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BASNEF Model intervention on blood pressure modification among hypertensive diabetic patients

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Abstract:

BACKGROUND: Prevalence of hypertension in patients with type 2 diabetes is two to three times more than nondiabetic patients. This study aimed at assessing the impacts of an educational program based on BASNEF Model on blood pressure modification among diabetic patients with hypertension.

MATERIALS AND METHODS: Two hundred patients with type 2 diabetes were recruited in an educational intervention study among two groups. The intervention group attended a 3-month self-care educational program regarding hypertension control in addition to the regular care presented for both the groups. Another group received no extra program except regular treatment. To collect information about demographic characteristics, type 2 diabetes-related variables, and BASNEF Model construct items, a self-designed questionnaire was utilized. Data analyzed by SPSS version 16 using Chi-square, independent *t*-test, and paired *t*-test.

RESULTS: Knowledge, behavioral beliefs, attitude to action, enabling factors, subjective norms, and practice were significantly higher in intervention group as compared to the controls ($P < 0.001$). In addition, blood pressure revealed significant differences in intervention group before and after program using paired *t*-test ($P = 0.001$) while in the control group, there was no significant difference in blood pressure ($P = 0.54$).

DISCUSSION: The study results revealed a significant change in blood pressure and model constructs in intervention group compared to control. This research suggested intervention program based on BASNEF Model has essentially effectiveness in blood pressure modification among diabetic patients.

CONCLUSION: BASNEF Model has effectiveness to high blood modification among diabetic patients with hypertension.

Keywords:

BASNEF Model, educational intervention, hypertension, type 2 diabetes

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Introduction

Hypertension is the main risk factor for cardiovascular diseases and its control is crucial.^[1] Although effective antihypertensive agents are highly available nowadays, the majority of patients still remained uncontrolled.^[2] Hypertension and type 2 diabetes are concurrent and both have a synergic effect on cardiovascular damage incidence which is responsible for disabilities and premature deaths among patients with type 2 diabetes.^[2] A study revealed 51%

of type 1 diabetic patients and 80% type 2 diabetic patients among 1500 diabetic patients who had blood pressure of more than 140/90 mmHg.^[3] Hypertension prevalence of diabetic patients is 1.5–3 times more than that of nondiabetic patients of the same age.^[4] Risk factors of coronary artery diseases such as hypertension, dyslipidemia, and obesity cumulate in diabetic patients.^[5] One or more risk factors have the tendency of increasing mortality risk among type 2 diabetic patients.^[6] Cardiovascular diseases are responsible for 75% of diabetic patients' death.^[7] Some studies have revealed that blood pressure control in patients has

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protective effect on cardiovascular morbidity and mortality as compared to nondiabetic patients.^[8]

Hypertension has been recognized as the main health problem in developed and developing countries. Twenty-five percent of adults and 60% of individuals aged more than 60 years in developed countries.^[9-11] Hypertension prevalence is remarkably high in Iran.^[12] A study in Iran had reported that 91.2% diabetic patients had no blood pressure control.^[1]

Community-based control or prevention of hypertension is achievable just through accurate and proper strategies in different community levels; all community members including family members, religious institutes, schools, and social organizations and others have to be involved and to participate in order to achieve the goals.^[13] It seems that traditional programs are insufficient without the application of educational models or using theoretical frameworks.^[14] However, the impact of knowledge and attitude on behavior is reasonable; there are many other factors in treatment processes or patient's adherence to treatment protocol, such as personal skills and environmental factors affecting patients' behaviors.^[15] BASNEF Model is one of the educational models which highlighted impact of enabling factors and subjective norms besides knowledge and attitude in individual behavior.^[16] This changing behavior model indicated factors such as attitudes (semistructured beliefs about an object or situations which make individuals ready to respond to specific directions), enabling factors (supplements, funds, skills that coordinate necessary situations for the realization of behavior), behavior (an observable practice), and subjective norms (perceived social pressure causes more tendency to be significant to others as role models).^[17,18] It is obvious that planned theory-based interventions can lead to behavioral changes. On the other hand, type 2 diabetic patients need more support and attention from around and significant others may have essential role in encouraging self-management behaviors. These behavior modifiers as facilitators are clearly addressed in BASNEF Model constructs.^[17,18]

Effects of BASNEF Model have been confirmed in several studies.^[14,17] In this research, BASNEF Model was applied to patients with type 2 diabetes during hypertension control and prevention fits side effects. According to the importance of educational intervention program among diabetic patients with hypertension, this study aimed at assessing the impacts of a BASNEF Model-based educational program on blood pressure modification among diabetic patients with hypertension.

Materials and Methods

This semiexperimental study conducted in diabetes outpatient clinics was affiliated to Tehran University of

Medical Sciences during 2013–2014. This research was approved by the Educational Deputy of Tehran University of Medical Sciences. The criteria included confirmed type 2 diabetes and hypertension of at least 1 year, systolic blood pressure of more than 130 mmHg and diastolic blood pressure of more than 80 mmHg were confirmed in two visits; there was no history of psychological disorders and willingness to participate in the study. The exclusion criteria were failure to attend the educational program or missing one-fourth of the planned sessions. Research team prosecuted a call to invite study participant, then, two hundred patients who met inclusion criteria participated as intervention or control groups. Baseline data were conducted and participants were divided randomly into two groups of intervention and control. Permuted block size of four patients was used to randomly divide patients into two study groups. The purpose of this study explained to participants to acquire guaranteed verbal information about their consent and confidentiality of data. Based on principles of research ethics, participation was voluntary and they had the right to leave the study. The questionnaires were filled anonymously. To consider ethical points, an educational program in two sessions was performed for control groups after completing the study process. The one hundred participants who were attended to in the intervention group during the 6-month intervention program which included 5–6 educational sessions within the period of 1 month consisted lecturing, question and answer, group discussions, and problem-solving strategies were based on BASNEF Model to adopt self-care behaviors regarding type 2 diabetes and control and its complications, especially hypertension. Based on the nature of BASNEF constructs, different and appropriate educational strategies were utilized. The control group just received routine treatment plan of the center. Data were collected at baseline and 6 months after the last session of intervention program. The self-designed questionnaire included two main sections; demographic characteristics and health-related variables including type 2 diabetes and hypertension including age, gender, level of education, family income, occupation, smoking, disease duration. The BASNEF Model-related items included BASNEF Model constructs (38 items) behavioral belief (8 items, e.g., regular physical activity [i.e., 30 min 5 days a week] has positive effect on blood pressure control), attitude (8 items, e.g., adherence to healthy diet and smoking cessation), intention (8 items, i.e., did you have serious decision on blood pressure and diabetes control), subjective norms (8 items, i.e., my family support me in blood pressure control), and enabling factors (6 items, i.e., educational sessions about blood pressure control is available for me). Scoring all the constructs except those that were based on 5-point Likert scale (very low = 1 to very high = 5); hence, the total score of the constructs excluded the enabling factors that ranged from 38 to 160. Enabling factors were ranged with three

responses (from 2 = Yes, 1 = Sometimes, and 0 = No). Practice about hypertension control was assessed by 6 items with three responses (from 2 = Yes, 1 = Sometimes, and 0 = No). The validity of questionnaire was confirmed by 10 expert members in diabetes, hypertension, and health education fields. Cronbach's alpha for each construct was as follows: belief = 0.95, attitude = 0.88, intention = 0.88, subjective norms = 0.71, enabling factors = 0.70, and practice = 0.84. Cronbach's alpha for the model constructs ranged from 0.70 to 0.95. The theory-based intervention program about blood pressure control was performed by one of the researchers who were aware of the health education models. The purpose of this blend of educational programs and importance of the nature of disease were introduced to the patients to involve them and to choose appropriately informed actions based on individual conditions theoretically and practically. Blood pressure measured by a unique pressure gauge for two groups during the study. Interventional program contents were provided based on pretest results. The intervention program included five to six sessions of lecturing, question and answer, role playing, educational films, and printed materials that focused on different aspects of the disease. In intervention group, ten groups consisted of ten participated in the study. Every session lasted 45–60 min with 2-week intervals. In the first session, patients and educators have reviewed the baseline data together to arrange the patient's concerns, classify more challenging areas, and set behavioral goals. The whole intervention program lasted 1 month. After intervention, the patients spent 6 months getting prepared to change previous behaviors and adopt behaviors to attain healthier lifestyles. Then, they filled out the questionnaire 6 months after intervention programs for the second time. The most important purposes of this program included helping patients to confront care issues, explaining about the importance of blood pressure control and diabetes care behaviors, organizing behavioral stages to reach the goals gradually, reinforcing the achieved benefits, identifying barriers, and trying to overcome these concerns, improving general knowledge about blood pressure control and diabetes care. All data analyses were performed using SPSS version 16 (SPSS, Inc., Chicago, IL, U.S.A) through descriptive and inferential statistical tests. Sociodemographic and disease-related variables were compared at baseline between the two groups. Means were compared using independent sampled *t*-tests. Results were considered statistically significant at $P < 0.05$.

Results

In this semi-experimental study, 200 patients with type 2 diabetes participated. Kolmogorov–Smirnov test showed normal distribution of data. The mean ages of the participants in intervention and control groups were 58.2 ± 6.8 and 57.1 ± 7.8 years,

respectively. Demographic characteristics were tested by Chi-square, independent *t*-test, paired *t*-test in two groups by random allocation. There were no significant differences between the two groups regarding demographic variables ($P > 0.05$) [Table 1]. Table 2 has shown a significant association between model constructs in intervention group after education program ($P < 0.001$) [Table 2]. Furthermore, 6 months after intervention, blood pressure was modified in

Table 1: Demographic characteristics of patients according to intervention

| Demographic characteristics | Intervention, n (%) | Control, n (%) | P |
|-----------------------------|---------------------|----------------|------|
| Gender | | | |
| Female | 61 (61) | 60 (40) | 0.88 |
| Male | 39 (39) | 60 (40) | |
| Level of education | | | |
| Illiterate | 20 (20) | 34 (34) | 0.12 |
| High school | 56 (56) | 47 (47) | |
| Diploma | 19 (19) | 17 (17) | |
| University | 5 (5) | 2 (2) | |
| Family history | | | |
| Yes | 65 (65) | 53 (53) | 0.08 |
| No | 35 (35) | 47 (47) | |
| History of hypertension | | | |
| Yes | 71 (71) | 66 (66) | 0.8 |
| No | 29 (29) | 34 (34) | |
| Economic status | | | |
| Poor | 9 (9) | 4 (4) | 0.08 |
| Moderate | 86 (86) | 95 (95) | |
| Privileged | 5 (5) | 1 (1) | |
| Age (mean±SD), years | 58.2±6.8 | 57.1±7.8 | 0.28 |
| BMI (mean±SD) | 28.5±3.4 | 28.7±4.2 | 0.75 |
| Blood pressure (mean±SD) | 131.9±13.9 | 130.7±14 | 0.62 |
| HbA1c (mean±SD) | 7.73±1.6 | 7.73±1.2 | 0.99 |

BMI = Body mass index, HbA1c = Glycated hemoglobin, SD = Standard deviation

Table 2: Score of BASNEF Model among participants

| Model components | Group | Before intervention (mean±SD) | P | After intervention (mean±SD) | P |
|------------------|--------------|-------------------------------|------|------------------------------|--------|
| Knowledge | Intervention | 4.2±1.9 | 0.51 | 6.8±2.04 | <0.001 |
| | Control | 3.7±1.6 | | 3.8±1.7 | |
| Belief | Intervention | 30.9±4.6 | 0.31 | 34.7±3.2 | <0.001 |
| | Control | 30.91±3.9 | | 30.8±3.8 | |
| Attitude | Intervention | 29.5±4.3 | 0.71 | 33.9±3.9 | <0.001 |
| | Control | 29.9±4.2 | | 29.1±4.1 | |
| Intention | Intervention | 30.6±3.9 | 0.61 | 35.5±3.2 | <0.001 |
| | Control | 30.4±4.1 | | 30.5±4.0 | |
| Enabling factors | Intervention | 5.2±2.7 | 0.18 | 7.2±2.9 | <0.001 |
| | Control | 2.2±0.5 | | 5.06±2.8 | |
| Subjective norms | Intervention | 30.5±4.2 | 0.75 | 33±3.6 | <0.001 |
| | Control | 31.4±3.7 | | 31.4±3.6 | |
| Practice | Intervention | 9.7±1.7 | 0.15 | 10.8±1.2 | <0.001 |
| | Control | 9.5±1.8 | | 9.4±1.8 | |

SD = Standard deviation

intervention group ($P < 0.001$), but there were no changes in control group ($P = 0.54$) [Table 3].

Discussion

As presented in the results, effectiveness of BASNEF Model had confirmed blood pressure control among diabetic patients in this research. The results revealed that the mean score of knowledge had incremental trend in baseline and 6 months after intervention group, this variation was statistically significant, indicating effectiveness of educational intervention on promoting knowledge in this group. In the control group, however, the mean score of knowledge had increased; this variation was not statistically significant.

In a study by Pereira *et al.*, results showed a noticeable increase in disease knowledge of diabetic patients in different issues among interventional groups while changes in the control group were unremarkable.^[19] These findings in knowledge section were compatible with our findings. Afshari *et al.* indicated that BASNEF Model constructs except subjective norms had significant differences after intervention.^[20]

The study results revealed significant differences in belief after intervention program which is in accordance with studies conducted by some researchers such as Afshari *et al.*^[20] and Izadirad *et al.*^[21]

Mean score of attitude was higher than baseline after 6 months intervention and this is in parallel with studies conducted by Jalilian *et al.*^[22] and Afshari *et al.*^[20] Furthermore, the study results presented mean score of enabling factors that had an increasing trend in intervention group, but there was no change in the control group. A study conducted by Sharifirad *et al.* had reported significant association on enabling factors about nutritional education among diabetic patients,^[23] in this line Izadirad *et al.* revealed that enabling factors were the most powerful predictive factors of BASNEF Model.^[21]

Mean score of subjective norms had increased with a statistically significant trend after intervention. However, there was no significant association in the control group. This finding was in accordance with studies conducted by Sharifirad *et al.*^[23] and Izadirad *et al.*^[21]

Table 3: Blood pressure amount among participants

| Outcome | Group | Mean±SD | | P |
|----------------|--------------|---------------------|--------------------|--------|
| | | Before intervention | After intervention | |
| Blood pressure | Intervention | 131.9±13.92 | 125.6±6.9 | <0.001 |
| | Control | 130.7±14.0 | 131.94±11.6 | |

SD = Standard deviation

Since the main aim of this study was to assess the impacts of a BASNEF Model-based educational program on blood pressure modification among diabetic patients with hypertension; the study results presented that practice (blood pressure control) which was promoted by educational intervention. This result was in accordance with Taheri *et al.*,^[24] Solhi *et al.*,^[25] Afshari *et al.*, and Izadirad *et al.*^[21]

Paquot and Scheen and Wei *et al.* confirmed healthy lifestyle plus medical treatment can reduce mortality and morbidity caused by cardiovascular disease in diabetic patients and multifactorial interventions was recommended.^[5,26]

The study results represented that implementation of educational intervention based on BASNEF Model caused a significant modification in blood pressure control. Based on the nature of type 2 diabetes and hypertension and the important role of family in directing self-management of patients, implementation of family-based intervention programs is recommended.^[27]

This study had some limitation. Nevertheless, clinical indicators such as blood pressure control by research team, but the rest of variables were self-reported.

Conclusion

This study has concluded that the application of BASNEF Model constructs might have influenced the effectiveness and behavioral modification. According to the nature of type 2 diabetes, it seems that it is helpful to involve family and friends to support treatment regimen^[28] in order to arrive at successful outcomes.

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Conflicts of interest

There are no conflicts of interest.

References

- Sezavar SH, Abbaszadeh L, Hosseinian A, Iranparvar M, Khodamoradzadeh M. A survey on hypertension controlling in type II diabetic patients referring to diabetes clinic of Bou-ali Hospital, Ardabil. *Res Sci J Ardabil Univ Med Sci Health Serv*

- 2003;3:27-32.
2. Mensah GA. The global burden of hypertension: Good news and bad news. *Cardiol Clin* 2002;20:181-5, v.
3. Sampanis C, Zamboulis C. Arterial hypertension in diabetes mellitus: From theory to clinical practice. *Hippokratia* 2008;12:74-80.
4. Amini M, Horri N, Farmani M, Zade AH. Annual and 5-year incidence rate of hypertension in type 2 diabetic patients. *Iran J Endocrinol Metab* 2002;4:1-10.
5. Paquot N, Scheen AJ. Prevention of cardiovascular disease in type 2 diabetes. *Rev Med Liege* 2003;58:271-4.
6. Bonow RO, Mann DL, Zipes DP, Libby P. Aggregation of the traditional CHD risk factors in diabetes. *Heart Disease: A Textbook of Cardiovascular Medicine*. 6th ed., Vol. 2. Philadelphia, PA: Elsevier Saunders; 2012. p. 137.
7. Flack JM, Peters R, Mehra VC, Nasser SA. Hypertension in special populations. *Cardiol Clin* 2002;20:303-19, vii.
8. Tuomilehto J, Rastenyte D, Birkenhäger WH, Thijs L, Antikainen R, Bulpitt CJ, *et al.* Effects of calcium-channel blockade in older patients with diabetes and systolic hypertension. Systolic hypertension in Europe trial investigators. *N Engl J Med* 1999;340:677-84.
9. Azizi A, Abasi MR, Abdoli GR. The prevalence of hypertension and its association with age, sex and BMI in a population being educated using community-based medicine in Kermanshah: 2003. *Iran J Endocrinol Metab* 2008;10:323-30.
10. Guerrero-Romero JF, Alvarado-Ruiz R, Rodríguez-Morán M. Accumulated probability of hypertension in diabetes and of diabetes in hypertension. *Rev Invest Clin* 1998;50:281-5.
11. Mugusi F, Ramaiya KL, Chale S, Swai AB, McLarty DG, Alberti KG. Blood pressure changes in diabetes in urban Tanzania. *Acta Diabetol* 1995;32:28-31.
12. Kearney PM, Whelton M, Reynolds K, Whelton PK, He J. Worldwide prevalence of hypertension: A systematic review. *J Hypertens* 2004;22:11-9.
13. Beato CV. A health message: When it comes to hypertension, we need your help. *J Natl Med Assoc* 2004;96:1105-6.
14. Taghdisi MH, Madadzadeh N, Shadzi SH, Hassanzadeh A. Effects of education interventions on the coke workers immune performances on BASNEF Model basis at Isfahan melting factory. *J Ilam Univ Med Sci* 2005;16:20-30.
15. Hubley J. Understanding behaviour: The key to successful health education. *Trop Doct* 1988;18:134-8.
16. Baghianimoghadam MH, Rahae Z, Morowatisharifabad MA, Sharifirad G, Andishmand A, Azadbakht L. Effects of education on self-monitoring of blood pressure based on BASNEF Model in hypertensive patients. *J Res Med Sci* 2010;15:70-7.
17. Hubley J. *Communicating Health. An Action Guide to Health Education and Health Promotion*. 2nd ed. Oxford: Macmillan Education Ltd.; 1993. p. 180-200.
18. Kargar M. The Comparison of Educational Intervention Effect Using BASNEF and Classic Model on Improving Assertion Skill Level. Isfahan: School of Health, Isfahan University of Medical Sciences; 2006.
19. Pereira DA, Costa NM, Sousa AL, Jardim PC, Zanini CR. The effect of educational intervention on the disease knowledge of diabetes mellitus patients. *Rev Lat Am Enfermagem* 2012;20:478-85.
20. Afshari M, Tol A, Taghdisi MH, Azam K. The effect of the combinatorial program on improving foot care in type 2 diabetic patients referred to diabetes clinic of Samirom city: Application of BASNEF model. *J Health Syst Res* 2014;Health Education Supplement:1697-707.
21. Izadirad H, Masoudi GH, Zareban I, Poor MS, Jadgal KH. The effect of educational program based on BASNEF Model on women's blood pressure with hypertension. *J Torbat Heidariyeh Univ Med Sci* 2013;1:22-31.
22. Jalilian N, Tavafian SS, Aghamolaei T, Ahmadi S. Educational intervention on the knowledge and attitudes of people with hypertension: A clinical trial. *J Health Educ Health Promot* 2013;1:37-44.
23. Sharifirad GH, Najimi A, Azadbakht L, Hassanzadeh A. The effect of nutritional education on metabolic outcomes based on BASNEF Model in elderly patients with type 2 diabetes. *J Health Syst Res* 2010;6:549-58.
24. Taheri GH, Baghiani Moghadam MH, Fallah Zadeh H, Parsa M. The effect of instructional designed SMS based on health belief model (HBM) on adoption of self-care behavior of patients with type II diabetes. *Mod Care Sci Q Birjand Nurs Midwifery Fac* 2014;11:10-8.
25. Solhi M, Jalilian F, Zinat Motlagh F. Effectiveness of education program on increasing self-management among patients with type II diabetes. *SJIMU* 2012;20:26-34.
26. Wei X, Zou G, Gong W, Yin J, Yu Y, Walley J, *et al.* Cardiovascular disease risk reduction in rural China: A clustered randomized controlled trial in Zhejiang. *Trials* 2013;14:354.
27. Baghbanian A, Tol A. The introduction of self-management in type 2 diabetes care: A narrative review. *J Educ Health Promot* 2012;1:35.
28. Tol A, Baghbanian A, Rahimi Foroshani A, Shojaeizadeh D, Mohebbi B, Majlessi F. The relationship between perceived social support from family and diabetes control among patients with diabetes type 1 and type 2. *Iran J Diabetes Lipid Disord* 2011;10:1-10.