

The Rate of Compliance of Prehypertension Individuals from Dietary Approaches to Stop Hypertension (DASH): An Application of the Theory of Planned Behavior

Seyed Saeed Mazloomi Mahmoodabad¹, Saeid Dashti^{1*}, Amin Salehi-Abargouei^{2,3}, Hossein Fallahzadeh⁴, Mohammad Hossein Soltani⁵

¹Social Determinants of Health Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran; ²Nutrition and Food Security Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran; ³Department of Nutrition, School of Public Health, Shahid Sadoughi University of Medical Sciences, Yazd, Iran; ⁴Department of Biostatistics, Shahid Sadoughi University of Medical Sciences, Yazd, Iran; ⁵Head of Yazd Cardiovascular Research Center, Shahid Sadoughi University of Medical Sciences, Iran

Corresponding author:

Saeid Dashti,
Social Determinants of Health Research Center,
Shahid Sadoughi University of Medical
Sciences,
Yazd, Iran,
Tel: 00989151067166
E-mail: drsaeiddashti@gmail.com

Abstract

Background Prehypertension is a commonly occurring disease around the world as a predictor of high blood pressure. High blood pressure can be delayed by following the pre-hypertensive diet. This study was conducted to determine the compliance of the DASH program among pre-hypertension individuals by using the Theory of Planned Behavior. **Methods:** This cross-sectional study was performed on 165 prehypertension individuals in Ferdows City. A researcher-made questionnaire was used to examine the scores of the theory of protection motivation structures. The diet was measured by using a three-day dietary questionnaire. Validity and reliability of the instrument were confirmed. The data were analyzed by means of correlation coefficient, chi-square, and linear regression. **Results:** The average Dash diet compliance was 25.24 ± 4.7 . Demographic variables did not have a meaningful relationship with the Dash diet. The positive and direct correlation was observed between all the structures. The structures of Theory of Planned Behavior predicted 72% of variance in behavioral intention. The role of the attitude construct was more than other constructs in predict of intention ($\beta=0.392$). **Conclusion:** Considering the medium rate of compliance of the diet plan and TPB function in predicting behavior, it is suggested to use predictive constructs in designing educational interventions in order to increase the compliance rate of the food program.

Keywords: Prehypertension; Dietary Approaches; Food Program; Hypertension

Introduction

In 2003, a new class of Systolic blood pressure was determined from 120 to 139 mmHg or DBP 80 to 89 mmHg as a “high blood pressure” by JNC7. ^[1] Prehypertension increases the risk of hypertension compared with those who have normal blood pressure. ^[2] They have higher weigh, cholesterol and triglycerides ^[3] than the normal population. About 90% of pre-hypertensive people have at least one risk factor of cardiovascular disease. ^[4] However, pre-hypertensive prevalence rates were reported as 30% to 48.9% in worldwide. ^[5] In Iran, Pre-hypertension prevalence rates in men were 44.2 -59.6% and in women were 44.5-35.5%. ^[6] Prehypertension has not been classified in the category of disease.

Because of the relationship between Prehypertension and cardiovascular disease (JNC7) in order to reduce blood pressure and prevent damage to organs and cardiovascular events, ^[7] approaches were suggested for lifestyle changes as an important role in reducing blood pressure, weight loss, compliance of the DASH diet, reducing sodium intake and physical activity. ^[1,8]

The results of systematic review and meta-analysis showed that “Dietary Approach to Stop Hypertension (DASH) which reduces systolic and diastolic blood pressure of 6.74 and 3.54 mmHg, respectively. ^[9]

The DASH diet contains a high intake of fiber, potassium, magnesium and calcium, and the high consumption of fruits, vegetables, low-fat dairy products, vegetable oils, grains, lean meats, chicken, and fish were suggested while the limited consumption of sodium (2300 mg/Mg daily), sugary drinks, saturated fats, total fat and cholesterol were suggested. ^[8,10]

However, studies have reported levels of DASH diet compliance in individuals with limited and healthy blood pressure. ^[11] Food programs are affected by many factors such as interpersonal, personal, cultural and environmental factors that these can promote or prevent healthy food. Adherence to the DASH diet plan is also subject to these factors. ^[12]

Health providers use the Theory of Planned Behavior that provides a useful framework for predicting and understanding the health-related behaviors. According to this theory, intention is the main determinant of

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behavior. The intention of the individual is influenced by three factors of attitude, subjective norms and perceived behavioral control.^[13] The theory of planned behavior is considered as an appropriate framework for predicting nutritional behaviors such as fruit and vegetable consumption, fast food consumption, healthy snacks consumption, and breakfast eating.^[14,15]

Considering that people with high prehypertension are at high risk for promoting control strategies in nutrition, recognizing the influencing factors on the Dash diet compliance can increase the effectiveness of educational interventions, and this study is aimed at determining the compliance of the DASH program which was conducted among prehypertension individuals by using the theory of planned behavior.

Materials and Methods

The present study was a cross-sectional descriptive-analytic study which was carried out on 165 prehypertension people in Ferdows city who were willing to participate in the study in winter 2018. Inclusion criteria of the study included: A person's blood pressure should be within the range of pre-hypertension, they should be satisfied with the

presence in the study. Exit criteria included 1-diagnosis of diabetes, kidney failure and inability to answer questions. Cluster sampling was sampling method. As health centers were considered as clusters, then two of them were selected randomly and available pre-hypertensive subjects were examined. The necessary explanations regarding the study and the confidentiality of their information described to the participants. A 3-day food records questionnaire was used to determine the pre-hypertensive person's dietary intake.

The Dietary Approaches to Stop Hypertension (DASH) assessment was based on the scoring of diet based on 8 food components including fruits, vegetables, grains, legumes and meals, low fat dairy products, red and processed meat, sweet beverages and salt intake. The subjects were ranked in different quintuple according to their intake for each component of the diet pattern. In the DASH diet plan, receiving more than 5 first groups and receiving low amounts of meat, sweet beverages and salt is desirable, so the lowest quintuple get the less amount of meat, sweet beverages and salt, which it would get the lowest score 5 and the highest quintuple would get 1. Then scores ranged from 8 to 40 in the DASH diet plan. People whom their score were more, they compliance the DASH diet and vice versa.^[16]

Table 1: Characteristics and level of dash diet in pre-hypertensive patients.

Variables		Level of dash diet					N (%)	P value
		1	2	3	4	5		
Gender	Female	13	18	12	12	13	68 (43)	P = 0.174
	Male	21	11	19	24	15		
Age	Under 30 years old	2	1	1	0	0	4 (2.5)	P = 0.751
	30 to 40	5	6	6	3	2	22 (13.9)	
	40 to 50	12	10	15	15	11	63 (39.9)	
	50 to 60	12	10	9	14	12	57 (36.1)	
Level of education	Over 60 years old	3	2	0	4	3	12 (7.6)	P = 0.222
	primary	10	9	4	9	9	37 (26.1)	
	Diploma	10	12	13	11	14	60 (38.2)	
Marital status	Academic	14	8	14	15	5	56 (35.7)	P = 0.327
	Married	29	29	30	35	27	150 (94.9)	
Job	Single / Divorced	5	0	1	1	1	8 (5.1)	P = 0.342
	housewife	11	17	10	13	12	63 (40.1)	
	Employee	12	7	9	7	4	39 (24.8)	
BMI	Retired	5	3	7	9	9	33 (21)	P = 0.173
	self-employed	5	2	5	7	3	22 (13.9)	
	normal	26	23	27	28	22	126 (80.3)	
Economic situation	Overweight	5	5	3	8	4	25 (15.9)	P = 0.433
	fat	3	1	0	0	2	3.8	
	good	9	4	8	9	3	33 (20.9)	
	average	23	24	21	27	25	120 (75.9)	P = 0.433
	weak	2	1	2	0	0	5 (3.2)	

Table 2: Descriptive statistics and inter correlations of TPB construct in pre-hypertensive patients.

TPB Constructs	Mean	SD	1	2	3	4	5
Attitude	4.36	0.67	1				
Subjective Norm	4.39	0.62	R=0.713**	1			
Perceived Behavioral Control	4.44	0.62	P=0.000	R=0.544**	1		
Intention	4.35	0.66	R=0.531**	P<0.000	R=0.657**	R=0.602**	
Dash diet	25.24	4.7	P<0.000	R=0.105	P=0.000	R=0.215**	R=0.199*
			P=0.202	P=0.300	P=0.007	P=0.015	1

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Discussion

Table 3: Regression analysis of TPB variables as predictors of Intention And Dash Diet.

Variables	β	SE	p-value	R ²	Dependent variables
Attitude	0.392	0.081	0.000	0.72	Intention
Subjective Norm	0.188	0.089	0.028		
Perceived Behavioral Control	0.343	0.074	0.000		
Intention	0.216	0.175	0.008	0.04	Dash Diet

A researcher-made questionnaire was used to investigate the structure of the theory of planned behavior. The questionnaire was designed based on the opinions of health education experts, interviews with some pre-hypertensive and dietitian and cardiologists.

The content validity ratio (CVR) and content validity index (CVI) was used to determine the validity and content validity. For assessing the validity of the questionnaire, questions were completed and approved by the 10 health and nutrition and cardiovascular health professionals. In the present study, the reliability of the questionnaire was evaluated by using Cronbach's alpha calculation and finally a questionnaire with 59 questions in four constructs was designed: attitude toward the behavior with 12 questions, abstract norms with 27 questions, perceived behavioral control with 10 questions, and behavioral intention with 10 questions with Cronbach's alpha of 0.76-0.96.

Questions were in the form of Likert scale (5 options), the score of "I completely agree" option was 5 and the score of "I completely disagree" was 1. Data were analyzed by using SPSS software version 18 using correlation coefficient, linear regression and Chi-square test. The level of significance was 0.05 in the tests.

Results

The average age of participants was 49 years old with a standard deviation of 8.99. The mean systolic blood pressure is 133 ± 9.82 mmHg and diastolic blood pressure 82 ± 11 mmHg. The demographic information is presented in Table 1.

Only 28 individual (17.7 percent) of pre-hypertensive people had the highest score in the diet. Chi-square showed that there was not a significant relationship between demographic variables and dietary compliance score ($p > 0.05$) [Table 1].

The average Dash diet compliance was 25.24 ± 4.7 . Attitudes toward behavior, abstract norms and perceived behavioral control were positively and significantly correlated with intention. The highest mean score among the constructs of the theory of planned behavior was belonged to perceived behavioral control (4.44 ± 0.62) and the lowest score was belonged to behavioral intention (4.35 ± 0.66). The results of correlation test showed that following the DASH diet program with perceived behavioral control constructs and intention have a positive and significant relationship, as well as attitude toward behavior with intention ($r=0.722$) and perceived behavioral control with behavior ($r=0.215$) had the most correlation [Table 2].

The results of regression analysis showed that the constructs of the theory of planned behavior has predicted 72% of variance in behavioral intention and attitudes toward behavior, abstract norms, and perceived behavioral control has predicted the intention. The highest contribution in predicting behavioral intention was belong to the intention toward behavior ($\beta=0.392$), and behavioral intention predicted 4% of the variance level of diet program compliance, $\beta=0.216$ [Table 3].

It seems that the development of the readiness and motivation to follow appropriate prevention and treatment programs and to preserve these programs in order to reduce the risk of cardiovascular disease is simply not achievable.^[17] Therefore, the effective provision of educational services is related to the proper understanding of behaviors preventive. In relation to the effectiveness of the theory of planned behavior for studying and intervention in nutrition-related behaviors, many studies have been conducted that their results indicate the effectiveness of this theory.^[14,15] Therefore, in this study, this theory was considered as the framework of the study.

The results of this study showed that the average of compliance of the Dash diet was 25.24 and 17.7% of the pre-hypertensive people had the highest levels of compliance of the Dash diet. Mellen et al., in a national study, found the rate of the diet program compliance as 33.66% and among people with hypertension, 33.46%.^[11] Similarly, Leon et al. reported the compliance rate of dietary supplements among hypertensive patients in the hospital, 20%.^[18] The systematic results of Kawan et al. showed that the level of the diet plan compliance was generally low,^[19] Racine et al. reported that only 21% of the participants were adherent in the interventional study after getting DASH diet counseling.^[20] The difference in the findings could be due to a lack of a standard for measuring the compliance of the diet plan, as well as differences in the number and type of participants, and the credibility of the DASH diet assessment program.

According to demographic factors, the results showed that there was no significant relationship between Dash diet and none of these factors. The study of Abdul-Karimi et al. showed that age and BMI with physical activity were not significantly different among diabetic patients.^[21] In the study of Leon and colleagues, gender, marital status, income levels have significant relationship with Dash diet compliance,^[15] Gunther and colleagues did not found a relationship between BMI and compliance diet.^[22] The differences in findings seem to be due to the differences in lifestyle, especially nutrition among cultures and communities, and among different illnesses.

The results of this study showed that there is a positive and significant correlation between the intention of compliance DASH diet plan and attitudes toward behavior, abstract norms and perceived behavioral control. However, the correlation between the structures and intention was different, so that the highest relationship was between intention and attitude ($r=0.722$) and the lowest was about perceived abstract norms ($r=0.602$).

The results of McDermott's overview on 42 articles and thesis showed that attitudes had the strongest relationship toward the intention $r=0.54$.^[23] Also, in the Pawlak and Blanchard study, there was a strong predictive attitude for behavioral intention in research units.^[14,24] In the study of Davarani et al., the attitude structure did not have a place in the prediction of intention.^[25] According to AJZEN, whatever one has a better attitude toward one's behavior, and the important others in her/his life, they confirm one behavior to feel to have more control on behaviors and more likely to have intention to do the behavior.^[13]

The results of the regression test showed that the constructs of the theory of planned behavior have predicted 72% of the behavioral intention variance. The constructions of the theory of planned behavior in the study of predictors of a healthy diet compliance among athletes was 72%,^[24] and the prediction of a healthy diet among diabetics was 76%,^[26] predicted physical activity was 37%,^[25-27] predicting a change in snack consumption was 47%,^[28] it seems that the difference in findings is due to the difference in Kinds of behaviors, environment and study group. In this study, the constructs of attitude toward behavior,

abstract norms and perceived behavioral control were the predictor of intention which behavioral attitudes has the most contributed to predict behavioral intent.

In this study, it was found that behavioral intention has positive correlation with the DASH diet plan and predicted 4% of the diet compliance behavior, which is consistent with the results of the Wong 4%^[29] and Yarmohammadi 6%^[30] studies. Also, the results of Davarani et al. were 37%.

Intention in the theory of planned behavior is introduced as an essential and immediate introduction to behavior,^[13] but there is no 100 percent relationship between intent and behavior. The intention is necessary for behavior, but it is not enough to act.^[31] There was no significant statistical relationship between the consumption of fruits and vegetables in Godin et al. study, so that nutritional behaviors in these individuals became habitual.^[32]

The present study was the first study in the field of Dash diet for pre-hypertensive patients in Iran which as well as the correlation, prediction of intention and behavior of Dash diet compliance plan was studied. Our study has some limitations, including collection of the dietary information and the structures of protection motivation theory through self-reporting, which could be a measurement error, in addition, the 3-day food records questionnaire was not able to measure the exact level of sodium diet, which is one of the main components of the diet. Also, the cross-sectional nature of this study was also a limitation of this study. However, it is recommended that by performing precise educational interventions based on the Theory of Planned Behavior, the practical effectiveness of this theory should be analyzed among pre-hypertensive individuals.

Conclusion

The rate of compliance of the DASH diet was moderate among people with prehypertension. The present study showed that there is a correlation between all TPB constructs with the intention of diet compliance and all the structures predicted behavioral intention. Among the structures, the attitude toward behavior has the highest contribution in predicting behavioral intention. Therefore, considering the TPB function in predicting behavior, it is suggested to use predictive structures in designing educational interventions in order to improve the compliance rate of diet program.

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Ethical Approval

The Ethics committee of the Shahid Sadoughi University of Medical Sciences-Yazd approved this study. Ethic code: IR.SSU.SPH.REC.13950103.

Conflict of Interest

The authors disclose that they have no conflicts of interest.

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