Motivational Interviewing to Improve Self-efficacy in Type 2 Diabetes Management

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Abstract

Background: Self-efficacy predicts adherence to treatment in patients with diabetes. Motivational interviewing could be a promising intervention to increase the patients' motivation to follow therapeutic recommendations. The present study aimed to assess the effects of motivational interviewing on self-efficacy in type 2 diabetes management.

Methods: This quasi-experimental study with a pretest-posttest design was conducted on 60 patients with type 2 diabetes, who were members of the Bukan Diabetes Association in Iran. The patients were selected using a random number table and were randomly allocated into intervention (n=30) and control (n=30) groups. Five motivational interviewing sessions (30-45 minutes) were held for the intervention group (two sessions per week). Data were collected using a demographic questionnaire and the diabetes management self-efficacy scale (DMSES). Data were analyzed with SPSS software version 14.0 using descriptive and inferential statistics.

Results: Sixty patients entered the analysis. A significant difference was observed in the mean score of diabetes management self-efficacy between the two groups before and after the intervention (P=0.014). The mean score of self-efficacy in diabetes management was increased significantly in the intervention group after MI (P=0.001).

Conclusions: Motivational interviewing improved self-efficacy in diabetes management. Thus, this approach is recommended to be used in patients with type 2 diabetes in order to increase their self-efficacy.

Background

Diabetes is one of the major causes of mortality across the world and is associated with complications that impose a huge burden on families, communities, and governments [1]. The prevalence of diabetes has been on the rise in developed and developing countries, and this issue has been reported to be more serious in the Middle East [2]. The world prevalence of diabetes was 6.4%, affecting 285 million adults in 2010 and will rise to 7.7% with 439 million adults by 2030. In Iran, 2,872,000 cases were diagnosed with diabetes in 2010 which is expected to rise to 5,981,000 cases by 2030 [3].

Diabetes decreases patient's quality of life and disrupts their routine activities due to sickness, absenteeism, disability, loss of productivity, early retirement or even premature death. [4]. Disease management improves the quality of care and productivity of patients with chronic diseases [5]. Disease management could be defined as a comprehensive strategy to enhance the general health status and reduce the treatment costs [6]. A disease management program had significant positive clinical impacts on the levels of hemoglobin A1C in patients with diabetes [7]. Diabetes management requires proper commitment to health behaviors. Behavioral changes seem crucial in patients with diabetes, and special attention must be paid to the effective factors in empowering these patients. Self-efficacy is one of the most important factors which play a key role in the proper management of diabetes [8]. In patients with

diabetes, self-efficacy could predict adherence to blood glucose monitoring, diet, insulin injection, and physical exercise; therefore, higher self-efficacy was associated with better diabetes management in these patients [9]. Meybodi et al reported a significant correlation between self-efficacy and self-care behaviors of patients with diabetes and concluded that self-efficacy plays a pivotal role in successful diabetes management in these patients [10].

Motivational interviewing (MI) is a counseling approach used by healthcare providers to help patients adhere to treatment recommendations [11]. The main purpose of motivational interviewing is to reduce the patients' perception of their own disability in order to change successfully and eliminate barriers [12]. MI increases internal motivation of patients and helps them explore and resolve ambivalence [9]. In addition to increasing motivation, MI attracts the patients' attention to a specific topic, thereby allowing substantial changes in various behavioral patterns [13]. This counseling approach has been developed by Miller and Rollnick as a promising intervention to bring about positive health behavior in medicine, health, and psychiatry [9]. MI could be implemented individually and in groups owing to its flexibility and ability to be applied in different behavioral aspects [14]. MI approach of Miller and Rollnick aims to enhance self-efficacy and increase motivation in individuals through interactive and empathetic listening in order to change their behavior patterns [15]. Another study conducted by Chien et al showed that MI program significantly improved self-management, self-efficacy, and quality of life in patients with schizophrenia [16]. Moreover, the literature review revealed the superiority of the MI program over traditional intervention strategies in addressing a wide range of psychological and physical disorders [10-12]. Despite the rapid growth in the application of MI in different areas of health care worldwide, it is a novel approach and limited research was conducted about its effectiveness in Iran. Because of the prevalence of diabetes as a chronic, disabling, and lifestyle disease that is growing so rapidly, the present study was conducted to investigate the effect of MI on self-efficacy in type 2 diabetes management. Our hypothesis was that MI might have an impact on self-efficacy in type 2 diabetes management.

Methods

Study design and participants

This quasi-experimental study with pre-test and post-test design was conducted in 2017. Participants were selected among patients with type 2 diabetes who were members of Bukan Diabetes Association in a city in west Azerbaijan located in the northwest of Iran. In total, 60 patients were selected using a random number table. The participants were allocated into the control (n=30) and intervention (n=30) groups by drawing "A" and "B" cards. The sample size was determined based on the study by Navidian et al with 95% confidence interval and 80% test power using the GPower 3.1 [17]. The inclusion criteria were as follows: 1) willingness to participate in the study; 2) no history of psychiatric diseases based on medical record; 3) no participation in similar MI programs; 4) no communication problems (e.g., blindness/deafness) and 5) no history of cognitive disorders. Unwillingness to participate in the study and hospitalization was considered as the exclusion criteria.

Measures

Data were collected using a demographic questionnaire including the age, gender, occupational status, education level, marital status, duration of diabetes, and type of medications. Moreover, the diabetes management self-efficacy scale (DMSES) was applied to evaluate self-efficacy in diabetes management. DMSES is theoretically based on Bandura's self-efficacy construct and it was developed by Naderimagham et al in 2013 [18]. This instrument consists of 17 items covering five domains: a specific diet, physical exercise, blood glucose monitoring, foot care, and smoking habits. The items in DMSES are scored based on a five-point Likert scale (Completely Disagree-Completely Agree) within the score range of 17-85. In the present study, we calculated the mean score in this questionnaire. The qualitative content and construct validity of DMSES was confirmed by Noroozi et al and the internal consistency of the instrument was also confirmed by Cronbach's alpha coefficients (α=0.92) [19].

Intervention

We obtained permission from the Ethics Committee of Urmia University of Medical Sciences in Iran (IR.UMSU.RCC.1395.132). We explained the purpose of the research to the participants, and assured their privacy and the confidentiality of their personal information. In addition, the participants signed an informed consent form, and they were notified of the voluntary nature of enrollment in the study. After all patients completed the questionnaire, we randomly allocated the patients to the intervention and control groups. Then, the intervention group was divided into three subgroups of 10. The lead researcher performed MI sessions based on the research contents showed on table 1. He had previous experience regarding MI and attended in a training class in this regard. The research content was about the specific diet, physical exercise, blood glucose monitoring, foot care, and smoking habits (Table 1). The structure of the MI sessions was based on Miller and Rollnick (2012) book [9], and the intervention was implemented in five sessions (two sessions of 30-45 minutes per week). The lead researcher who was trained about the MI approach, presented in each session to guide the group. The lead researcher began the session with the evaluation of the participants. Then, he set the primary goals according to the participants' evaluation results and determined the action plan. The most important skills were used in the sessions were goal setting and menu building. He provided a menu of helpful options for what is discussed and what goals are identified. The researcher then started the interview session with the group. During the interview, he led the session using the content he has already prepared. He taught and consulted the patients by using reflexive listening. He used all five principles of Motivational Interviewing during MI sessions. 1. Expressing empathy: He showed empathy to participants through reflective listening (informing patients of their abilities and acceptance, positive attention, inner purity). 2. Developing discrepancy: He tried to enhance motivation for change in the participants by developing discrepancies between their current situation and their hopes for the future. He helped them focus their attention on how current behavior differs from desired behavior (demonstrating the risks and severity of the effects of the disease that are not acknowledged by patients). 3. Avoiding arguments: He never used argument and confrontation (not trying to convince patients that an issue still exists or that change is needed). 4. Adjusting to client resistance: He tried to walk with participants and adjust to participants'

resistance rather than confronting it directly (reflective listening to the failures of patients). 4. Support self-Efficacy: He assists participants to believe that they can start behavior changes. He helped participants to improve their self-efficacy to gain hope, optimism, and the feasibility of accomplishing change (evaluating the past successes of patients and highlighting their abilities/achievements).

Sessions	Structure and Contents of MI Sessions
Orientation	Introduction, group norms and processes, and presentation of a motivational approach
Emotions	Emotional recognition exercises, exercise and completion of impact dimensions with emotional dimension and homework assignments
Positive and Negative Behavioral Aspects	Brain storming exercise, short-term and long-term benefits and losses, and description and practice of corrective and alternative options
Values	Defining values, performing practices to identify and prioritize first-class values, practicing the definition of values, and practicing value-behavior matching
Vision and Final Assessment	Summary and previous session practices in the form of practicing the vision, and preparation to initiate the behavioral change program

Table 1

Contents of MI sessions

The contents of the MI sessions were easy to understand and were provided based on the participants' education level, so that they could comprehend the teachings. The researcher initiated the first MI session by introducing himself and trying to create a friendly atmosphere. He was not allowed any prejudice, views, and knowledge affecting his behaviors in the classes, while he remained focused throughout the sessions. MI consists of four principles, including empathy (informing patients of their abilities and acceptance, positive attention, inner purity), creating conflict (demonstrating the risks and severity of the effects of the disease that are not acknowledged by patients), tolerance with resistance (reflective listening to the failures of patients), and supporting self-efficacy (evaluating the past successes of patients and highlighting their abilities/achievements). Four weeks after the intervention finished, all the patients completed the questionnaires again, and the MI sessions were implemented in the control group as well.

Data analysis

Analysis was performed on 60 patients who completed the baseline and 4-weeks follow-up assessments (Figure 1). Shapiro-Wilk test was used to determine the normal distribution of the data. Data analysis was performed using SPSS software version 14 (SPSS, Inc., Chicago, IL, USA). The descriptive (mean, standard deviation, number and percentage) and inferential (independent t-test, paired t-test, Mann-Whitney U test, and Chi-square) statistics were used to analyze data. P-value of less than 0.05 was considered significant.

Results

There was no significant difference between the intervention and control groups in terms of demographic characteristics (P>0.05). As such, it could be claimed that the research groups were homogeneous in regards to the demographic characteristics (Table 2).

Variable		Control	Intervention	Chi-square test
		N (%)	N (%)	
Gender	Female	14(46.66)	15(50)	$X^2 = 0.067$ df = 1 P = 0.796
	Male	16(53.33)	15(50)	
History of diabetes	Yes	12(40)	14(46.7)	$X^2 = 0.271$ df = 1 P = 0.602
	No	18(60)	16(53.3)	
Marital status	Married	28(93.4)	28(93.4)	$X^2 = 0.484$ df = 1 P = 0.999
	Single	1(3.3)	1(3.3)	
	Widowed	1(3.30	1(3.3)	
Types of medication	Insulin	1(3.3)	3(10)	$X^2 = 1.643$ df = 2 P = 0.440
	Pill	21(70)	17(56.7)	
	Both	6(26.7)	10(33.3)	
Types of occupation	Housewife	17(56.6)	15(50)	$X^2 = 1.037$ df = 4 P = 0.792
	Employed	11(36.7)	10(33.33)	
	Disabled	2(6.7)	3(10)	
	Retired	0(0)	2(6.7)	
Level of education	Primary	19(63.3)	19(63.3)	$X^2 = 2.933$ df = 2 P = 0.231
	Secondary	4(13.3)	8(26.7)	
	Higher	7(23.3)	3(10)	
Variable		Mean ± SD	Mean ± SD	Independent t-test
Age(Years)		55.14 ± 7.89	51.9 ± 6.27	t = 1.399 df = 58 P = 0.162
Duration of diabetes)Years)		5.5 ± 5.88	7.6 + 6.20	t = 0.897 df = 58 P = 0.373
BMI		29.8 ± 5.14	30.77 ± 4.06	t = 0.766 df = 58 P = 0.447

Table 2
Comparison of Intervention and Control Groups in Terms of Demographic Characteristics

There was a significant difference between the intervention and control groups regarding the mean nutrition score before and after the intervention (P=0.006). In addition, the results indicated a significant difference between two groups in terms of the mean score of physical exercise before and after the intervention (P=0.004). After the MI sessions, a significant difference was observed between the two groups in terms of the self-assessment score (P=0.0001). The independent t-test showed a significant difference regarding the mean score of foot care between two groups after the intervention (P=0.0001). In contrast, no significant difference was observed in the mean score of smoking habits between the groups after the MI sessions (P=0.091). Moreover, independent t-test demonstrated a significant difference in the mean score of diabetes management self-efficacy between the two groups after the intervention (P=0.014) (Table 3).

Domains	Time	Control group	Intervention group	Independent t-test
		Mean ± SD	Mean ± SD	
Diet	Before the intervention	7.36 ± 3.87	9.43 ± 4.16	t = 2.262 df = 58 P = 0.027
	After the intervention	7.68 ± 4.03	13.23 ± 4.16	t = 7.06 df = 58 P = 0.0001
	Before and after difference	0.32 ± 0.16	3.8 ± 1.69	t = 4.08 df = 58 P = 0.006
Physical exercise	Before the intervention	7.11 ± 3.95	10.26 ± 4.53	t = 2.874 df = 58 P-0.006
	After the intervention	7.81 ± 4.52	16.23 ± 2.97	t = 8.509 df = 58 P = 0.0001
	Before and after difference	0.7 ± 0.57	5.97 ± 1.46	t = 5.635 df = 58 P = 0.004
Blood glucose self-monitoring	Before the intervention	6.62 ± 2.88	8.7 ± 3.03	t = 7.812 df = 58 P = 0.229
	After the intervention	6.61 ± 2.93	12.23 ± 2.16	t = 8.447 df = 58 P = 0.0001
	Before and after difference	0.01 ± 0.08	3.53 ± 0.87	t = 0.635 df = 58 P = 0.0001
Foot care	Before the intervention	10.04 ± 5.18	10.55 ± 4.74	t = 0.121 df = 58 P = 0.904
	After the intervention	10.17 ± 5.30	18.13 ± 2.25	t = 0.755 df = 58 P = 0.0001
	Before and after difference	0.13 ± 0.12	7.58 ± 2.49	t = 0.634 df = 58 P = 0.0001
Smoking	Before the intervention	12.66 ± 3.44	13.70 ± 3.15	t = 1.054 df = 58 P = 0.296
	After the intervention	12.61 ± 4.23	14.2 ± 2.61	t = 1.720 df = 58

				P = 0.091
	Before and after difference	0.05 ± 1.62	10.5 ± 0.54	t = 0.666 df = 58 P = 0.0001
Diabetes management self-efficacy	Before the intervention	45.09 ± 13.58	53.77 ± 13.55	t = 2.476 df = 58 P = 0.016
	After the intervention	45.86 ± 14.00	74.16 ± 8.09	t = 9.608 df = 58 P = 0.0001
	Before and after difference	0.77 ± 42	-20.39 ± 5.46	t = 7.132 df = 58 P = 0.014

Table 3

Comparison of the mean score of self-efficacy in diabetes management and its domains before and after the motivational interviewing between the intervention and control groups

There was a significant difference in the mean score of nutrition, physical exercise, self-assessment, and foot care before and after the intervention in the intervention group (P=0.0001). However, no significant difference was observed in the intervention group in terms of the mean score of smoking habits before and after the intervention (P=0.433). The results of paired t-test also demonstrated no significant difference in the mean score of diabetes management self-efficacy in the control group before and after the intervention (P=0.744). Nevertheless, a significant difference was observed in the intervention group regarding the mean score of diabetes management self-efficacy before and after the intervention (P=0.001) (Table 4).

Domains	Time	Before the intervention	After the intervention	Independent t-test
		Mean±SD	Mean±SD	
Diet	Control group	7.36±3.87	7.68±4.03	t=0.413 df=29 P=0.683
	Intervention group	9.43±3.16	13.23±1.47	t=8.627 df=29 P=0.0001
Physical exercise	Control group	7.11±3.95	7.81±4.52	t=0.918 df=29 P=0.366
	Intervention group	10.26±4.53	16.23±2.97	t=10.425 df=29 p=0.0001
Blood glucose self-monitoring	Control group	6.62±2.88	6.61±2.93	t=- 0.037 df=58 p=0.970
	Intervention group	8.7±3.03	12.23±2.16	t=8.006 df=58 p=0.0001
Foot care	Control group	10.04±5.18	10.17±5.30	t=-0.257 df=29 p=0.799
	Intervention group	10.55±4.74	18.13±2.25	t=10.371 df=29 p=0.0001
Smoking	Control group	12.66±3.44	12.61±4.33	t=-0.070 df=29 p=0.945
	Intervention group	13.70±3.15	14.2±2.61	t=0.796 df=29 p=0.433
Diabetes management self-efficacy	Control group	45.09±13.58	45.86±8.09	t=12.745 df=29 p=0.744
	Intervention group	53.77±13.55	74.16±8.09	t=0.413 df=29 p=0.0001

Table 4

Comparison of the mean score of self-efficacy in diabetes management and its domains before and after the motivational interviewing within the intervention and control groups

Patients' blood glucose was improved significantly in the intervention group after the MI sessions. The mean score of blood glucose was measured and a significant difference was observed between the intervention (169±63.6) and control (210.6±96.04) groups before and after the intervention (P=0.046).

Discussion

The results of this study indicated no significant differences in demographic characteristics between the two groups. In other words, the study groups were homogenous in terms of demographic characteristics, and any significant difference in the dependent variable was attributed to the MI sessions at the end of the study.

Our findings also demonstrated that the MI approach positively influenced the nutritional self-efficacy in patients with diabetes. In addition, the MI method could effectively enhance the sense of self-efficacy in the face of negative emotions, social pressure, and physical discomfort situations, leading the patients toward performing positive and enjoyable activities. In fact, the MI approach could create sustainable and relatively long-lasting changes in all of the previously mentioned parameters. These findings confirmed the hypothesis that MI is a more effective method than routine education approach in increasing the sense of self-efficacy of eating behavior as a predictor of success in weight loss programs. Baer believes that low self-confidence in the control of eating behavior, especially when experiencing negative emotions, is associated with symptoms of eating disorders [20]. Our results showed that physical exercise self-efficacy could improve in patients with diabetes after MI sessions. It might be due to enhancing optimism and positive emotions and reinforcing the self-care and self-management motivation of these patients after MI sessions. Nowadays, experts consider physical exercise along with diet and medication as the third major pillar of diabetes treatment [21].

Our results showed the MI approach positively influenced the self-monitoring of blood glucose (SMBG) in the patients with diabetes. The basic principles of MI are to reinforce the sense of self-efficacy to the clients regarding all behavioral changes. Most of the MI techniques used in this research were exclusively related to this matter, such as the evaluation of commitment-confidence, controlling temper in stimulating situations, participation in decision-making, supporting the autonomy of the clients, elimination of bias, and drawing attention to discuss change. In this respect, Simpson et al argued that the MI approach mostly emphasizes on the support of self-efficacy, participation, and inquiries for the viewpoints of the clients [22]. Thus, creating a strong sense of self-efficacy against temptations can lead to SMBG.

Our results indicated that the MI method positively influenced foot care in the patients with diabetes. By compensating for disabilities and regulating individual performance, the MI approach could improve practical care in patients. Nevertheless, the MI method had no effects on the smoking habits of the patients in the current research. Most diabetic patients have a dual sense of decision-making when it comes to change rather than resistance/poor will power. Diabetes control requires the understanding of the information and required treatment procedures, and inadequate knowledge regarding the disease control process may decrease the patients' self-confidence in this process.

After MI sessions in our study, the mean score of diabetes management self-efficacy increased in the intervention groups. Thus, it confirmed that the implementation of the MI approach could positively influence the management self-efficacy of these patients. MI has a positive impact on the self-efficacy of individuals by affecting the perceptions and increasing the mental involvement of patients to realize their conditions and learn to manage their problems independently. In this regard, our findings are in

congruence with the study by Walpole et al which was conducted to evaluate the effects of MI on increased self-efficacy in adolescents [23]. Our finding is confirmed by following studies. Song et al showed that MI had a positive impact on the self-management of patients with diabetes [24]. Bóveda-Fontán et al confirmed the effectiveness of MI in the management of patients with dyslipidemia [25]. In addition, Mojahed et al indicated that MI enhanced the self-efficacy of pregnant women and helped them to quit hookah smoking [26]. In another study focusing on self-efficacy and chronic diseases, Ebrahimi Belil et al observed that increasing self-efficacy in patients resulted in creating a sense of empowerment to perform personal tasks, reducing fear, enhancing stress management, improving social relationships and promoting self-management [27]. According to Sheeran et al self-efficacy could directly affect health-related behaviors, as well as other cognitive determinants. Furthermore, it could be argued that individuals with higher self-efficacy have more prominent personal goals, expect better outcomes, and consider the obstacles against self-management as challenges to be overcome, all of which ultimately increase their self-management [28].

Similar to our findings, Chen et al reported an improvement in the self-efficacy of more than half of the participants in the intervention group after implementing the MI approach [15]. In other research, MI was provided in the form of video calls as diabetes self-management education, and the results showed a significant improvement in the patients' self-efficacy [29]. Inconsistent with our results, the findings of similar research showed that educational interventions for diabetes self-management improved the glycated hemoglobin levels more significantly compared to the diabetes self-management education based on the MI approach [30]. In addition, another study demonstrated that MI had no considerable impact on the routine care of patients with types I and II diabetes [31]. The resaon could be due to high attrision rates in their studies.

Study Limitations

One of the limitations of our study was the small sample size, which might have an impact on the effect size of the study. Conducting the study in a small region, which had a specific cultural background was another limitation of the study. The cultural tendencies of individuals affect their learning abilities and implementation of the teachings. Therefore, it is suggested that further investigations be conducted in this regard with larger sample sizes and in larger areas with various cultures, so that the effects of MI on diabetes management self-efficacy could be confirmed, and the results could be generalized with greater confidence.

Conclusions

Self-efficacy plays a key role in the prediction of self-care activities in patients’ with diabetes, and diabetes management self-efficacy could be improved through implementing the MI approach and increasing the motivation of the patients. Our findings could be used in various fields, such as nursing management, nursing research, and nursing services, as well as in the diabetes associations and

educational centers in order to improve the quality of nursing care and ultimately to promote health and quality of life in patients with diabetes.

List Of Abbreviations

Motivational interviewing (MI), Diabetes Management Self-efficacy Scale (DMSES), Self-Monitoring of Blood Glucose (SMBG).

Declarations

Ethics approval and consent to participate

This study is approved by the ethics committee of Urmia University of Medical Sciences (Approval code: IR.UMSU.RCC.1395.132). The participants were fully informed about the purpose of the study. Each participant provided written consent prior to participation. They were given explanation regarding their voluntary nature of participation and that they can stop cooperation at any given time. Participants were also assured about the privacy and confidentiality of their information.

Consent for publication

Not applicable.

Availability of data and material

The datasets used and analyzed during the current study are available from the corresponding authors on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Author Contributions

All authors (Masumeh Hemmati Maslakpak, Naser Parizad, Amir Ghahremani and Vahid Alinejad) have actively participated in this study. Design of the study MHM, NP, AG, VA; data collection: NP, AG; analysis and interpretation of data: MHM, NP, AG, VA; manuscript preparation: MHM, NP, AG; manuscript revision, MHM, NP, AG, VA. All authors read and approved the final manuscript before submission.

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Figures

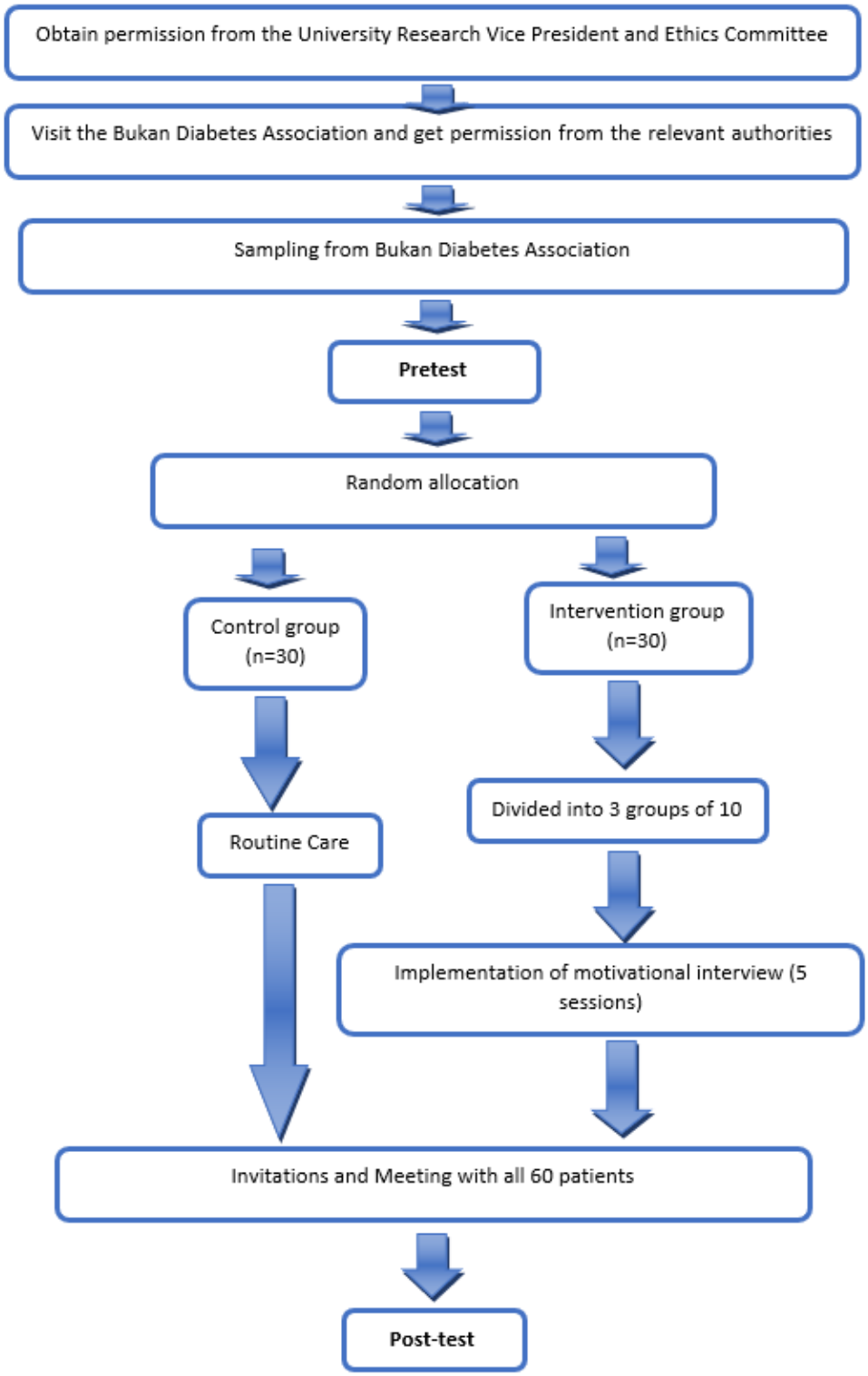

Figure 1

Design methodology flow chart / Analysis was performed on 60 patients who completed the baseline and 4-weeks follow-up assessments (Figure 1).