The status and predictors of hypertension preventive nutritional behaviors in adolescents based on the constructs of the Theory of Planned Behavior

Mohammad Matlabi¹, Reza Esmaeili², Mahdi Moshki³, Afshaneh Ranaei⁴, Alireza Haji⁵, Rahele Mehrabi⁶

¹ Assistant Professor, Department of Public Health, School of Public Health, Gonabad University of Medical Sciences, Gonabad, Iran
² Social Development & Health Promotion Research Center” and “Public Health Department, Health Faculty”, Gonabad University of Medical Sciences, Gonabad, Iran
³ Associate Professor, Department of Public Health, School of Public Health, Gonabad University of Medical Sciences, Gonabad, Iran
⁴ M.Sc. Student, Department of Health Education and Health Promotion, School of Public Health, Gonabad University of Medical Sciences, Gonabad, Iran
⁵ M.Sc. Student, Department of Health Education and Health Promotion, School of Public Health, Gonabad University of Medical Sciences, Gonabad, Iran
⁶ M.Sc. in Medical Library and Information Sciences, Gonabad University of Medical Sciences, Gonabad, Iran

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Abstract

Background: Malnutrition is an important factor affecting hypertensive incidence. Since the unhealthiest nutritional behaviors are rooted in childhood attitudes and experiences, applying educational interventions to these age groups will be most useful in the formation of preventive nutritional behaviors.

Objective: To determine the predictive power of the TPB on hypertension in junior high-school students.

Methods: The present cross-sectional study was conducted on 160 junior high-school students in Kashmar, Iran in academic year commencing 2-13-2014, selected through random sampling. The participants completed a researcher-made questionnaire consisting of a demographic information form and a section to evaluate the constructs of the TPB. The data collected were analyzed in SPSS-16 using the correlation Wilcoxon statistics test, the one-way ANOVA and multiple linear regression analysis.

Results: The mean age of the students was 13.51. A total of 47% of the students had snacked on potato chips and cheese puffs, 45% had eaten high-fat foods and 51.2% had eaten cookies and chocolates within the past week. The variable of behavioral intention predicted 32% of the variations in preventive nutritional behaviors by itself. The Pearson product-moment correlation analysis found that hypertension preventive nutritional behaviors were significantly correlated with attitude (p<0.001, r=0.38), perceived behavioral control (p<0.001, r=0.38), and behavioral intention. Moreover, significant correlations were observed between subjective norms and attitude (p<0.028, r=0.173), perceived behavioral control and attitude (p<0.003, r=0.231), behavioral intention and attitude (p<0.001, r=0.370), behavioral intention and subjective norms (p<0.030, r=0.171) and between behavioral intention and perceived behavioral control (p<0.001, r=0.484).

Conclusion: The examined students revealed an adequate adherence to preventive nutritional behaviors. Nutrition education interventions should be developed based on variables such as behavioral intention and its determinants, i.e. attitude, perceived behavioral control and subjective norms.

Keywords: Preventive nutritional behaviors, Theory of planned behaviors, Students, Hypertension

1. Introduction

Non-contagious diseases including cardiovascular diseases, brain attack, diabetes, cancer and chronic respiratory diseases are the main causes of death and the burden of diseases in the world. Out of 58,000,000 deaths annually,
nearly 35,000,000 cases are because of the mentioned diseases. Among the non-contagious diseases, cardiovascular diseases are the most common ones and they account for one fourth of the deaths in the world. In our country, cardiovascular diseases account for 40% of deaths, and about 10.5% of the burden of diseases is due to those diseases and it takes exorbitant national costs to cure these diseases (1). Today, hypertension and its complications comprise a significant health problem in the modern world and are considered precursors to many diseases such as myocardial infarction, stroke, congestive heart failure, advanced chronic kidney disease and peripheral vascular diseases (2, 3). According to studies, the global economic burden of this disease was about $370 million in 2012, making up for 10% of global total health expenditure (4). Hypertension is rooted in childhood and adolescence, as most people with childhood and adolescent hypertension continue to suffer from this condition in adulthood (5). The prevalence of hypertension varies across different countries and has been reported as 1% in children and 3% in adolescents (2), although, some reports have estimated it to range from 5% to 11% (6). Hypertension is caused by different factors; however, poor nutritional behaviors are among the main factors contributing to this condition. Furthermore, behavioral characteristics such as poor nutrition patterns formed in adolescence cause many complications, such as adulthood mortality. In other words, many healthy and unhealthy behaviors established during this stage manifest themselves as fixed patterns into adulthood (7, 8). As an adolescent, the individual is now responsible for his own nutrition patterns, attitudes and behaviors, and attitudes tend to play a key role in the continuation and maintenance of a wide range of nutrition habits and behaviors (4). The physical and psychological changes developed in adolescence make up the adolescent’s nutritional health; if these changes are ignored, they will cause adverse consequences such as anorexia and overeating, and the adolescent will become underweight or overweight as a result (8, 9). Adolescents account for one-fifth of the total population of the world. Almost 84% of this age group lives in developing communities. In Iran, the 10-19 age group makes up more than 20% of the total population. The health and progress of this group is undoubtedly integral to the socioeconomic future of the country. Nevertheless, research suggests that this age group suffers from low or moderate levels of nutritional awareness in different aspects (10). In one study, Mirmiran found that only a small percentage of adolescents in Tehran have proper nutritional behaviors and most of their nutritional behaviors are not guided by nutritional awareness (4, 7). The rapid and significant changes in nutrition patterns and lifestyles in different communities facilitate the development of many diseases such as hypertension, and have thus become the cause of premature mortality in developed and developing countries (11, 12). Changes in eating habits contribute significantly to this pattern and nutritional factors are currently known as risk factors for the development of non-contagious diseases (7). Emphasizing the awareness, attitude and performance of this group is the main prerequisite of health promotion programs in society. Meanwhile, theories are capable of determining potentially-alterable personal characteristics, beliefs and values associated with different health behaviors. The TPB is a principal theory used in different studies to determine the attitudes and beliefs associated with food selection (13, 14). The results of meta-analyses conducted on the TPB have shown that the constructs of this theory can properly predict intention and ultimately, behavior (15, 16). According to this theory, the primary factor involved in determining behavior is the individual’s intention in performing that behavior. The second factor involved is the individual’s perception of the social pressures exerted by significant others for doing or not doing that behavior (social norms). The third factor involved is the individual’s perception of the ease or difficulty of performing that behavior, i.e. perceived behavioral control, which consists of internal and external factors. These factors can inhibit or facilitate a behavior (13, 17). The exact contribution of each of the factors to the prediction of behavior differs depending on the type of behavior in question and the study population (18). A review of literature shows that the majority of studies on this subject are focused on the relationship between fruit consumption and the incidence and prevalence of some diseases, and no studies have examined the effects of hypertension preventive nutritional behaviors in adolescents using the TPB (19-21). The present study was therefore conducted in Kashmar, Iran, to investigate the status and the predictive factors of hypertension preventive nutritional behaviors in adolescents based on the constructs of the TPB.

2. Material and Methods

2.1. Research design

The present cross-sectional study was conducted on 160 students in Kashmar, Iran, in 2013. The study population was all the junior high school students of Kashmar in the academic year of 2013-2014. Six high schools have been randomly selected for the study, including girls and boys.

2.2. Inclusion criteria

The following were set as the inclusion criteria: 1) being in grade 2 or 3 of junior high school, 2) being 12 to 13 years old, 3) nonstop presence from the beginning of the academic year, and 4) having Iranian nationality and being interested in the study.
2.3. Sampling

2.3.1. Sample size
Based on this equation as well as the results of similar studies (22), in which the standard deviation obtained for preventive behaviors was 0.6, the study sample size was calculated as 150 with a precision of 0.05 and an acceptable error rate of 0.1. A total of 160 eligible students were ultimately selected to account for potential sample losses and the potential submission of incomplete questionnaires.

2.3.2. Sampling method
The subjects were selected through multistage random sampling. At the first stage of sampling, two all-girl and two all-boy middle schools (junior high-schools) were chosen and 80 subjects were selected from each school based on the number of eligible students in each class so as to complete the questionnaires.

2.4. Instrument and data collection
The questionnaire used in this study investigated the students’ personal information, including age, gender, parental education, parents’ occupation, type of residence, household size, average monthly income and allowance, and examined the constructs of the TPB, including attitude, subjective norms, perceived behavioral control, behavioral intention and behavior. Due to the lack of a standard questionnaire on this subject, the researchers developed their own questionnaire using relevant books, studies and references and in accordance with Icek Ajzen’s website on the TPB. Cronbach’s alpha values were calculated to confirm the reliability of each of the constructs. Behavioral intention (six items), attitude (11 items), subjective norms (five items) and perceived behavioral control (five items) were assessed based on a five-point Likert scale and with responses ranging from 1 (completely disagree) to 5 (completely agree). Ultimately, behavior was assessed with eight items, two of which were scored based on the Likert scale and the remaining six by ‘yes’ (1 point) and ‘no’ (0 points) responses. The constructs were assessed directly and the questionnaire was distributed among ten experts and 20 non-participating adolescents and two nutritionists to review and respond to the items and to determine their clarity. Based on the reviewers’ opinions and suggestions, modifications were made to further clarify the items. In addition, ten experts reviewed and confirmed the questionnaire’s face and content validities and their comments were implemented to further improve the questionnaire. A test-retest was performed with an interval of two weeks on 20 non-participating samples in order to determine the reliability and the stability coefficient of the questionnaire. The reliability of the items pertaining to the constructs of the TPB was confirmed by measuring their Cronbach’s alpha, which was reported as 92.7% for attitude, 88.8% for subjective norms, 86.6% for perceived behavioral control, 86.7% for behavior and 86.5% overall. The questionnaire took 15 minutes to be completed. The study sample size was calculated based on the two objectives of the research, i.e. estimating the mean and the ratio. The required sample size calculated through the equation for estimating the mean was higher, and this estimation thus formed the basis of the calculations.

2.5. Statistical analysis
Data were analyzed by SPSS-16.5 (SPSS Inc., Chicago, Illinois, USA), using descriptive statistics, Pearson product-moment correlation, and multiple linear regression. P<0.05 was set as the level of statistical significance. The normal distribution of the data was confirmed by the Kolmogorov-Smirnov test.

2.6. Ethics
Before beginning the study, permissions were obtained from Gonabad University of Medical Sciences (Ref. No.: GMU.REC.1392.59) and Kashmar’s Department of Education to arrange a time for the students to fill out the questionnaires. The students were briefed on the study objectives and ensured of the confidentiality of their information, and then decided whether they wanted to participate in the study or be excluded from it; nevertheless, all the eligible candidates showed interest in participating in the study.

3. Results
The students ranged from 12 to 15 in age and had a mean age of 13.51 (Table 1). In terms of birth order, 41.25% of the subjects were first-born. The majority of the subjects had fathers who were self-employed (62.5%) and mothers who were housewives (90.62%). A total of 71.87% of the fathers and 70.62% of the mothers had below high-school level education. A total of 70% of the subjects estimated their family income and economic status as moderate while 16.8% predicted it as high. A total of 58% of the subjects were enjoyed eating pizza and sandwiches while only 13% did not like pizza and sandwiches at all. Moreover, 55.4% of the subjects had a strong liking for chips and cheese puffs. According to the study findings, 47% of the students had snacked on chips and cheese puffs within the previous week and 57% within the previous month; 45% had had high-fat foods within the previous week and 55.6% within the previous month; and 51.2% had had cookies and chocolates within the previous week and 55.6%
within the previous month. A total of 68.1% of the students were in favor of having soft drinks with their meals and 64% had no dietary plans. A total of 87% of the students liked dairy and 68% liked to drink milk every day. A total of 94.3% of the students were also in favor of incorporating vegetables into their meals. The number of items of questionnaire and the mean scores of the studied variables are presented in Table 2. The Pearson product-moment correlation analysis (Table 3) found hypertension preventive nutritional behaviors to be significantly correlated with attitude (p<0.001, r=0.38), perceived behavioral control (p<0.001, r=0.38) and behavioral intention. Moreover, significant correlations were observed between subjective norms and attitude (p<0.028, r=0.173), perceived behavioral control and attitude (p<0.003, r=0.231), behavioral intention and attitude (p<0.001, r=0.370), behavioral intention and subjective norms (p<0.030, r=0.171) and between behavioral intention and perceived behavioral control (p<0.001, r=0.484). As shown in Table 4, the regression model showed that, of the constructs that had significant correlations with hypertension preventive nutritional behaviors (i.e. attitude, perceived behavioral control and behavioral intention), behavioral intention alone predicted 32% of the variations in hypertension preventive nutritional behaviors.

Table 1. The demographic details of the study participants

| Variable                  | Unit of Measurement          | n   | %   |
|---------------------------|-----------------------------|-----|-----|
| Age (year)                | 13-14                       | 60  | 37.5|
|                           | 14-15                       | 81  | 50.6|
|                           | 15                          | 7   | 4.3 |
| Birth Order               | First-born                  | 66  | 41.25|
|                           | Second-born                 | 38  | 23.75|
|                           | Third-born and higher orders| 56  | 35  |
| Father’s Occupation       | Unemployed                  | 1   | 0.6 |
|                           | Office Employee             | 35  | 21.8|
|                           | Laborer                     | 20  | 12.5|
|                           | Business and Trade          | 100 | 62.5|
|                           | Other                       | 4   | 2.5 |
| Mother’s Occupation       | Office Employee             | 7   | 4.37|
|                           | Laborer                     | 2   | 1.25|
|                           | Business and Trade          | 6   | 3.75|
|                           | Housewife                   | 145 | 90.62|
| Father’s Education        | Below High School Level     | 115 | 71.82|
|                           | High School Diploma         | 19  | 11.87|
|                           | University Education        | 26  | 16.25|
| Mother’s Education        | Below High School Level     | 113 | 70.62|
|                           | High School Diploma         | 29  | 18.12|
|                           | University Education        | 18  | 11.25|
| Type of Residence         | Owner                       | 139 | 86.87|
|                           | Renting                     | 18  | 11.25|
|                           | Corporate Housing           | 3   | 1.78|
| Income Status             | Low                         | 112 | 70  |
|                           | Moderate                    | 21  | 13.1|
|                           | High                        | 27  | 16.8|

Table 2. The number of items and their mean and standard deviation in the study subjects in relation to the constructs of the TPB and hypertension preventive nutritional behaviors

| Model Construct           | Number of Items | Mean of scores | SD  |
|---------------------------|-----------------|----------------|-----|
| Attitude                  | 11              | 28.27          | 6.13|
| Subjective Norms          | 5               | 12.58          | 2.98|
| Perceived Behavioral Control| 5              | 12.81          | 2.97|
| Behavioral Intention      | 6               | 16.02          | 4.61|
| Behavior                  | 8               | 8.00           | 3.22|
**Table 3.** The correlation coefficients matrix of the TPB constructs and hypertension preventive nutritional behaviors

| Model Construct | Attitude Correlation Coefficient | Subjective Norms Level of Significance | Perceived Behavioral Control Correlation Coefficient | Behavioral Intention Level of Significance |
|-----------------|----------------------------------|----------------------------------------|-----------------------------------------------------|------------------------------------------|
| Attitude        | 0.380                            | 0.001                                  |                                                     |                                          |
| Subjective Norms| 0.173                            | 0.028                                  |                                                     |                                          |
| Perceived Behavioral Control | 0.234 | 0.146 | 0.003 | 0.065 |
| Behavioral Intention | 0.370 | 0.171 | 0.489 | 0.001 | 0.001 |
| Behavior        | 0.380                            | 0.056                                  | 0.381                                               | 0.499                                    |

**Table 4.** The results of the linear regression model between hypertension preventive nutritional behaviors and the TPB constructs

| Variable              | R²     | B       | SE     | Beta | p-value |
|-----------------------|--------|---------|--------|------|---------|
| Allowance             | 0.01   | 0.745   | 0.558  | 0.106| 0.180   |
| Family Income         | 0.001  | 0.027   | 0.25   | 0.008| 0.917   |
| Attitude              | 0.16   | 0.237   | 0.042  | 0.409| 0.002   |
| Subjective Norms      | 0.002  | 0.058   | 0.095  | 0.049| 0.540   |
| Perceived Behavioral Control | 0.16  | 0.482   | 0.087  | 0.403| 0.001   |
| Behavioral Intention  | 0.32   | 0.480   | 0.056  | 0.558| 0.002   |

**4. Discussion**

Adolescent population growth and the particular problems of this age group comprise one of the problems with which developing countries such as Iran are faced. Examining nutritional behaviors in the group of junior high-school students revealed 47% to have snacked on chips and cheese puffs within the past week and 57% within the past month, which is consistent with the results of a study conducted by Delvarianzadeh, in which 56% were in favor of chips (23). Moreover, 68.1% of the students were in favor of having soft drinks with each of their meals, which is consistent with the results of a study in 2007 on adolescent girls in Hawaii, which found food intake in 51% of this group to not be based on the food pyramid and also showed a significant increase in the use of sweetened soft drinks and sugar. Mirmiran et al. also examined nutritional behaviors in a group of middle-school students and reported their nutritional status as moderate (24-26). According to Pi-Lin, inadequate or incorrect nutritional information exposes adolescents to poor food selection and nutritional behaviors (27). In the present study, 45% of the students had consumed high-fat foods within the past week and 56% within the past month, which is relatively consistent with the results of other studies on the subject (28). The present study reported the consumption of pizza, sandwiches and chips in 27.6% of the students, which is consistent with the results of the other study in which 27.6% of middle-school students consumed fast foods and other pre-processed foods two to three times per week (29). While the present study found the daily consumption of milk to be 68%, another study reported it as 35%; this disparity may be justified by noting the free distribution of milk among the students in the present study. A study conducted by Wave on female adolescents in Minnesota also obtained contradictory results (30). The present study found 94.3% of its subjects to be in favor of incorporating vegetables into their every meal. As also shown by Gholipour and Delvarianzadeh (31), this attitude can highlight the role of students in increasing families’ consumption of fruits and vegetables. In contrast to the present study, Lin found a distinct gap in information, attitude and nutritional behaviors, particularly in relation to the consumption of fruits and vegetables (32), which indicates the weak attitudes of this age group. In terms of subjective norms, the present study found that 45% of the parents had been effective in their children’s nutritional behaviors; this finding suggests that, besides the parents, other people such as friends and teachers can also have a role in determining the students’ nutritional behaviors, which is perhaps caused by the sense of independence from parents that begins to form at this age. This finding is consistent with the results obtained in similar studies (33, 34). The present study found no significant relationships between preventive nutritional behaviors and the fathers’ level of education, the mothers’ level of education, the fathers’ occupation and the mothers’ occupation. This finding is consistent with the results obtained by Dehdari et al. (31, 35). Other studies, however, reported this difference to be significant, as an increase in the education and job status of the head of the household reduced the consumption of high-calorie food groups such as bread, cereal and
sugar and added to the consumption of fruits and vegetables in the family (36). In another study, Dastgiri also showed that an increase in the income and education of the head of the household enhanced the family’s food security and reduced their food insecurity. Ultimately, food insecurity is related directly to reduced fruit and vegetable consumption (37). After determining the correlation between hypertension preventive nutritional behaviors and the TPB constructs, the constructs that had positive correlations with this variable were entered into the regression model. In the first model, behavioral intention alone predicted 32% of the variations in preventive nutritional behaviors, which is consistent with the results of the study by Dehdari et al. (31). Similar studies reported the predictive power of behavioral intention as 50% and 64% for eating fast food and having breakfast, in respective order (17, 38). Studies have shown that, at best, the TPB has a moderate value in the prediction of behavior, and adding other constructs such as past behaviors, i.e. past food habits can enhance the theory’s predictive power (39).

According to Ajzen, intention cannot lead to behavior in and by itself, and there is a gap between intention and behavior, which can be overcome by the incorporation of constructs such as past behaviors (13). A limitation of the present study was the lack of similar studies on the subject to form the basis of comparison. Another limitation was, the psychological and intellectual difference and the motivation of individuals who can be effective on how to respond.

5. Conclusions
Given the results obtained in this study and the role of the TPB in hypertension preventive nutritional behaviors in adolescents, an appropriate educational program should be developed based on the TPB to improve hypertension preventive nutritional behaviors. It is useful that the future studies examine this model in other preventive behaviors.

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Conflict of Interest:
There is no conflict of interest to be declared.

Authors' contributions:
All authors contributed to this project and article equally. All authors read and approved the final manuscript.

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