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Knowledge, Attitude, and Practice of the Pre-Diabetic Elderly regarding Pre-diabetes

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Abstract

Background

One of the risk factors of diabetes is the pre-diabetes stage which is significantly prevalent in the elderly. Knowledge, attitude, and practice of the pre-diabetic stage are of great importance and can decrease complications. The present study aimed to determine the knowledge, attitude, and practice of the pre-diabetic elderly.

Methods

: This cross-sectional study was conducted from April 2022 to August 2022 on 219 pre-diabetic elderly people referring to Sina Hospital in Tabriz, one of the most populated cities in the northwest of Iran. Data were collected using questionnaires of Knowledge, Attitude, Practice-Prediabetes Assessment Questionnaire (KAP-PAQ). The data were analyzed by SPSS 21.

Results

The mean scores of knowledge (in the range of 0–17), attitude (in the range of -10, + 10), and practice (in the range of 0–26) were 1.72 ± 1.0, 2.24 ± 1.92, and 5.76 ± 2.61, respectively. The elderly's knowledge and practice levels in the pre-diabetes stage were low and about 50% of them had negative views. According to the Spearman correlation test, there was a positive significant relationship between the elderly's knowledge and practice ($p < 0.001$, $r = 0.234$).

Conclusions

The elderly in the pre-diabetes stage had low knowledge and attitude and a negative viewpoint towards correcting lifestyle on diet, exercising and physical activity, weight control, diagnostic and screening methods. Increased knowledge about pre-diabetes and strengthened positive attitude towards correcting lifestyle through counseling as well as empowering the pre-diabetic elderly can increase the efficiency of pre-diabetes prevention and control programs and prevent its progression to the diabetes stage.

Background

The elderly population is increasing all over the world and it is predicted to reach 1.3 billion people by 2030 and 2 billion people by 2050. 60% of the elderly live in developing countries [1]. Aging is a physiological process that does not directly lead to disease but causes the occurrence of many physical and mental diseases due to the passage of time and the influence of environmental factors, reduced social relations, the loss of a spouse and family members, and unhealthy lifestyle [2, 3]. In addition to social and economic issues, chronic diseases such as diabetes affect the elderly's quality of life. One of the risk factors of

diabetes is the pre-diabetes stage which is prevalent among the elderly. The prevalence of pre-diabetes and diabetes significantly increases with age. It is estimated that in the United States about 50% of elderly people have pre-diabetes factors [4]. In Iran, on average one out of every 3 people over 60 years old has diabetes. Therefore, due to the higher prevalence of diabetes in the elderly, special attention should be paid to this age group [5].

In the pre-diabetes stage, the blood sugar level is higher than normal but not high enough to be diagnosed as type 2 diabetes [6]. Pre-diabetes can not only lead to diabetes, but it is an independent risk factor for a range of diseases, including endothelial dysfunction, atherosclerosis, and heart attack, which become more important with age. Furthermore, it has been indicated that pre-diabetes increases the risk of hospitalization and mortality, especially among the elderly [7].

The pre-diabetes stage in the elderly is sensitive. The knowledge of the elderly about their nutrition and lifestyle can be very vital and lead to their improved health [8]. Knowledge about diabetes and pre-diabetes can play an important role in motivating individuals to prevent and minimize the complications of diabetes [9, 10]. Therefore, the elderly's increased knowledge about the pre-diabetes stage, through preventive strategies and changing lifestyle, can prevent the pre-diabetes stage. In this regard, it has been proved that knowledge in the pre-diabetes period is more important than in the diabetes period because it can postpone the onset of diabetes [11].

Another dimension that should be considered in the pre-diabetic elderly is their attitude which can affect their behavior. Attitude is indeed the individuals' underlying beliefs and can be influenced by their mental opinions and feelings [12]. Individuals' beliefs can play an important role in their attitudes toward their lifestyle, habits, and behavior. Inadequate care in diabetes is mostly related to the inappropriate attitude of the personnel and patients, and patients who have a positive attitude are more successful in diabetes control and care [13]. Therefore, knowing the elderly's attitude in the pre-diabetes period compared to the diabetes period towards the consequences and complications of the diseases can be helpful and effective in changing their views and attitudes towards the disease.

Change in individuals' knowledge and attitude towards a certain subject can change their behavior and attitude towards that subject, which can be significant and considerable [14]. The elderly's practices in pre-diabetes and diabetes periods are very important. Health care will be inefficient unless correct health behaviors are ensured [15]. Increased knowledge and attitude among the elderly and consequently their practice to control the disease is very important so that it can prevent the occurrence and progress of the diseases by controlling it through changing their lifestyle and diet [16].

Since the prevalence of diabetes is high in the elderly and the old people are considered to be the vulnerable population against this disease, diabetes can be controlled by timely diagnosis in the early stages and its complications can be delayed. Therefore, it is necessary to identify the patients in the pre-diabetes stage and before diagnosing diabetes, measure their knowledge, attitude, and practice, and provide a training and care program to prevent the complications and consequences of the disease. However, there are limited studies on the elderly's knowledge, attitude, and practice in the pre-diabetes

stage, and most studies have focused on the stage after diagnosing diabetes. Therefore, the present study aimed to determine the knowledge, attitude, and practice of the pre-diabetic elderly to provide health planners and policy-makers with valuable information to design interventions for this vulnerable population.

Methods

This descriptive cross-sectional study was conducted from April 2022 to August 2022 on 219 pre-diabetic elderly people referring to Sina Hospital in Tabriz, one of the most populated cities in the northwest of Iran. In this study, the sample size was determined to be people after performing a pilot study and considering the standard deviation of (the highest standard deviation was 0.36 for practice dimension) ($\alpha = 0.05$, $d = 0.05$). The inclusion criteria were the elderly in the pre-diabetic stage (the last fasting blood sugar test between 110 and 125 mg/dl [17]), who were referred to the diabetes clinic and could communicate verbally to answer the questions. They were included in the study using the convenience sampling method.

After obtaining the required permits from the Deputy of Research and Technology of Tabriz University of Medical Sciences and the ethics committee (under the code of ethics: IR.TBZMED.REC.1401.119), the researcher explained the purpose of the study to the participants. The written informed consent forms were obtained from the selected elderly. The data were collected using the knowledge, attitude, and practice pre-diabetes assessment questionnaire (KAP-PAQ) in the form of interviews performed by the researcher.

Knowledge Attitude Practice-Prediabetes Assessment Questionnaire (KAP-PAQ) is a valid questionnaire to measure pre-diabetic people's knowledge, attitude, and practice. It was developed by Mohsina et al. in 2020 in India [18]. The questionnaire was developed in 15 months in several stages including conceptualization, designing the questionnaire, reviewing the texts, examining the experts' opinions, pre-test, and pilot test. Finally, it was validated using validation methods such as form validity, factor analysis, and Cronbach's alpha. It contains 30 items that measure knowledge, attitude, and practice of the pre-diabetes stage.

The knowledge section includes 10 multiple-choice questions about etiology, diagnosis, consequences, and recommendations about pre-diabetes, with only one correct answer. The wrong answer is scored zero. For every correct answer in questions 1, 2, 7, 8, 9, and 10, 1 point is awarded. For every correct answer in questions 4 and 5, 2 points are awarded. For the correct answer to question 3, 3 points, and the correct answer to question 6, 4 points are awarded. The total score of the questionnaire is 17, and the participants' knowledge level is classified under three levels: less than 10 (weak), 10–13 (medium), and 14–17(good) [18].

The attitude section measures the participants' attitudes on a 3-option Likert scale (strongly agree, neither agree nor disagree, and strongly disagree). The items of this section are focused on pre-diabetic people's attitudes towards correcting lifestyle and gaining beliefs and feelings about pre-diabetes. Every positive attitude is awarded 1 point, every negative attitude is scored − 1, and every neutral attitude is scored zero. The total score is 10. The scores less than zero indicate an extremely negative attitude, the scores between 0 and 2 indicate a negative attitude, the scores between 3 and 6 indicate a neutral attitude, 7 and 8 indicate

a positive attitude, and scores 9 and 10 indicate an extremely positive attitude. The range of scores is between − 10 and + 10. Higher scores in the attitude section indicate a positive attitude toward diabetes prevention [18].

The practice section also includes 10 multiple choice questions about the daily habits on nutrition, physical activity, sleep pattern, number of meals, and blood tests. The lowest practice was scored zero, the acceptable practice was scored one, and the highest score was scored 2–4. The sum scores and the highest score indicate a healthier lifestyle. In this spectrum, the maximum score is 26; scores less than 6 indicate very weak practice, scores between 7–13 indicate weak practice, scores between 14–20 indicate good practice and very good practice is indicated by scores higher than 20 [18].

The validity of the questionnaire was examined using face validity and content validity. The content validity index (CVI) and content validity ratio (CVR) indices for the whole questionnaire were 0.86 and 0.84, respectively. The reliability of the questionnaire was calculated by determining the internal consistency (Cronbach's alpha coefficient). The Cronbach's alpha coefficient was obtained as 0.70 for the whole tool.

The descriptive statistical methods (frequency, percentage, mean, and standard deviation), Spearman correlation coefficient, and SPSS 21 were used to analyze the data.

Results

The mean age of the participants was 65.44 ± 5.15 in the age range of 60–88 years. 126 people (57.5%) were male and 93 (42.5%) were female. The average score of knowledge was 1.72 ± 1.0 (the maximum score was 17), of attitude was 2.24 ± 1.92 (out of a maximum score of 10), and of practice was 5.76 ± 2.61 (out of a maximum score of 26).

Table 1 shows the distribution of the elderly's knowledge about the pre-diabetes stage. As it shows, the most correct answer was related to the items "suggesting diet control and doing physical activity for the pre-diabetic elderly" (95.9%) and "pre-diabetes disorder can lead to type 2 diabetes" (67.1%). The items "if both parents have type 2 diabetes, what is the chance of developing pre-diabetes?", "What kind of foods should be consumed regularly in pre-diabetes?", and "how often should people with pre-diabetes exercise?" with 100% wrong answers had the highest frequency of wrong answers.

Table 1
Knowledge about pre-diabetes

Knowledge about pre-diabetes		Correct answer	Correct	False
		Total Score: 17 marks	Number (%)	Number (%)
Prediabetes condition can lead to	a. Type 2 diabetes mellitus b. Type 1 diabetes mellitus c. Both d. None of the above	a (1 mark)	147 (67.1)	72 (32.9)
What is the chance of one getting pre-diabetes, if both their parents have type 2 diabetes mellitus?	a. 25–40 percentage b. 10–15 percentage c. More than 50 percentage d. 0 percentage	c (1 mark)	0 (0)	219 (100)
Which is the best method for detecting pre-diabetes conditions?	a. Blood testing b. Urine testing c. Both d. None of the above	a (3 marks)	1 (0.5)	218 (99.5)
What is the fasting blood glucose level (after an overnight fast of 10 hours) in pre-diabetes?	a. 140–199 mg/dl b. 100–125 mg/dl c. < 100 mg/dl d. > 200 mg/dl	b (2 marks)	3 (1.4)	216 (98.6)
Average blood glucose for the past 3 months is given by the _____(type of a blood test)	a. HbA1c Test b. Fasting blood glucose test c. Fructosamine test d. Oral glucose tolerance test	a (2 marks)	1 (0.5)	218 (99.5)

Knowledge about pre-diabetes		Correct answer	Correct	False
		Total Score: 17 marks	Number (%)	Number (%)
What is the importance of testing insulin levels along with glucose levels in pre-diabetes?	a. To identify insulin tolerance b. To identify insulin resistance c. To identify insulin overdose d. None of the above	b (4 marks)	1 (0.5)	218 (99.5)
Preferred recommendation for pre-diabetes:	a. Diet control and exercise b. Insulin injections c. Dental checkup d. None of the above	a (1 mark)	210 (95.9)	9 (4.1)
The pre-diabetes should take regularly	a. Foods that are high in fat b. High fiber foods c. Soft drinks and energy drinks d. Foods rich in carbohydrate	b (1 mark)	0 (0)	219 (100)
How often pre-diabetes should do exercise?	a. Once a week for at least 30 mins b. Once a month for at least one hour c. Most days of the week for at least 30 mins d. None of the above	c (1 mark)	0 (0)	219 (100)

Knowledge about pre-diabetes		Correct answer	Correct	False
		Total Score: 17 marks	Number (%)	Number (%)
How far weight reduction help pre-diabetes condition in obese patient?	a. Will not help b. Slightly help c. Greatly help d. Unsure	c (1 mark)	2 (0.9)	217 (99.1)

Table 2 shows the distribution of the elderly's attitudes toward the pre-diabetes stage towards pre-diabetes. As is seen, the item of "support of family members is important to deal with pre-diabetes" with 90.4% and the item "people with pre-diabetes should be trained about diabetes mellitus" with 90.0% had the highest rate of agreement, and the item "pre-diabetes disorder is not considered by the society" with 82.2% had the highest rate of disagreement.

Table 2
Attitude about pre-diabetes

Attitude about pre-diabetes	Strongly agree (1 mark) Number (%)	Neither Agree nor Disagree (0 mark) Number (%)	Strongly disagree (-1 mark) Number (%)
I can do a lot for my pre-diabetes	170 (77.6)	36 (16.5)	13 (5.9)
Prediabetes should keep their blood sugar close to normal	180 (82.2)	30 (13.7)	9 (4.1)
Control of blood sugar is difficult in pre-diabetes	1 (0.5)	57 (26.0)	161 (73.5)
There is not much use in blood sugar control in pre-diabetes because type 2 diabetes mellitus will happen anyway	0 (0)	59 (26.9)	160 (73.1)
Prediabetes happens only to a cursed person	0 (0)	132 (60.3)	87 (39.7)
People with pre-diabetes should be taught about diabetes mellitus	197 (89.9)	10 (4.6)	12 (5.5)
Prediabetes condition is ignored much by the society	0 (0)	39 (17.8)	180 (82.2)
Support from family is important in dealing with pre-diabetes	198 (90.4)	11 (5.0)	10 (4.6)
Prediabetes should be taught about life style modification	191 (87.2)	21 (9.6)	7 (3.2)
I can lead a normal life in spite of pre-diabetes	193 (88.1)	16 (7.3)	10 (4.6)

Table 3 shows the distribution of the elderly's practice in the diabetes stage. As it is seen, the most correct practices among the participants were related to the consumption of sweet drinks with sugar (carbonated drinks and carbonated fruit drinks) with 61.2% and the consumption of fiber-rich foods such as oats, whole grains, fruits, or vegetable salad as a substitute for regular meals with 48.9%, and the practice of other cases was not good.

Table 3
Practice about pre-diabetes

Practice about prediabetes		Score	Number	Percent
How many hours per week do you perform exercises like cycling, walking, yoga etc.?	3 to 6 hours a week	4 marks	60	27.4
	1 to 2 hours a week	1 mark	0	0.0
	Less than 1 hour a week	0 mark	150	68.5
	None	0 mark	9	4.1
How often you consume sugar sweetened beverages (Soda, Carbonated beverages and Non-carbonated fruit drinks)?	Almost never	4 marks	134	61.2
	1–2 times a week	1 mark	0	0.0
	3 or 4 times a week	0 mark	80	36.5
	5 or more times a week	0 mark	5	2.3
How frequently you substitute fiber rich foods like oats, whole grains, fruits or vegetable salads over normal meals?	Almost never	2 marks	0	0.0
	1–2 times a week	1 mark	0	0.0
	3 or 4 times a week	0 mark	8	3.7
	5 or more times a week	0 mark	211	96.3
How often you sleep less than six hours/ night?	Almost never	2 marks	0	0.0
	1–2 times a week	1 mark	0	0.0
	3 or 4 times a week	0 mark	0	0.0
	5 or more times a week	0 mark	219	100.0
How often you skip meals?	Almost never	2 marks	0	0.0
	1–2 times a week	1 mark	0	0.0

Practice about prediabetes		Score	Number	Percent
	3 or 4 times a week	0 mark	0	0.0
	5 or more times a week	0 mark	219	100.0
How often you consume high fat foods (Like fried snacks and meat, fast foods, chocolates)?	Almost never	2 marks	0	0.0
	1–2 times a week	1 mark	0	0.0
	3 or 4 times a week	0 mark	0	0.0
	5 or more times a week	0 mark	219	100.0
How often you eat food while watching TV/ using mobile phone/ reading books (distracted eating)?	Almost never	2 marks	0	0.0
	Once a day	1 mark	0	0.0
	Twice a day	0 mark	189	86.3
	Every time	0 mark	30	13.7
How long you spend in front of Computer/ TV in a day?	Almost never	4 marks	0	0.0
	1–3 hours a day	1 mark	0	0.0
	4–6 hours a day	0 mark	203	92.7
	More than 6 hours a day	0 mark	16	7.3
How often you check blood sugar at home/lab?	Weekly or monthly once	2 marks	0	0.0
	Once in 2 or 3 months	1 mark	54	24.7
	Once in 6 months or yearly	0 mark	5	2.3
	Never	0 mark	160	73.0

Practice about prediabetes		Score	Number	Percent
How often you check cholesterol profile at lab?	One or more times in 2 year	2 marks	0	0.0
	Once in 5 years	1 mark	173	79.0
	Once in 10 years	0 mark	42	19.2
	Never	0 mark	4	1.8

Table 4 shows the elderly's knowledge, attitude, and practice in the pre-diabetes stage and the relationship between the variables. As it shows, the elderly's knowledge and practice were at a weak level and about 50% of the elderly had a negative attitude towards pre-diabetes. Also, according to the test of correlation between knowledge and practice in pre-diabetic elderly, a significant and positive relationship was found ($p < 0.001$, $r = 0.234$).

Table 4
Level and correlation of knowledge, attitude, and practice about pre-diabetes

Variable	Status	Range of score	Number	Percent	95% CI	Knowledge	Attitude	Practice
Knowledge	Good	14–17	218	95.5	97.46–99.92	-	r = 0.057 p = 0.404	r = 0.234 P < 0.001
	Average	10–13	1	0.5	0.08–2.54			
	Poor	Below 10	0	0.0				
Attitude	Strong positive	9–10	1	0.5	0.08–2.54	r = 0.057 p = 0.404	-	r = 0.059 p = 0.387
	Positive	7–8	0	0.0				
	Neutral	3–6	111	50.7	44.11–57.24			
	Negative	0–2	69	31.5	25.72–37.93			
	Strong negative	less than 0	38	17.3	12.91–22.92			
Practice	Very Good	Above 20	0	0.0		r = 0.234 P < 0.001	r = 0.059 p = 0.387	-
	Good	14–20	0	0.0				
	Poor	7–13	87	39.7	33.48–46.33			
	Very poor	Below 6	132	30.3	53.67–66.52			

Discussion

The results of the present study showed that the average score of knowledge about pre-diabetes was 1.72 ± 1.0 (out of 17) and more than 95% of the elderly had weak knowledge about diet, exercising and physical activity, weight control, diagnostic and screening methods. Previous studies in Asia and developing countries showed that people with diabetes have insufficient knowledge about diabetes [19–25]. In the study by Nguyen et al., (2020), it was found that the knowledge of people aged above 70 in Vietnam about diabetes was significantly lower than the knowledge of people under 60–69 years old [26]. The researchers in this study pointed out that knowledge is an important factor in preventing pre-diabetes and diabetes. Insufficient knowledge is a risk factor for pre-diabetes and preventive measures, which may lead to a high prevalence of pre-diabetes and diabetes. Prediabetes is a reversible condition that can be prevented from progressing to type 2 diabetes by increasing knowledge about correcting lifestyle [27].

In the present study, about 50% of the elderly had a negative attitude towards correcting their lifestyle in the pre-diabetes stage. Borba et al., (2019) showed that more than 85% of the Brazilian elderly had a negative attitude toward diabetes [24]. Islam et al., (2014) reported that the elderly compared to people under 35 years old had significantly negative attitudes toward diabetes [23]. Mainous et al. pointed out that people with negative attitudes towards pre-diabetes were less likely to believe that they can successfully follow the lifestyle changes necessary for preventing diabetes and agree with screening [28]. Therefore, in planning health measures regarding correcting lifestyle in the pre-diabetic elderly, mental-emotional factors should be considered by interdisciplinary experts.

Furthermore, the results of the study showed that the pre-diabetic elderly's practices of correct consumption of foods, physical activity, sleeping patterns as well as diagnostic and screening methods were not desirable. Ng et al. concluded that appropriate knowledge and attitude factors have led to good measures of disease control [29]. Knowledge can change a person's thinking process, practices, and attitudes, creating major changes in the person's behavior. A person's ability in the light of knowledge appears in the form of appropriate human practices, and in general, a person's knowledge is the fundamental basis of correct and effective practice in various issues [30].

In the present study, there was a significant and positive relationship between pre-diabetic knowledge and practice. Hyder et al., (2021) also found a positive correlation between knowledge and practice in people with newly diagnosed pre-diabetes. They argued that the more knowledgeable people are about pre-diabetes, they will follow healthier lifestyles to control it [31]. Therefore, an increase in knowledge among the elderly will improve their practices regarding correct consumption of foods, physical activity, sleeping pattern, and diagnostic and screening methods, which is in turn very important in preventing the progress of pre-diabetes and its control.

Providing healthy lifestyle strategies related to correcting the eating pattern with the aim of weight loss (5–10% of body mass) using real and sustainable dietary approaches with the support of a nutritionist, exercise, and physical activity to facilitate weight control and blood glucose reduction, as well as psychological and social support and timely screening should be considered to increase the results of changing lifestyle in pre-diabetic people [32]. Therefore, increased knowledge and health literacy about pre-diabetes, strengthening positive attitudes towards lifestyle correction through counseling programs, and empowering the pre-diabetic elderly may increase the efficiency of preventive and control programs for pre-diabetes and diabetes in countries that experience diabetes as a major public health problem.

One of the limitations of the present study was that it was performed in one of the hospitals in Tabriz and since social, economic, and cultural factors can affect the elderly's knowledge, attitude, and practice, it is suggested to conduct a cross-cultural study in different social and cultural conditions. Another limitation was the use of the self-reporting method, which can lead to boredom, and intentional and unintentional biases in the elderly, leading to an estimation lower than the reality. However, to reduce the possibility of mistakes or boredom in answering the questions and validating the collected data, it was tried to complete the questionnaires at the most appropriate time so that the accuracy of answers can increase as much as possible. According to the results of the study that the elderly's knowledge, attitude, and practice of pre-

diabetes were low, it is suggested to conduct an interventional study to promote their knowledge, attitude, and practice of pre-diabetes, and evaluate their status after the intervention.

Conclusion

The elderly had insufficient knowledge and weak practice and a negative attitude towards lifestyle correction regarding correct diet patterns, physical activity, weight control, and diagnostic and screening methods. Increase of knowledge in the elderly will improve their practices regarding correct consumption of foods, physical activity, sleeping pattern, and diagnostic and screening methods. Increased knowledge and health literacy about pre-diabetes, strengthening positive attitudes towards lifestyle correction through counseling programs, and empowering the elderly may increase the efficiency of preventive and control programs for pre-diabetes and prevent its progress to the diabetes stage.

Declarations

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Authors' contributions

VP, HN, FM designed the study. FM collected the data. HN, FM analyzed the data. HN, VP, FM involved in manuscript writing. All authors approved the manuscript.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Ethics approval and consent to participate

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of Tabriz University of Medical Sciences approved the study (IR.TBZMED.REC.1401.119). Participants were provided with information about the study aims and objectives. Written informed consent was obtained from all participants prior to taking part in the study. The survey was anonymous, and participants had the right to withdraw from the study anytime during the completion of the questionnaires. All the methods in this study were carried out in accordance with the relevant guidelines and regulations.

Consent for publication

Not applicable.

Competing interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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