

Impact of Jacobson Relaxation on Dialysis Adequacy in Elderly Hemodialysis Patients

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Background: Dialysis adequacy is one of the determining factors for survival in elderly patients. Improving the dialysis adequacy highly affects the remission and prognosis of old dialysis patients. Current study was conducted to evaluate the effects of Jacobson relaxation technique on dialysis adequacy in elderly people, who are under dialysis treatment.

Methods: This is a clinical trial performed on 80 hemodialysis patients in two hemodialysis centers of Gonabad and Yazd, Iran, in 2013. The patients were selected through purposive sampling method, and randomly assigned into the two groups of control (n=40) and intervention (n=40). The participants in intervention group were provided by three sessions of relaxation training, and were asked to perform the relaxation daily for six weeks, while the control group just received the routine cares. Afterwards, the adequacy of dialysis was compared between the two groups. The data was collected using the demographic information, and the dialysis adequacy was calculated by KT/V equation.

Results: A significant statistical difference was found between groups regarding the mean difference of dialysis adequacy in pre- and post-intervention ($P < 0.001$). Besides, dialysis adequacy increased post-intervention in the case group and decreased slightly in the control group compared to pre-intervention.

Conclusion: Training and performing the relaxation method lead to an improved dialysis adequacy in elderly patients under hemodialysis.

Keywords: Dialysis adequacy, Hemodialysis, Jacobson relaxation, Old patients

Introduction

Aging is a natural process, during which physiological and psychological changes occur in the body. Therefore, most of the senile people require special health care due to chronic diseases (1). Chronic kidney disease is among the main problems in this age, and various body systems get affected by the uremia resulting from this disease (2).

The prevalence of chronic renal failure (CRF) has been 240 cases per million throughout the world, and about 8% is added yearly to this rate (3). Chronic kidney diseases are considered as the eighth mortality reason in the USA (4). According to the statistics reported by the Iranian ministry of health in 2014, prevalence of these diseases is 680 cases per million in Iran, and it has the yearly incidence of 1200-1600 people (3).

The patients with end stage kidney disease need alternative treatments to survive; hemodialysis is the most common therapeutic method in these patients (5, 6). Dialysis adequacy is among the important factors affecting survival rate and life-expectancy in elderly CRF patients. Inefficient dialysis adequacy results in increased hemodialysis frequency and duration, and imposes additional therapeutic expenses on health systems (7). Based on the literature, inadequacy of dialysis is one of the main mortality reasons in CRF patients.

In order to provide high quality care, nurses of special departments should consider the emotional and moral issues of the patients as well as the physical aspect. These aspects affect each other and might improve overall health (8). Subsequently, using supplementary and non-pharmacological treatments is highly insisted in health systems (9). Supplementary medicine mostly has little side effects and risks, and could be applied with or without other methods resulting in positive influence on physical and psychological disorders (10).

Progressive muscular relaxation technique is one of the non-pharmacologic approaches, which was introduced by Edmond Jacobson in 1983. This technique requires the patient's active involvement in care and treatment program, and this is considered as a fixed rule in holistic nursing (11).

Nurses are excellent in applying the behavioral techniques such as progressive muscular relaxation because they have the most contact with the patients. Progressive muscular relaxation is non-invasive and is well-trained by the nurses. Besides, the caring roles of the nurse are highlighted by training this technique (10). Consequently, using this technique as one of the branches of supplementary non-pharmacologic medicine is developing among the nursery protocols.

This relaxation technique is so easy to learn and perform, and brings no further expense for the patients. The nature of this technique makes it more acceptable for the patients and they are encouraged to apply it. Relaxation is regarded as a coping technique, and it has the potency to improve the person's ability for facing the disease consequences or treatment sequels. The progressive muscular relaxation originates from the theory that a psychological condition known as increased muscular and nervous tension is the base for anxiety conditions and psychosomatic disorders. Jacobson has stated that muscular relaxation results in mental relaxation as well (12).

Findings of the study performed by Hou et al. (2011) indicated the favorable impact of progressive muscular relaxation on quality of life (QoL) in hemodialysis patients (13). Another research in 2006 demonstrated that the relaxation technique might reduce the patients' anxiety and enhance their QoL (14). Additionally, this technique could control and eliminate the unfavorable physiological effects induced by psychological tension and stress; these positive impacts are made through psychoendocrine system and activation of the sympathetic and parasympathetic systems.

Dialysis as a solution for CRF management is a tense process, and the stress of this method could lead in reduced adequacy of dialysis. Therefore, regarding the dialysis-induced psychological tensions and the raise in senile population, the current study was performed to assess the impact of Jacobson relaxation on dialysis adequacy in elderly people under treatment by hemodialysis.

Methods

The study population of this clinical trial consisted of all the patients under hemodialysis in two hemodialysis centers of 22-Bahman, Gonabad, Iran and Shahid Rahnemoon, Yazd, Iran in 2013. Due to insufficient samples in Gonabad and unavailability of other cities of Khorasan Razavi province for the researcher, eighteen people were selected from Gonabad and 62 from Yazd.

The inclusion criteria: 1) age of over 60, 2) 2-3 dialysis per week, 3) passing of at least 6 months from the first dialysis, and 4) absence of any psychological disorders such as depression diagnosed by a doctor. The exclusion criteria: 1) finding out exchange of the trained information between the two groups, 2) absenteeism 3) hospitalization due to any reason during the study, and 4) psychological crisis induced during the study.

The sample size was calculated as 80 according to the formula for comparison of the means. Data collection tool was a questionnaire consisting of two parts of the demographics and the information regarding the disease, dialysis adequacy, and the intervention. KT/V calculation software was utilized for assessing the dialysis adequacy, and KT/V of ≥ 1.2 was considered as dialysis adequacy cut-off point.

The samples were selected from the centers based on the inclusion and exclusion criteria. Afterwards, the participants were randomly assigned into the two groups of intervention ($n=40$) and control ($n=40$). Nine patients from Gonabad and 31 from Yazd were included in control group.

In order to control those variables that affect the dialysis adequacy, similar conditions including three dialysis sessions per week, four-hour dialysis sessions, dialysis solution flow of 500 mL/min, and blood flow of 300 mL/min were set for all the study units. All the other variables influencing dialysis adequacy such as the machine and filter types, dialysis medications, filter clearance coefficient, and machine temperature were matched.

The Jacobson relaxation technique was taught to the intervention participants by the researcher in the hospital during three private

sessions. The patients were asked to close their eyes, relax, and focus on their respiration. Afterwards, they had five deep breaths, during which the lungs were completely filled with air followed by a slow expiration. Meanwhile, they were requested to think of calm, freedom and laxation. In the next step, muscular contraction and relaxation were performed for fourteen muscle groups including facial muscles (frontal, levator palpebrae superioris, mandibular, and orbicularis oris), neck, fingers, palms, forearms, arms, shoulders, back, chest, abdomen, gluteals, thighs, shanks, and plantar muscles. Contraction and relaxation of each muscle lasted five and tensseconds, respectively. During the whole process, it was necessary for the patients to be concentrated on the contracting and relaxing muscle. Finally, the patients were requested to relax their whole body, have five deep breathes, open their eyes slowly, and return to normal condition (11).

Relaxation technique was performed several times under the supervision of the researcher in these three sessions. After the training, the patients were asked to complete the 10-15 min relaxations before sleeping for six weeks at home. The intervention was not implemented during the dialysis due to the noise and routine cares performed in the department.

The participants were provided with a checklist for recording the date, time, and duration of the technique, and also the reason if not performing. This relaxation checklist was collected from the patients by the researcher weekly. In addition, a compact disk about relaxation training was given to the patients; and the researcher made phone calls with the participants once every other day to manage any possible problem regarding the technique and also to control whether or not they completed the form.

A consult session was also held for those who accompanied the patients, and they were advised to monitor the relaxation exercise on the specified time. No intervention was done in the control group. Finally, the dialysis adequacy was repetitively measured at the determined time points, and the results were compared with the previous data.

The statistical analysis

the data was analysed by SPSS version 14 using Mann-Whitney U test to compare the dialysis adequacy between the two groups. In addition, the paired t-test was used for making comparison between the changes of dialysis adequacy pre- and post-intervention in each group. P-value of less than 0.05 was considered as significant.

The ethical considerations

The written approvals were taken from the officials of Gonabad and Yazd Universities of Medical Sciences and the written consents were taken from the patients. This trial was registered in Iranian Registry of Clinical Trials with the code of IRCT2013042713132N1 following the evaluations of regional Ethics Committee and receiving the ethical code of K8/5/91/1.

Results

The Mean age was 75.35 ± 7.3 , mostly in the range of 75-80 years. Most of the participants were men (73%), married (59%), and had education level of under diploma (93%). The two groups were not significantly different ($P > 0.05$) regarding the demographic characteristics.

Mean of KT/V indicator of dialysis adequacy was 1.09 ± 0.35 . The diseases that most likely predispose the patients to CRF and hemodialysis were diabetes (40%) and systemic hypertension (53%). The results of paired t-test demonstrated that the alteration between the mean difference of the dialysis adequacy pre- and post-intervention was not statistically significant ($P = 0.05$). Moreover, according to Mann-Whitney test no significant difference was observed between the mean of post-intervention dialysis adequacies of the two groups ($P = 0.07$). Nonetheless, mean of the changes in dialysis adequacy whether before or after the intervention was significantly higher in the treatment group compared to control group ($P < 0.001$) (Table 1).

Discussion

The impact of Jacobson relaxation technique on dialysis adequacy of elderly patients under treatment with hemodialysis was assessed in the present study and the

mean KT/V as indicator of dialysis adequacy was 1.09 ± 0.35 .

Several studies have shown the inadequacy of dialysis in various centers and hospitals in Iran. For example, Delavari et al. found the inadequacy of dialysis in Kordestan, Iran, and revealed that 78.9% of the patients had dialysis adequacy of less than 1.2 (15).

The dialysis adequacy was more favorable in this study compared to similar studies, which is probably due to the educational base of the centers. It should be considered that conduction of the different studies in these centers has led in appropriate training and awareness of the patients and personnel.

The findings indicated that although means of pre- and post-intervention adequacies were not significantly different in the groups, the post-relaxation adequacy of the treatment group increased in comparison with that of control group. The KT/V enhancement from 1.12 to 1.21 is clinically remarkable, since according to the information provided by USRDS (United States Renal Data System) seven percent reduction in the mortality risk is expected by each 0.1 increase in KT/V up to 1.2 (16). The rise in dialysis adequacy in the present study might be attributed to applying the supplementary medicine in addition to the routine treatment for these patients. Furthermore, one of the long-time side effects of hemodialysis and uremic syndrome is psychological tension and anxiety that could result in decreased dialysis adequacy in these patients.

In the current study, relaxation technique as one of the concentration methods led in reduction of muscular tension and unfavorable physiological effects induced by stress and anxiety in hemodialysis patients.

The national standards, Iranian studies, and guidelines of special diseases office in ministry of health of Iran have stated the level of 1.2 as the suitable dialysis quality (minimum acceptable level). Nonetheless, the international standards being used in different studies are higher, such as 1.4-1.7 that has been stated by the American nephrologists (16). However, reaching the minimum acceptable level of quality seems difficult in Iran (17).

Tayebi et al. (2012) also evaluated the impact of Hatha yoga on dialysis adequacy in a quasi-experimental study on 62 hemodialysis patients divided into two groups. Modified Hatha yoga exercises were performed as one-hour sessions twice a week for two months. Their results demonstrated that Hatha yoga, which is a branch of supplementary medicine and a combination of breathing and postural exercises along with relaxation, might significantly improve the dialysis adequacy (18).

It could be concluded that yoga might enhance QoL and result in feeling healthy due to the close relation between the mind and body, and represent the yoga's focus on balancing these two as the Eastern life philosophies.

Additionally, the study conducted by Rafiee et al. (2009) indicated that demonstrative movements increase the dialysis adequacy (19), which is consistent with the findings of the current study. The results obtained by Trisha et al. (2006) were also indicative of significant increase in dialysis adequacy (20%) after exercise with bicycle as a non-pharmacological supplementary treatment. The exercise duration was 60 min within the first two hours of dialysis, because researches have presented that three 15-minute exercise sessions during the dialysis are not sufficient for removing the serum urea, while two 30-minute periods more appropriately augment urea removal through dialysis fluid (20). Furthermore, the relaxation technique is used as a supplementary therapeutic method owing to its simple performance.

Results of the current study showed that dialysis adequacy is higher in old women than men, which is consistent with the findings of Tahrir et al. (2014). The latter result could be attributed to the better diet, muscular mass, and lower weight in women (17), and further research regarding this point are

required to find out which gender is more prone to CRF.

In the present study, aged people with diabetes presented lower dialysis adequacy compared to the non-diabetic elderly patients. However, in the study performed by Pasadakiss et al. (2010) no evidence existed regarding that the diabetic patients receive insufficient dialysis in comparison with the non-diabetic patients (21). It seems that the reasons for low dialysis adequacy in patients with diabetes include vascular sequels (e.g. atherosclerosis), vasoconstriction, reduced blood flow speed and lack of suitable access to blood vessels (17).

Nowadays, methods such as increasing the machine round, using strong filters, and applying double filters during the dialysis as well as nocturnal dialysis are considered as common methods of improving the adequacy. On the other hand, it was revealed in this study that applying the supplementary medicine could enhance the dialysis adequacy even without these costly methods that have side effects as well. For instance, according to study conducted by Siridhar et al. in the USA, utilizing double filters for hemodialysis might increase the dialysis adequacy just by 2% (22).

Conclusion

Findings of the present study highlighted that training and executing the progressive muscular relaxation technique might boost the dialysis adequacy in CRF patients. Therefore, training the patients in hemodialysis units to perform relaxation technique as an effective cost-efficient method is recommended.

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Table 1: Comparison of pre- and post-intervention mean of dialysis adequacy in the patients of the two groups

Pain frequency Bag type	Neck pain N(%)	Shoulder pain N(%)	Back and hand ache N(%)	Total N(%)
Backpack	64(83.1)	12(15.6)	1(1.3)	77(100)
Satchel and handbag	3(50)	3(50)	0	6(100)
Shoulder bag	3(100)	0	0	3(100)
Total	70(81.4)	15(17.4)	1(1.2)	86(100)

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