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Investigating influential factors in preventing stroke based on the health belief model in patients with type 2 diabetes: a cross-sectional study

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Abstract

Controlling diabetes and preventing its complications is a progressive problem that requires a long-term and low-cost solution. Therefore, the use of structured models, such as the health belief model, can be considered as an effective step in this direction. Therefore, this study was conducted to investigate the effective factors for the prevention of stroke in patients with type 2 diabetes based on the components of the health belief model. In this cross-sectional study, 140 patients with type 2 diabetes from the Diabetes Clinic of Dezful Ganjavian Hospital in 2022 were included in the study using the convenience method. They completed a 25-question questionnaire that measured susceptibility, severity, benefits, barriers, cues to action, and self-efficacy. Descriptive analysis was used to explain demographic variables and the health belief model's dimensions. Mann-Whitney using SPSS 16 software with a statistical significance at P<.05 was used for data analysis. The total score of the questionnaire was below average (63.88 ± 6.73). Perception of benefits had the highest average (15 ± 1.77). There was a significant relationship between the total score of the health belief model and education level (p <0.001). The results showed that the perception of patients regarding stroke prevention was low and that attention should be paid to this issue in health and educational programs.

Keywords: Health Belief Model, Stroke, diabetes mellitus, Cross-Sectional Studies.

Introduction

As a cerebrovascular disorder, stroke is considered the second most influential cause of death [1]. In addition, stroke is one of the catastrophic cases in the care system, which causes the disability of the patient and a heavy burden on the caregivers [2]. Stroke is associated with uncontrolled hypertension, diabetes mellitus, dyslipidemia, heart disease, and other modifiable factors. Diabetes mellitus alone increases the risk of stroke by 30% [3]. Diabetes is a known risk factor for stroke. Pathological changes in blood vessels caused by diabetes can occur anywhere in the body, and if cerebral vessels are directly affected, stroke can occur [4].

The cause of many deaths and diseases is the health beliefs and behaviors of patients. Therefore, the role of these items in promoting health and preventing diseases has been considered. Several health behavior models have been proposed to understand the health-related behavior of individuals. These models assume that the health-related behavior of patients depends on their beliefs about the impact of the disease and its consequences. These models emphasized that a better understanding of the stroke from the patient's perspective allowed for more effective management [5].

One of these models is the health belief model. This model refers to an emotional model used in the prevention of chronic diseases and health promotion and serves as a practical framework for designing educational interventions and promoting preventive behaviors. This model includes the constructs of self-efficacy, perceived susceptibility, severity, barriers and benefits, and action cues [6].

Because the control of diabetes and the prevention of its complications is a progressive problem that requires a long-term and low-cost solution, the use of structured models such as the health belief model with the knowledge of effective factors in the prevention of stroke in diabetic patients can be considered an effective step in this direction. Therefore, this study was conducted to investigate factors affecting stroke prevention in patients with type 2 diabetes based on the components of the health belief model.

Materials and Methods

Study Design

This cross-sectional study was conducted in 2022 at the Diabetes Clinic of Ganjavian Hospital, Dezful, Iran.

Sampling

According to Zheng et al. (2019), who reported a p-ratio of 10%, the sample size was 140 people [7].

$$n = \frac{Z_{1-\frac{\alpha}{2}}^{2} P(1-P)}{d^2} = \frac{(1.96)^2 \times 10(0.90)}{(0.05)^2} = 140$$

Inclusion criteria included being 30 years old or older, suffering from type 2 diabetes for at least 6 months, and having a file in a diabetes clinic. Exclusion criteria included incomplete completion of the questionnaire, lack of cognitive ability, unwillingness to participate in the study, gestational diabetes, and history of stroke.

Due to the small number of people who refer to the diabetes clinic, sampling was done using the convenience method.

Data collection

Demographic characteristics, including age, sex, marital status, education level, employment status, history of high blood pressure, and place of residence, were collected using a demographic information questionnaire.

The Alalawi (2018) questionnaire was used to collect information related to effective factors in stroke prevention [8]. This questionnaire has 25 questions that are answered on a Likert scale from very agree (score 1) to very disagree (score 5). The sub-scales include understanding sensitivity (4 questions), understanding intensity (3 questions), understanding barriers and benefits (5 questions each), and action guidance and self-efficacy (4 questions each). The minimum score is 25 and the maximum score is 125.

Table 1. Demographic characteristics of the participants

Variable	Characteristic	Frequency	percentage
Age	30-40 year	4	2.9
	41-50 year	29	20.7
	51-60 year	41	29.3
	>60 year	66	47.1
Sex	Female	69	49.3
	Male	71	50.7
Level of education	High school	91	65
	Diploma	16	11.4
	Above diploma	33	23.6
Marital Status	Single	12	8.6
	Marriage	128	91.4
Blood pressure history	Yes	84	60
	No	56	40
Employment status	Employee	31	22.1
	Housewife	62	44.3
	Retired	31	22.1
	Other cases	16	11.4
Residence	City	114	81.4
	Village	26	18.6

The researchers re-measured the reliability of the health belief model constructs questionnaire. Cronbach's alpha was 0.8 based on 25 questions. Face validity was investigated by 10 patients with type 2 diabetes. For content validity, the questionnaire was assessed with the help of 10 faculty members of the Faculty of Nursing and Midwifery (CVI=0.80, CVR=0.79).

Analysis

Descriptive analysis was used to explain demographic variables and the health belief model's dimensions. Mann-Whitney test using SPSS 16 software with a statistical significance at P<.05 was used for analyzing data.

Results

The study results showed that 47.1% of the patients were over 60 years old. The demographic characteristics of the participants are shown in Table 1.

The results of the patients' answers to the questions on each dimension of the health belief model are shown in Table 2. This table determines the items that scored highest and lowest among the other factors.

The overall average score of the health belief model and its components are shown in Table 3. The overall health belief score was lower than the average score of the questionnaire. The results showed that perceived benefits have a high score.

There was a significant relationship between the total score of the health belief model and education level ($p < 0.001$).

Discussion

In this study, stroke prevention in patients with type 2 diabetes was measured based on the dimensions of the health belief model. The total score of the health belief model was below average. To improve social health behavior, people must have strong health beliefs [9]. Behavior changes studies have shown that patients with correct beliefs about their condition are more likely to adhere to prevention practices than those with incorrect beliefs [5]. Because of the low overall health belief score, it seems that patients with diabetes are more prone to stroke, and this issue requires special attention from healthcare planners and providers.

The results of the study showed that the score of perceived benefits of patients was high. People believe that low sugar consumption (57.1%) can reduce the risk of stroke. In addition, people said that by following the checkup, they can recognize the risk of stroke in themselves (50.7%). The health belief model states that when behavior change is beneficial for people, they will respond

Table 2. The frequency and percentage of each question in the health belief model

Question	N (%)				
	Very agree	Agree	Neutral	Disagree	Strongly disagree
Perceived susceptibility I am more likely to develop stroke than the average person is	30 (21.4)	20 (14.3)	15 (10.7)	40 (28.6)	35 (25)
I believe I will get stroke sometime in my life	50 (35.7)	35 (25)	20 (14.3)	15 (10.7)	20 (14.3)
A diagnosis of stroke can change my lifestyle	70 (50)	21 (15)	10 (7.1)	29 (20.7)	10 (7.1)
I have one or two risk factor(s) for stroke	20 (14.3)	15 (10.7)	19 (13.6)	51 (36.4)	35 (25)
Perceived severity Stroke can prevent	62 (44.3)	40 (28.6)	10 (7.1)	20 (14.3)	8 (5.7)
Stroke can have a serious consequence on my quality of life	90 (64.3)	30 (21.4)	20 (14.3)	-	-
Stroke cannot lead to death	10 (7.1)	15 (10.7)	5 (3.6)	69 (49.3)	41 (29.3)
Perceived benefits My medication can reduce my risk of stroke	62 (44.3)	20 (14.3)	15 (10.7)	12 (8.6)	31 (22.1)
Regular exercise cannot reduce my risk of stroke	4 (2.9)	2 (1.4)	14 (10)	25 (17.9)	95 (67.9)
Low low-salt diet cannot reduce stroke risk	-	13 (9.3)	-	40 (28.6)	87 (62.1)
Low sugar can reduce stroke risk	80 (57.1)	45 (32.1)	5 (3.6)	10 (7.1)	-
Following my medical check-up can help to detect my risk of stroke	71 (50.7)	34 (24.3)	15 (10.7)	5 (3.6)	15 (10.7)
Perceived barriers The weather is not encouraging for exercise	100 (71.4)	10 (7.1)	10 (7.1)	20 (14.3)	-
There are close places to perform exercise in my neighborhood	10 (7.1)	25 (17.9)	40 (28.6)	25 (17.9)	40 (28.6)
My household food contains a limited amount of sweet	60 (42.6)	50 (35.7)	10 (7.1)	10 (7.1)	10 (7.1)
Healthy food costs too much	54 (38.6)	40 (28.6)	10 (7.1)	20 (14.3)	16 (11.4)
It is easy for me to access the clinic	52 (37.1)	10 (7.1)	10 (7.1)	19 (13.6)	49 (35)
Cues to action I have a friend or a family member with a stroke	15 (10.7)	5 (3.6)	10 (7.1)	40 (28.6)	70 (50)
Nobody explained to me my risk of stroke	90 (64.3)	30 (21.4)	10 (7.1)	10 (7.1)	-
I'm afraid that a stroke will make me dependent on others	60 (49.2)	40 (28.6)	20 (14.3)	20 (14.3)	-
My family can support me to be healthy	40 (28.6)	50 (35.7)	10 (7.1)	22 (15.7)	18 (12.9)
Self-efficacy I will walk after sunset	60 (42.9)	40 (28.6)	18 (12.1)	5 (3.6)	17 (12.9)
I will follow a healthy diet	90 (64.3)	40 (28.6)	10 (7.1)	-	-
I will follow my medication as prescribed	110 (78.6)	20 (14.3)	-	10 (7.1)	-
There are actions that I will do at present to reduce my risk of stroke	40 (28.6)	50 (35.7)	40 (28.6)	5 (3.6)	5 (3.6)

Table 3. The score of dimensions of the health belief model.

Dimensions of the health belief model	Mean ± SD	Minimum	Maximum
Perceived susceptibility	11.10 ± 1.77	8	16
Perceived severity	7.62 ± 2.04	3	11
Perceived benefits	15 ± 1.77	10	18
Perceived barriers	12.41 ± 3.12	5	20
Cues to action	10.09 ± 2.96	4	17
Self-efficacy	7.49 ± 2.13	4	14
Total score	63.88 ± 6.73	42	78

appropriately to health. This is known as the perceived benefit [10]. Adherence to several healthy lifestyle factors, including less weight, a healthy diet, physical activity, not smoking, and reducing alcohol consumption, is associated with a 90% reduction in the incidence of diabetes, an 80% reduction in coronary artery disease, and 50% reduction in ischemic stroke [11].

The results showed that although the score for perceived benefits was high, the score for perceived barriers was also high. The lack of suitable weather to encourage exercise (71.4%) was the most perceived barrier among the study subjects. On the other hand, 38.6% of people believed that having a healthy diet is expensive and 35% stated that they do not have easy access to the clinic. Also, 28.6% of people stated that there is no closed place to exercise near them. Beliefs about the actual and predictable costs of pursuing a new behavior are perceived barriers in the health belief model [12]. Perceived barriers are the most critical component of the health belief pattern when performing recommended behaviors. The individual's actions are affected by the balance and imbalance between the positive and negative forces perceived by the individual on his/her health behavior [13]. The high score of obstacles indicates the need to pay attention to this matter because it can be a serious risk to predispose a person to a stroke.

In this study, 35.7% of the participants believed that the possibility of having a stroke is not certain. In addition, 36.4% of the respondents said that they did not have many risk factors for having a stroke, although they believed that having a stroke could change their quality of life (50%). These items show perceived susceptibility, which refers to a person's subjective understanding of disease risk [14]. A study in Greece found that despite half of the participants having access to a complete higher education program, their understanding of stroke risk was significantly poor [15]. Another study showed that most people with multiple risk factors do not know their stroke risk. This result indicates a lack of knowledge about stroke risk in high-risk populations [16].

Diabetic patients in this study believed that stroke could be prevented (44.3%). They also stated that stroke can have serious effects on their lives (64.3%). Therefore, it can be concluded that the dimension of understanding the severity of the disease is high in these people. Perceived severity refers to an individual's view of the severe consequences of their illness [15]. Many patients do not fully recover after a stroke and face residual long-term implications such as psychological symptoms, cognitive impairment, physical fitness limitations, and other post-stroke symptoms [5]. People with diabetes, compared with non-diabetics after a stroke, have a higher risk of death, hospitalization for cardiac and non-cardiac causes, and readmission to the hospital due to stroke recurrence [17].

In this study, 64.3% of people stated that no one explained to them the risk of stroke. This issue shows that patients do not have a proper guide. Action guides are accelerating forces that make a person feel the need to act [18]. Cues to action are needed to encourage individual participation in health behaviors. Indications for action can be internal or external. Physiological cues (e.g., pain and symptoms) are examples of internal cues for action. Extrinsic cues include events or information from other close people, such as the media or healthcare providers [19].

The results of this study showed that a high percentage of people want to walk (42.9%), follow a healthy diet (64.3%) and follow prescribed medications (78.6%). Self-efficacy ranks last among the constructs of the health belief model .The self-efficacy of a person's confidence refers to his/her ability to perform and pursue a behavior [12]. Self-efficacy plays a significant role in adopting and maintaining behavior. Bandura believes that perceived self-efficacy can determine an individual's level of effort and the time it takes to persevere despite problems and barriers. Thus, it could affect the level of motivation [20]. Self-efficacy is the most critical factor in managing diabetes [21]. Several studies inform about the predictive role of self-efficacy in physical activity and its importance in adhering to self-care behaviors of patients with

diabetes [22, 23]. This could result from the fact that patients with greater self-confidence are more likely to continue trying to perform the suggested behaviors in different situations.

The study showed a significant relationship between health beliefs and low-level education. The findings of one study are consistent with those of another study [24]. Also, another study showed that illiterate people had more knowledge about stroke and were involved in stroke prevention [25]. The regular visit of patients with low literacy levels to the diabetes clinic and the limited number of educated people in the present study may be one of the reasons for the current result.

This study is a cross-sectional one and only examined the dimensions of health belief model constructs. Considering that the self-care behaviors of diabetic patients were not investigated in this study, it is not possible to say with certainty whether the patients have proper self-care to prevent stroke. Also, Convenience sampling limits the generalizability of the study results.

Conclusion

The overall score of the health belief model in these patients was lower than the average score. Some aspects such as cues to action, perceived susceptibility, and barriers, require more attention to prevent stroke. However, the high self-efficacy score and perceived benefits show that by finding solutions such as providing education and support to these patients, the process of stroke can be stopped or slowed down in these patients.

Ethical approval

An informed consent form was obtained from all subjects. Participants were assured that their information would remain confidential. This study was approved by the Ethics Committee of Dezful University of Medical Sciences (IR.DUMS.REC.1401.014).

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