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Social Cognitive Theory-Based Intervention and Low Back Pain among Health Care Workers in Qom Hospitals of Iran

Sarallah Shojaei[1], Sedigheh Sadat Tavafian[2*], Ahmad Reza Jamshidi[3], Joan Wagner[4], Mohammad Reza Sepahvandi[5]

1. Department of Health Education, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran & Vice Chancellor for Education, Nekoei hospital, Qom University of Medical Sciences, Qom, Iran.
2. Department of Health Education, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran.
3. Rheumatology Research Center, Tehran University of Medical Sciences, Tehran, Iran.
4. Faculty of Nursing, University of Regina, Saskatchewan, Canada.
5. Vice Chancellor for Education, Qom University of Medical Sciences, Qom, Iran.

Background: The most common type of Muscular-skeletal Disorders (MSD) among health care worker is Low Back Pain (LBP). This study aimed to investigate the effects of an educational program based on the Social Cognitive Theory (SCT) on low back pain severity in healthcare workers in hospitals located in Qom, Iran.

Materials and Method: In this interventional research study, 125 nursing aides were divided into two experimental and control groups. Data gathering instruments were a demographic questionnaire and a questionnaire based on the predictor constructs of SCT. For the intervention group, training was administered by health education specialist in four 2-hour sessions In each session discussion regarding self-efficacy, self-control, outcome reinforcement, and emotional coping were taken into account carefully, respectively. Data were analyzed SPSS version 18.0, IBM company.

Result: There were significant differences between the two groups regardless of time, between different periods of time regardless of the groups, and between time and group ($P \leq .0001$). During the time period, the intervention group had better conditions in all LBP predictors comparing to the control group.

Conclusion

According the results, it is recommended that further similar researches be conducted for the health care providers with longer follow-up period.

In the case of similar results, it seems this intervention can be proposed to primary healthcare in national health system for LBP prevention.

Keywords: Educational intervention, Social-Cognitive Theory (SCT), Health Care Workers

Introduction

Low Back Pain has been described as one of the main occupational problems among healthcare workers (Karahan et al, 2009). Its prevalence rate is between 30 and 60% (Yip, 2004; Bos et al., 2007). In many occupations, it is difficult to avoid lifting the loads (Verbeek et al., 2012). Patient-handling activities are considered to be the main cause of LBP among healthcare workers (Tullar et al., 2010). The activities during patient handling often include lifting, transferring, and repositioning of the patients and devices causing awkward back postures and high forces to be exerted on the healthcare worker (Skotte et al., 2002). Performing more than 10 patient-handling activities per day increases the risk of LBP to a persistent condition among female healthcare workers with sub-chronic LBP (Holtermann et al., 2013).

Corresponding author: Health Education Department, Faculty of Medical Sciences, Tarbiat Modares University, Tehran. P. O. Box: 14115-331, Tel: 0098 21 82884547; Fax: 00982182884555: e-mail: tavafian@modares.ac.ir

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The management of LBP comprises a range of different intervention strategies including surgery, drug therapy, and non-medical interventions (Van Middelkoop et al., 2011). Patient education is defined as "a systematic experience, in a one-to-one situation, that consists of one or more methods such as the provision of information and advice for the patients and training in behavior modification techniques, which influence patients' knowledge and health behaviors and the way they experience their illness with the aim of improving, maintaining, or learning to cope with a condition (Engers et al., 2008)".

In a previous study, it was found that the unhealthiest behaviors for lower back, conducted by nursing staff were: lifting the patient, changing the position of patient from one point to another in bed, transferring the patient to the chair and stretcher, and keeping his/her bed tidy, respectively. They are risk factors for musculoskeletal disorders and in particular are accounted for discomfort related to back pain. One of the ways to prevent chronic back pain is to teach the principles of proper body mechanics as well as to observe ergonomics and correct posture (Owen, Keene & Olson, 2002). However, by improving staffs' skills, creating a supportive environment, and incorporating health concerns into macroeconomic policy, good changes have been made in occupational health in many countries (Hsiao et al., 2005).

One of the ways to improve healthcare system is upgrading education, health educational programs, and prevention for health-care providers in this system. Tendency towards personal health among health workers results in enhancing their accountability in preservation and promotion of others' health (Resnick, 2003) .Although many health workers in the health centers are among those that the employees' badge is attached to their uniforms manually, they do not usually participate in the in-service upgrading programs provided for health care system (Bagwell & Bush, 2000). Many factors affect the decision of individuals to adopt a healthy behavior, including the role of health education specialists; the recognition of personal characteristics, environment and behavior; and then planning for change in promoting health behavior (Cotrell, Girvan & McKenzie, 2002). Therefore, it seems necessary that an appropriate model of planning and effective indicators be provided. In this regard, one of the raised patterns is Bandura's Social Cognitive Theory (SCT), which describes and predicts human behavior. It is around the continuous interaction of the individual with the environment and contains most effective factors and related structures to the behavior (Glanz, Rimer & Viswanath, 2008). Most of the factors and constructs associated with low back pain are included in the social-cognitive theory which considers the intraction between environment, individuals and behavior comprehensively and in a multi-dimensional manner. Therefore, an intervention based on SCT considering both the environment and individual's behavior can be helpful in prevention and treatment of LBP. Generally, SCT posits that personal, environmental, and behavioral factors are reciprocally influential in determining behavior and behavior changes.

Although, back pain and the ways of its prevention are among the prior programs of the Ministry of Health; however, very few studies have been conducted with a special focus on the patient care workers in Iran. This study aimed to investigate the effects of an educational program based on the SCT on LBP prevention behavior predictors, based on SCT in healthcare workers suffering from LBP.

Materials and Methods

This study was an interventional research with 6-month period follow-up in which randomized sampling was used to select 125 health care workersworking in two hospitals affiliated to Qom University of Medical Science in Qom, Iran during May and December 2015.

The inclusion criteria for the study population were as follow: being health care workers for at least one year, with the age ranges from 20 to 60 years, suffering from diagnosed LBP based on the physicians' examination for at least three months, and being satisfied to enter into the study. The exclusion criterion included having a history of surgery on back vertebra, participation in other interventional approaches for their back pain during the study, and unwillingness to sign the study consent form. Furthermore, health care workers suffering from neck, or lumbar disease, or congenital abnormalities, or tumor in the spine based on the neurosurgeon physician diagnosis, or being pregnant were excluded from the study. There were no para clinical tests for diagnosing chronic low back pain or exclusion criteria. To select participants, firstly, from all the hospitals located in Qom city, two hospitals affiliated to

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Qom University of Medical Sciences in the city of Qom were selected randomly and then randomly divided into control or intervention hospital. The work conditions and hospital's characteristics were the same in both hospitals. Furthermore, both of them were affiliated to Qom University of Medical Sciences with similar status and procedure for patient admission and hospitalization. From the intervention hospital, 63 eligible health care workers and from the other hospital 62 eligible health care workers who were satisfied to enter into the study were selected. To avoid the influence of confounding variables on outcome, both groups were matched on variables such as age and occupational variables.

The participants in the intervention group received specified educational program, but the control group was not introduced to any program. There were no lost to follow-up, because all health care workers were working in the hospital, and the first researcher was in touch with them throughout the study. Moreover, all their contact ways such as telephone number of their home and workplace, mobile number, e-mail address, and telegram contact were obtained at the initial of the study.

The procedure and targets of the study were explained to the potential participants, and if they were satisfied to be studied and signed the consent form, they were entered into the study. All ethical principals were considered in this study, and ethical committee of Tarbiat Modaress University approved the study and allocated an IR.TMU.REC.1394.15 code.

Two questionnaires were used in this study. Data collection was conducted in participants' working sites.The first data collection (demographic) tool included: 17 demographic questions on the subject's age, weight, height, sex, education, physical activity, employment status, marital status, working conditions, organizational position, LBP characteristics, socio-economic characteristics, and work history. Work-related demographic questions were also included in this section, including questions about the type of work setting, usual shift schedule, the average hour of patient handling and movement per month, work in another job supplementing the main nursing job, and finally, patient handling and movement history.

The second questionnaire influencing the constructs was around the SCT with the aim of determining the damaging behaviors to the spine, which was consisted of four structural units with 25 items covering the constructs of self-efficacy, self-control, outcome reinforcement, and emotional coping. These constructs were identified in the previous study (Shojaei, 2016). The data of the two groups before and after receiving the educational program were completed. The response scale for the items was a 5-point Likert scale from strongly agree to strongly disagree with a high score as an indicative of good responses (Shojaei et al., 2016).

To provide content validity, an expert panel consisting of 10 specialists, including two neurosurgeons specialist, a rheumatologist, an epidemiologist, three nursing teachers, and three health education experts checked all the items and inserted their recommendations into the questionnaire. After establishing the content validity, the questionnaire was simplified so that each participant could answer the questions easily (Shojaei et al., 2015). A pilot study was conducted to assist in establishing the face validity of each question. The questionnaire was given to 25 patient caregivers from different units of Qom hospitals. Items were evaluated and modified based on the appearance, fit, brevity, clarity, ease of understanding, and inclusiveness.

The multidisciplinary educational intervention was consisted of social cognitive theory-based educational program and ergonomic posture training. The educational program was based on four concepts of SCT which were predictors of healthy behaviors among health care workers suffering from LBP. The procedure determining these predictors has been described in previous research (Shojaei et al., 2016). Because of the intervention nature, we were unable to mask participants or those providing the intervention for treatment assignment, so the patients knew what they were undergoing. However, data analysis was performed through blinded procedure. This educational program included four 2-hour education/practice sessions as follows:

Promoting self-efficacy of the participants in complying with ergonomic posture: The concept of self-efficacy points to having belief in a persons' ability to perform behaviors that bring desired outcomes (Glanz, Rimer & Viswanath, 2008). Therefore in this session, the participants were educated and confident about complying with correct ergonomic posture, so the heath education specialist (first author) tried to address and practice the skills related to maintaining vertebra biomechanics postures and improving the beliefs of health care workers about their ability to comply

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with ergonomics of their vertebra while transferring or repositioning the patients. In this class, maintaining vertebra correct/natural postures while standing, sitting, walking, and reclining as well as doing strengthening back exercises in the workplace were educated step by step, and the participants were confident and reassured that they could cope with the behaviors while doing their duties in their workplace even in critical situations. Individuals were made sure that they have learned intended skills and made additional attempts to acquire required masteries. People in similar conditions who were engaged in such behaviors in their workplace were set as patterns. Proper practices were practically performed by instructor, and then patient carriers were asked to conduct them accordingly. Individuals were asked to have strong concentration on backache preventive behaviors. Required self-confidence to get others' assistance was molded in patient carriers who were assured of their self-confidence in performing proper behaviors even under critical conditions.

The methods applied here were consisted of guided practices, confirmation of skillful experiences, verbal persuasions, encouragements, improvement of mental-physical states, training of ascription, behavior self-monitoring, creation of conditional rewards, goal setting, benchmarking, training of skills, setting tasks on a proper slope of hardness and response, negotiations, stress reduction techniques, and role-playing. Using such techniques and methods, it was attempted to increase self-efficiency degrees in patient carriers. To increase self-efficiency, both factual and conceptual barriers blocking individuals' ability to complete a task were addressed. Short- and long-run targeting was carried out. Ascription training was given. Those who attribute their failure to their inabilities and unluckiness were less likely to reach to the success. Previous unfruitful attempts were assigned to external factors.

Promoting self-control of the participants regarding complying with ergonomic posture: The concept of self-control/regulation points to controlling oneself through self-monitoring, goal setting, feedback, self-reward, self-instruction, and enlistment of social support (Glanz, Rimer & Viswanath, 2008). In this session, the participants were educated in how they can comply with correct ergonomic posture in their work sites, and they were able to make use of self-control abilities to resolve their problems, so the author tried to educate the health care workers who participated in the class regarding self-monitoring/self-management of vertebra ergonomic and correct posture of their back during a work shift while transferring/repositioning the patients' standing, sitting, walking, and reclining. Reviewing the correct and incorrect back pain preventive behaviors at the end of each work shift or before bedtime was focused in this class. Self-assessment during patient handling in the workplace was practiced with the participants. Moreover, in this session, all the participants were recommended to have a proper action plan for low back pain preventive behavior in their workplace.

Individuals were asked to monitor themselves during a work shift and to assign to themselves positive or negative scores after reviewing their proper/improper practices at the end of each shift or before going to bed. They were demanded for diminishing their negative scores and increasing their positive ones. In addition, individuals were asked to arrange an appropriate backache and spinal cord preventive plans in workplaces and achieve inclusive dominance over their responsibilities. By comparing their own behaviors to cited behaviors, individuals could express appropriate emotional reactions.

Highlighting outcome expectations of maintaining ergonomic posture of vertebra: The concept of outcome expectations points to the belief in the likelihood and value of the consequences of behavior choices (Glanz, Rimer & Viswanath, 2008). In this session, the participants were educated about the positive outcomes of complying with correct ergonomic posture, so the participants were provided with positive outcomes of maintaining ergonomic posture of vertebra during a work shift while transferring/repositioning the patients, standing, sitting, walking and reclining. In this session, these outcomes such as reducing pain severity, improving physical/mental function, reducing health care costs, reducing work absenteeism, increasing work satisfaction, and faith in positive results of maintaining correct posture of vertebra were focused.

Focusing on emotional coping with maintaining ergonomic posture of vertebra in workplace: The emotional coping points to the techniques employed by a person to control the emotional and physiological states associated with new condition/ behavior (Glanz, Rimer & Viswanath, 2008). Emotion-focused coping involves trying to reduce the negative emotional responses associated with stress which may be due to maintaining ergonomic posture of vertebra in workplace.

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Therefore, in this class, the participants were educated and emotionally coped with correct ergonomic posture, so the health care workers were to practice to feel satisfaction, happiness, and exhilaration with maintaining biomechanics of their vertebra during patient handling or doing their duties at the workplaces. Nurses' feeling of worthiness, philanthropy, and humanitarian while patient handling/transferring were focused on in this session because it could cause to prevent self and others' damage. All educational classes were managed through group discussions and questioning/answering procedures.

For descriptive/ analytical statistics, we used SPSS software (IBM SPSS Statistics for Windows, Version 18.0, IBM Corp). We used Student t- test/ paired t- test for continuous variables and $\chi 2$ for categorical variables to compare differences between two studied groups who completed the study (completers). All studied health care workers in this study were official employees of the hospitals and so were accessible after six months. Therefore, there were no missed participants.

Results

A total of 125 eligible and accessible patient care workers were randomly divided into two control and intervention groups. According to the results, 23.2 (N = 29), 60.8 (N = 76), and 16% (N = 20)of the study subjects were in the age ranges of fewer than 30, 31-45, and above 45 years, respectively. Comparison of the two groups in terms of basic demographic characteristics and data regarding back pain are shown in Table 1. The results of Chi-square test did not show any significant difference between the two study groups regarding the demographic variables. Results are expressed as significant at $P > .05$ (Table 1).

The results from repeated measure analysis of variance at the baseline, right after the intervention, and 6-month follow-up show that there are significant differences in scores of all constructs of the SCT within each group by time ($P < .01$). Accordingly, outcomes of between groups were different in all of the constructs of the SCT ($P < .05$). In the cases of significant differences of outcome between time and group, post-hoc analysis was performed to determine which time points were responsible for the difference. The results of this analysis show that the mean differences between the baseline and 6-month follow-up of 4 constructs of the social cognitive theory, including self-efficacy, self-control, outcome reinforcement, and emotional coping, were significant at the level of $P < .05$. However, a significant difference was found in the intervention group after the educational intervention, and total mean scores of all predictor constructs were higher in the intervention group than the control group following the intervention. (Table 2).

Table 1. Relative distribution of the study subjects based on the demographic variables (by Chi-square test).

Group Variables number	Intervention		Control		*P*-value
	Number	%	Number	%	
Age					.36
under < 30	14	22.2	15	24.2	
30□45	36	57.1	40	64.5	
> 45	13	20.6	7	11.3	
BMI					.97
> 20	4	6.3	5	8.1	
20□25	22	34.9	22	35.5	
25-30	24	38.1	23	37.1	
> 30	7	11.1	8	12.9	
Educational level					.26
Primary school	20	31.7	11	17.7	
Secondary school	16	25.4	22	35.5	
High school	23	36.5	25	40.3	
Associate Degree	4	6.3	4	6.3	
Gender					.35
Male	52	82.5	47	75.8	
Female	11	17.5	15	24.2	
Sciatica pain					.65
Yes	18	28.6	20	32.3	
No	45	71.4	42	67.7	

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Table 2. Repeated measures of constructs of the Social cognitive Theory (SCT).

	Intervention	Control	Group Difference	Time Difference	Group × Time Difference
	Mean (SD)	Mean (SD)			
Self-efficacy			.003	< .0001	< .0001
Baseline	26. 1 ± 5.5	26 ± 5.2			
Right after the intervention	30.2 ± 4.8	25.8 ± 4.5			
6-month follow-up	28 ± 4.2	26.4 ± 4.7			
Self-control (Goal setting)			.003	< .0001	< .0001
Baseline	20. 3 ± 5.7	20.1 ± 5.3			
Right after the intervention	24.8 ± 4.3	20.1 ± 4.7			
6-month follow-up	22.8 ± 4.9	21.5 ± 4.5			
outcome reinforcement			.023	.002	< .0001
Baseline	31.9 ± 5.4	33.1 ± 5			
Right after the intervention	35.7 ± 5.2	32.8 ± 4.5			
6-month follow-up	34.3 ± 3.9	31.6 ± 4.7			
emotional coping			.007	< .0001	.001
Baseline	14. 1 ± 3.2	14.4 ± 3.4			
Right after the intervention	16.8 ± 2.9	14.7 ± 3.1			
6-month follow-up	16 ± 2.7	14.5 ± 3			

Discussion

The present study showed that educational intervention based on the SCT, could significantly improve predictor constructs of this theory (including self-efficacy, self-control, outcome reinforcement, emotional coping) in health care workers immediately and 6 months after the intervention. This finding is in line with a study conducted in rehabilitation centers by Smeets (2006) using the cognitive-behavioral treatments for the patients with chronic low back pain to reduce their functional limitations, patient's main complaints, and pain intensity. Its results showed that the three theory-based treatments were more effective than waiting list (Smeets et al., 2006). Gohner (2006) demonstrated that a short and inexpensive cognitive-behavioral training program is an effective tool to enable patients with back pain to follow treatment recommendations on a regular basis. However, no group differences regarding pain intensity emerged (Gohner & Schlicht, 2006). Similar studies have suggested that further researches on theory-based treatments to be carried out in order to confirm the findings, to investigate mediation, and to develop more effective treatments (Smeets et al., 2006).

This is in line with Rasmussen (2015) study that showed a multifaceted intervention consisted of participatory ergonomics, physical training, and cognitive-behavioral training, can reduce LBP days, pain intensity, and bother of elder care workplaces (nursing homes and home care) in a group of workers mainly made up of health care workers(Rasmussen et al., 2015).

In other words, the use of these processes of change caused the workers to advance into the next stage including preventive behavior and reduction in low back pain. This finding was supported by Kirk et al. (2010) (Kirk, MacMillan & Webster, 2010). The findings of their study indicated that the mean score of the SCT constructs as well as adopting correct body posture among patient care workers in the intervention group could be improved through the educational program conducted in a 6-month period of follow up.

The results of the present study showed that the mean score of self-efficacy among nurses in the intervention group increased significantly following the intervention. These findings were also consistent with Lubans et al. (2006) (Lubans & Sylva, 2006) and Sol et al. (2011) (Sol et al., 2011). Self-efficacy routinely emerges as a strong predictor of exercise adoption and maintenance in exercise research (Anderson et al., 2006). Given the importance of self-efficacy to adopt correct body posture among nurses, researchers should focus on developing ergonomics-oriented educational interventions aimed at increasing self-efficacy among them.

We also found that the intervention considerably increased self-control in the intervention group compared to the control group up to 6 months following the intervention. Self-control, which is a key in social-cognitive approaches to change health behavior (Bandura,

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2002), was the most influential social-cognitive variable in the model of Anderson's study (2006) (Anderson et al., 2006). Similar studies on other models have been able to achieve good results; for instance, (Mohammadi Zeidi et al. 2011) showed that developing a TTM-based ergonomics educational program can considerably enhance the advantages of adopting good body posture among computer users (Mohammadi Zeidi, Morshedi & Zeidi, 2011).

Several studies investigated the effectiveness of different treatment protocols including education, ergonomic change in work sites, relaxation, exercise, and multidisciplinary for decreasing MSD, especially LBP in nurses (Tavafian, Jamshidi & Mohammad, 2011; Karimian et al., 2010). Intervention effectiveness trials for preventing and reducing LBP and its consequences in workplaces with physically demanding work are few, and mostly unsuccessful (Rasmussen et al., 2013). Poor body mechanics and lack of training in appropriate lifting techniques in nursing education are considered by preoperative nurses and technicians as the main cause of the high prevalence rate of upper and lower back pain (Sheikhzadeh et al., 2009).

Only a few studies have focused on the natural course (i.e. development without interventions) of LBP in detail, and no studies have focused on the course of LBP in detail after an intervention. Studies showed that ergonomics training in maintaining an adequate body posture at workplace reduces the prevalence rate of WMSD among nurses (Sheikhzadeh et al., 2009).

Patient handling, including lifting and transferring, is associated with an increased risk of developing WMSDs of the lower back. It is suggested that training in proper handling and lifting techniques and simple stretching exercises while at work can be implemented to reduce the occurrence of the WMSDs among heath care workers. These positive effects may potentially contribute to sickness absence, prolong working life, and thereby may be beneficial for the society as well. By pursuing specialized medical care and clinical duties, the burden of transferring patients shifts upon the shoulders of health service personnel and first-aiders offering primary care services. But these medical workers have never been under educational support and despite being in an educational-therapeutic environment, educational platform are rarely provided for them. Therefore, they have not become aware of occupational hazards in order to control and prevent a variety of musculoskeletal disorders.

Despite high prevalence rate of low back pain among patient care workers and the importance of ergonomics education in reducing their WMSD, to the best of our knowledge, no educational intervention targeting WMSP has been developed. Current educational programs have never been sufficient. Therefore, further theory-based educational efforts should be established for patient care workers about measures that should be taken into consideration in in-service training to prevent low back pain. Accordingly, it is recommended that further similar researches be designed and conducted for the health care providers with longer follow-up period.

Conclusion

According the results, it is recommended that further similar researches be conducted for the health care providers with longer follow-up period.

In the case of similar results, it seems this intervention can be proposed to primary healthcare in national health system for LBP prevention.

Conflict of Interest

There is no potential conflict of interest relevant to this study.

Authors Contribution

SSh: has designed and conducted the study.

SST: has supervised all sections of the study.

ARJ: has consulted for selecting the eligible participants.

JW: has consulted and revised the manuscript.

MRS: has consulted about the study.

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