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Original Article

Education Section

Effects of Continuous Care Model on Blood Pressure in Patients with Type II Diabetes

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ABSTRACT

Introduction: One of the main problems encountered by type II diabetes patients is high Blood Pressure (BP). Continuous care is the standard process of making effective, mutual, and continuous relationships between patients and nurses as healthcare providers. Continuous Care Model (CCM) can help the nurses in identifying needs, problems, and sensitisations of the patients and encourage them to maintain and enhance their health status.

Aim: This study aimed to investigate the effects of CCM on the BP trends of patients with type II diabetes in Ilam city.

Materials and Methods: This quasi-experimental research was conducted in 80 patients with type II diabetes. Subjects were selected using cluster sampling method and then were randomly divided into intervention and control groups. Interventions based on the CCM were in the form of training sessions that were conducted for three weeks. Consequently, continuous care consultations, control, and assessment were conducted for nine weeks. A questionnaire on demographic characteristics and a BP recording device was used to collect the data obtained before intervention and 1-3 months after intervention. Then, descriptive and inferential tests (ANOVA, repeated measures, chi-square) were used for data analysis.

Results: Findings revealed that the mean BP (measured in mmHg) scores of the CCM (systolic, 133.22±3.98; diastolic, 86.00±2.96) and control groups (systolic, 133.65±2.10; diastolic 84.62±2.72) before intervention were not significant ($p>0.05$); however, after intervention, a significant difference was observed between the mean BP (measured in mmHg) scores of the CCM (systolic, 127.52±3.13; diastolic, 80.75±1.97) and control groups (systolic, 133.65±2.25; diastolic, 83.87±2.12) ($p<0.05$).

Conclusion: CCM is suggested to be effective in managing the BP and can be applied to improve the health behaviour in patients with type II diabetes.

Keywords: Caring, Chronic disease, Nursing model

INTRODUCTION

Diabetes is a multifactorial metabolic disorder characterised by increased blood glucose due to defect in secretion or action of insulin, or both. Diabetes results in 2.5-15% increased cost of healthcare budget, and indirect costs reach manifold. It is also responsible for ischaemic heart disease, hypertension, retinopathy, neuropathy, and cataract and for 9% of all deaths worldwide. Therefore, diabetes is considered as a major general healthcare problem in the USA and other parts of the world, particularly in Iran [1-6]. The prevalence of type II diabetes is increasing worldwide [7-9]. The number of patients suffering from type II diabetes is estimated to be at least 350 million individuals by the year 2030 [5,10-13]. The complications of diabetes can be increased risk of cancer [14,15], cardiovascular outcomes [16] and decrease in quality of life [17]. One of the main problem in patients with diabetes is high BP, which is continuously growing due to the high prevalence and concurrency of cardiovascular diseases in industrial and developing countries [18]. High BP in the middle east is one of the non communicable diseases with a significantly increased prevalence [19]. Therefore, appropriate interventions to manage hypertension seem significant.

One of the methods used by proficient nurses is the care model. In Iran, the CCM was developed and evaluated by Rahimi A et al., in relation with chronic diseases. This model introduces patients as the continuous and effective caring factor in promoting their health [20,21]. Continuous care is a process of making effective, mutual, and continuous relationships between patients and nurses as healthcare providers who identify patients' needs, problems, and sensitisation for acceptance of continuous healthcare behaviours and contribution in keeping improved and enhanced health [22,23]. Applying this mode is accurately identifying patients' problems and motivating and involving them and their families to eliminate their problems [24]. The main objective of the CCM is designing and developing a program that results in acceptance, increased appropriate visions, and controlling the diseases and potential side effects [25].

The results of this study may improve the knowledge-based evidence on caring of patients with diabetes to facilitate a more specialised care. It also motivates nurses, patients, caregivers, and family members for implementing CCM and controlling disease consequences. Therefore, given the prevalence of diabetes [26,27] this study was conducted aiming to determine the effects of CCM on the BP of patients with diabetes in Ilam city.

MATERIALS AND METHODS

The present quasi-experimental research with pre test-post-test stages was conducted on 80 patients with type II diabetes who visited the health care centers. They were divided into control and intervention groups. The sample size was considered 80 according to the Cochran formula with a confidence interval of 95% and a statistical power of 80%. In every province of Iran, there are many health care centers that serve people at primary prevention level. In the city of Ilam, there are 11 health care centers. The patients were selected from the health centers by cluster sampling. Then they were divided into two groups of intervention and control. Patients who referred on even days were placed in the control group and who referred on odd days were placed in the experimental group. Patients and data collectors were blinded (double blind). Inclusion criteria were patients suffering from type II diabetes for at least one year, with age ranging from 18 to 65 years and literate. Exclusion criteria were patients suffering from diabetes type I, absent for more

than two sessions of training interventions, hospitalisation during intervention, risk of diabetic ketoacidosis or non ketone hyperosmolar hyperglycaemic syndrome, suffering from cardiovascular diseases, and well-known psychological disorders.

Training sessions were conducted for three weeks, and subsequently, consultants of continuous care, control, and assessments were followed up for nine weeks. Data collection instruments were divided into two parts: personal characteristics (age, gender, marital status, education, monthly income, suffering from diabetes, etc.) and the BP measurement. BP was measured and recorded for all patients at 0, 1, 2 and 3 months of the study. To measure the BP, patients were left in a quiet environment for five minutes, and tea, coffee, and cigarettes were not allowed. The BP by mercury manometer was measured from the left hand, in supine position. Before conducting the study, the reliability of the instrument was confirmed on 10 patients.

The CCM included four phases: orientation, sensitisation, control, and evaluation which was conducted for four interventional groups including 7 or 8 members.

1. **Orientation phase:** A session was held for 10 to 15 min. in the presence of the researcher, patients, and family members. Participants and the researchers stated their expectations from the course and emphasised the relationship between continuation of care and treatment. In this phase, moral considerations and demographic information questionnaire forms were conducted.
2. **Sensitisation phase:** This phase aimed at partcipation of patients' and family member's in implementing care for 4-6 sessions in 30-45 minutes with regard to the level of tolerance and acceptance of patients and their families. Then, the researcher informed the subjects, in an understandable way, about the characteristics of diabetes, control of side effects of the disease, significance of diet, physical activities, regular visits to physicians, observation of given prescriptions, and other factors affecting BP. Moreover, the significance of regular visits to the physicians and how to perform the prescribed procedures, giving up inappropriate habits such as smoking, continuation of care behaviours, and discussion about considered questions and answers were taken into account. Personal sessions for complete discussions and also for those who were absent during the sessions were held. First and second stages took about three weeks.
3. **Control phase:** In investigating and paying attention to new care problems (hospitalisation and mode of continuing learned behaviours) and keeping mutual relations (via phone calls or face-to-face relations), consultations were continued and the process of problem solving was decided. This period took one week.
4. **Evaluation phase:** This phase included investigation of patients' BP evaluated at one, two, and three months in both intervention and control groups.

Ethical approval was taken from The Ethical Committee of Ilam University of Medical Sciences (ir.medilam.rec.1396.43) and informed consent was taken from the participants for this research.

STATISTICAL ANALYSIS

Data were analysed using the SPSS version 20 and descriptive statistics (mean scores, percentage, and absolute and relative frequency) for personal variables, and chi-square test for comparing personal variables of the two groups. The repeated measure ANOVA was employed to compare the BP before and after the intervention.

RESULTS

Among the 80 subjects participating in the study, 48 (60%) were male and 32 (40%) were female. Statistical tests indicated no significant differences between the intervention and control group in terms of demographic variables [Table/Fig-1].

Findings in [Table/Fig-2,3] indicate that the BP in the intervention group decreased after the intervention. ANOVA indicated a significant difference between BP of the control and intervention groups ($p<0.05$).

Demographical characteristics		Intervention group n (%)	Control group n (%)	p-value
Gender	Men	25 (62.5)	23 (57.5)	0.38
	Women	15 (37.5)	17 (42.5)	
Marital status	Married	36 (90)	37 (92.5)	0.43
	Single	4 (10)	3 (7.5)	
Education	Primary	10 (25)	11 (27.5)	0.88
	Secondary	6 (15)	10 (25)	
	High school	15 (37.5)	12 (30)	
	University	9 (22.5)	7 (17.5)	
Job	Employed	7 (17.5)	4 (10)	0.93
	Housewives	16 (40)	14 (35)	
	Self-employed	15 (37.5)	20 (50)	
	Unemployed	2 (5)	2 (5)	
Income per month	Less than 500 thousand tomans	15 (37.5)	17 (42.5)	0.74
	From 500 to 1 million tomans	6 (15)	7 (17.5)	
	More than 1 million tomans	19 (47.5)	16 (40)	
Smoking	Yes	7 (17.5)	10 (25)	0.10
	No	33 (82.5)	30 (75)	
Regular visits to physician	Yes	8 (20)	9 (22.5)	0.60
	No	32 (80)	31 (77.5)	
Family history of diabetes	Yes	15 (37.5)	19 (47.5)	0.42
	No	17 (42.5)	21 (52.5)	

[Table/Fig-1]: Demographic characteristics of research samples.
ANOVA and Chi-square tests were used for comparing quantitative and qualitative data.

Systolic blood pressure	Intervention group		Control group	
	Mean±SD	p-value	Mean±SD	p-value
Before intervention	133.22±3.98	-	133.65±2.10	-
One month after intervention	130.22±2.02	0.01	133.77±2.22	0.35
Two months after intervention	129.77±3.66	0.01	134.02±2.87	0.38
Three months after intervention	127.52±3.13	0.01	133.65±2.25	0.42
Variance analysis with repeated measure	p=0.01 df=3			

[Table/Fig-2]: Comparison of systolic blood pressure before, 1, 2, and 3 months after the intervention.
Analysis of variance with repeated measure was used to compare means in three groups
SD-Standard Deviation

Diastolic blood pressure	Intervention group		Control group	
	Mean±SD	p-value	Mean±SD	p-value
Before intervention	86.00±2.96	-	84.62±2.72	-
One month after intervention	83.22±3.74	0.01	84.42±2.72	0.30
Two months after intervention	82.50±2.07	0.01	84.37±2.69	0.33
Three months after intervention	80.57±1.97	0.01	83.87±2.12	0.32
Variance analysis with repeated measure	p=0.01 df=3			

[Table/Fig-3]: Comparison of diastolic blood pressure before, 1, 2, and 3 months after the intervention.
Analysis of variance with repeated measure was used to compare means in three groups
SD-Standard Deviation

DISCUSSION

This study aimed to investigate the effects of CCM on the BP trends of patients with type II diabetes in Ilam city. Our results showed that before conducting intervention, the systolic and diastolic BP in most of the subjects was >130 mmHg and >80 mmHg, respectively. Ghavami H et al., and Shahbodaghi Z et al., studies are consistent with the results of the present study [25,28]. In Abbasian M and Delvarianzadeh M study conducted on 340 patients with type II diabetes, findings indicated that 34.8% of the patients had history of high BP [29]. Grobbee DE also reported that cardiovascular diseases and high BP were among the prevalent problems in diabetic patients [30]. In Bonakdaran S and Taghavi M study the prevalence of BP in patients with type II diabetes was 51.6% [11]. Diabetic patients who have systolic BP of ≥140 mmHg and diastolic BP of ≥90 mmHg should change their lifestyle and treatment behaviours and receive drugs [31].

Findings of the present study indicated that the CCM causes decreased BP in patients with diabetes as evidenced by a continuously decreasing systolic and diastolic BP after four months; however, significant difference was not observed in the control group. Ghavami H et al., indicated that applying CCM can effectively decrease the mean scores of systolic BP of diabetic patients and prevent the occurrence of side effects by slightly decreasing the systolic and diastolic BP during four continuous months in the intervention group; however, this trend was not observed in the control group [25]. The result of Borji M et al., showed that applying the CCM does not change score of BP in patients on hemodialysis [22].

Raymond I et al., reported that this model caused improvement in the degree of stress, anxiety, and depression in haemodialysis patients [32]. Hashemi S et al., reported that this model caused increased adherence to the diets [33]. Rahimi A et al., estimated the effect of CCM on the Quality of Life (QOL) of hemodialysis patients and observed that in general domains and specific dimensions of QOL, except for the ability to work, the QOL of these patients increased [21].

LIMITATION

One of the limitation of this study was that measurement using a manual BP cuff may reveal inconsistent and inaccurate results. To resolve this limitation, the validity and reliability of the BP device was confirmed. It is suggested that in subsequent studies, patients' BP should be monitored using a digital pressure cuff. Other limitations of this study include various factors that may affect the patients' BP. To resolve this limitation, the researcher tried to identify and control the confounding factors.

CONCLUSION

This study improves the knowledge based on evidence about caring patients with diabetes, facilitates more specialised care, and motivates nurses, patients, caregivers, and family members in implementing CCM to manage BP. The study again confirmed the effectiveness of this model and indicated that its implementation is appropriately effective on the BP of patients with diabetes. This model is a comprehensive and complete model for caring patients, and its executive stages are compatible with the nursing models. Clinical nurses in different domains of training and nursing management should use this care model.

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