arm/elbow, and 37.2% for leg/foot, respectively from the highest frequency. Those findings were not consistent with the findings in this study(27). This inconsistency is considered attributable to the increase of pains area shoulder rather than those area the lumbar because the excessive use of the lumbar has been reduced due to the use of electrical beds for patients in working conditions for participants in the study.

As a result of SSEP practices for care workers with these pains, the significant reduction of pains appeared area the shoulder and lumbar, comparing to that of the control group. In addition, the reduction of pain appeared area arm/elbow, hand/wrist/finger, and leg/foot in the group with exercises, although it was not significant. The alleviation of pains is considered to have occurred due to the increased scope of mobility for joints by the stretching exercises.

Lee and Han showed a decrease of incidents on patients with musculoskeletal disorders by 63.2%, who had been treated under industrial disasters as a result of precaution program practices including a rehabilitation program for 2,094 workers in a tire manufacturing factory(28). Lee's study showed the findings consistent with those in this study as pains significantly decrease after exercises in the study groups under the practices of a stretching program for 12 weeks for general office workers using computers(29).

We attempted to learn how SSEP affects the JDI for care workers with regard to the job, supervision, pay, transfer/change of occupation, colleague rela-

tionship and institution. Comparing to NSPG as a result of our study, SSPG showed a significant increase by  $1.20 \pm 2.61$  for job( $p < .05$ ) and an increase by  $.80 \pm 1.99$  for institution, resulting in the most significant increase for the JDI( $p < .01$ ). These findings are thought to be attributed to positive impacts on the institution and JDI as the extent of depression(30) is reduced due to SSEP.

In the preceding study, Kim showed the findings consistent with those in this study as Kim reported that a group participating in the stretching exercises showed the JDI significantly higher than that of a group not participating in the stretching exercises and the JDI was higher when the participating period and frequency are higher(31).

A study by Lee et al. reported that the JDI was higher as care workers had better subjective health conditions as a result of survey on 198 care workers(19). Park reported that workers bearing a high level of physical workloads like those works with burdens on muscles and bones were exposed simultaneously to a higher level of social and psychological stress factors than workers without those burdens, resulting in correlations with both burdens on muscles and bones in addition to the JDI due to a tendency on the deteriorated factors on social and psychological job stress such as the job instability and psychological job demand(32). These findings lead us to consider that the subjective health conditions and stretching exercises might positively affect the JDI. However, there was no significant difference in this study although the JDI increased for the job, supervision and institution with respect to the JDI at the examinations before and after SSPG. Nevertheless, the JDI of NSPG significantly decreased at the survey before and after exercises for colleague relationship and institution ( $p < .05$ ) with a decrease for job, supervision and pay despite no significance.

These findings imply that not only exercise programs but other environmental factors should be improved to increase the JDI of care workers.

Restrictions in this study include that it cannot be generalized for all the care workers because it was carried out for care workers working for hospitals for the elderly, which is located in Gyeonggi-do, Korea; that it cannot be judged as any medical diagnosis because of musculoskeletal symptom using a subject self-survey table; and that auxiliary health foodstuffs under administration could not be controlled with an individual's living habits.

However, the exercises for flexibility through SSEP are thought to improve physical and mental conditions

of care workers, prevent them from various symptom in their muscles and joints, increase the physical flexibility, and expect them to have effects on the stress dissolution and strain relief.

Accordingly, SSEP is considered to positively affect the JDI as well as pain relief for care workers complaining about musculoskeletal symptom, which can act as a stable factor in the supply of human resources in addition to the qualitative improvements on the service delivery for the applied institutions.

## CONCLUSION

This study was carried out for 40 care workers for eight weeks from October 2 to November 21, 2011 who were working for hospitals for the elderly located in Gyeonggi-do, Korea, in an effort to identify how SSEP improves musculoskeletal symptom according to instructions by physical therapists for care workers working for hospitals for the elderly. The findings include the following.

For pains per body area of care workers complaining about musculoskeletal symptom at the survey before exercises in the groups, shoulder showed the highest value at 77.5%, sequentially followed by leg/foot at 47.5%, lumbar at 45%, hand/wrist/finger at 37.5%, and arm/elbow and neck at 30%, respectively.

Comparing to NSPG as a result of SSEP practices, SSPG showed a significant decrease of pain area shoulder ( $p < .01$ ) and lumbar ( $p < .05$ ).

For the JDI at the survey before and after SSPG, there was no significant difference although the JDI for the job, supervision and institution increased. NSPG's JDI significantly decreased for colleague relationship and institution ( $p < .05$ ). There was a decrease for the job, supervision and pay although it was not significant.

Comparing NSPG in variations on the JDI at the survey before and after exercises for both SSPG and NSPG, SSPG showed a significant increase for the job ( $p < .05$ ) and the JDI showed the most significant increase for institution ( $p < .01$ ), but there was no significant difference from the supervision, pay, transfer/change of occupation, and colleague relationship.

Through this study, we could find out that the practice of SSEP for care workers working for hospitals for the elderly showed statistical significance on musculoskeletal symptom and improvements on the JDI.

It is therefore necessary to have future studies in developing exercise programs in a more effective way in terms of the self-stretching exercises and muscular exercises in consideration of occupational characteristics for care workers, as it is considered that the adoption of SSEP under instructions by physical therapists could become an important and specific plan to relieve care workers from pains on musculoskeletal symptom and improve the JDI.

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