Knowledge levels among elderly people with diabetes mellitus – A preliminary study

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ABSTRACT

Introduction: Education for diabetes mellitus is not only acceptable, but it is now recognized as an urgent need for modern citizens, and especially for the elderly, as the dimensions of the disease are enormous. Education is a comprehensive process of reassessing the attitude and culture of society towards the acceptance of diversity and the better treatment of sick people.

Purpose: To assess the knowledge of older adults of Open Care Centers for the elderly (KAPI) for diabetes mellitus, which is then evaluated with the help of an appropriate questionnaire. The questionnaire is likely to be used as a teaching tool, to increase the knowledge of diabetes mellitus in the elderly.

Materials and Methods: The collection of numerical data was conducted through a structured questionnaire based on Greenhalgh, Helman and Chowdhury (1998). The questionnaire was approved in Greek after translation and appropriate adaptation. The questionnaires were collected in two phases, the pilot and the primary phase. In both cases, the responses were recorded on a MS excel Computer Sheet and then transferred to the IBM SPSS v.21 database (Windows environment version) for processing.

Results: In the sample survey for the 1st record, men were 31 (36.5%), significantly less than women who were 45 (52.9%). In the second phase, the percentages of men and women appear significantly lower, as many of the participants did not record their gender. However, women are still more than men (43.5% versus 28.6%).

Conclusions: The training course, combined with the short and clearly formulated questionnaire, made it easy to correct the mistakes made by the participants during the first recording.

Keywords: Old age, knowledge, diabetes

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INTRODUCTION

Education for diabetes mellitus (DM) is not only acceptable but it is now recognized as an urgent need for modern citizens especially in countries having sea borders such as Asian/Pacific Islands and Greece as it is highlighted through global bibliography [1-5]. In fact, the elderly face numerous complications both physically and mentally, as the dimensions of the disease are enormous [6].

This education is a comprehensive process of rethinking society's attitude and culture towards the acceptance of diversity and the better treatment of sick people. Besides, education and training helps people with diabetes to understand the importance of regular glucose testing in their lives and body, self-care and proper management of the symptoms of DM [7.8] Education and training for DM can improve the quality of life of people with DM, prevent and help early onset of the disease [9,10]

Teaching a person the basic principles of nutrition, exercise and therapeutic approach to the disease is the most important step for DM Thus, through appropriate educational programs, the patient can gain knowledge about the self-monitoring of blood and urine glucose, learning to discipline his body's needs, improving the way of taking injectable insulin, taking better care of his lower limbs and taking into account the signs that his body is showing him about the progression of the disease [11,12].

Furthermore, it should not be an event that takes place at a given time, and then it stops. More specifically, education and training for DM must be continuous in order for training to be effective. It should follow the medical and technological developments to ensure a good long-term result for the patient's health and the therapeutic interventions he follows [9,10].

The first step in acquiring Knowledge about DM is to mobilize the patient himself. It should be noted that the information provided by the medical staff should be stated simply to be understood [13].

Knowledge for DM includes raising public awareness regarding the disease and the citizens' readiness to delve deeper into the conceptual approach taken by experts. (9)After all, the proper acquisition of knowledge regarding DM comes through the interaction of individuals with health care providers such as doctors and nurses [14,15,16].

The purpose of the present study is to assess the knowledge of older adults of Open Care Centers for the elderly (KAPI) for Diabetes mellitus, which is then evaluated with the help of an appropriate questionnaire. In addition, the questionnaire is likely to be used as a teaching tool to increase the Knowledge of diabetes mellitus in the elderly.

Sample size

The sample comes from elderly people who frequently visited the Open Care Centers for the elderly (KAPI) of the Municipality of Xanthi. The survey was conducted during the months of August and September 2019. From the sample of the survey, all those who did not submit the consent form to the researcher completed or they were not in the area of KAP. At the time of the researcher's arrival or they did not wish to participate, as the participation was exclusively voluntary were excluded. As a result, 85 questionnaires were distributed during the first recording. During the second recording, 77 were returned complete.

MATERIALS AND METHODS

The collection of numerical data was carried out through a structured questionnaire, based on the standard questionnaire of Greenhalgh, Helman, and Chowdhury (1998). The questionnaire was distributed in the Greek language after translation and appropriate adaptation. During the adjustment of the questions, emphasis was placed on the profile of the participants (age, educational level, etc.) [17].

The research questionnaire consists of 9 distinct sections. Section (O) includes four demographic questions (gender, education, age, existence of a person in the wider family environment with DM). Section (A) includes 11 statements of general Knowledge about DM Section (B) includes seven statements on risk factors of DM Section (C) includes eight statements related to the symptoms of DM Section (D) includes six statements related to the complications of DM Section (E) includes five formulated expressions related to healthy dietary changes for disease management. Section (F) includes five statements about things that are allowed or not for people with DM Section (G) contains five statements related to diabetes management. In all the statements above, the elderly are asked to choose between the answers "RIGHT," "WRONG" or "I DON'T KNOW".

The ninth and last section (H) includes three multiple-choice questions about the participants' attitude on the issue mentioned and two structured statements requiring answers: "YES," "NO," "I DON'T KNOW."

The final score for the first 47 questions (sections A to Z) results after a score of 1 point for each correct answer and 0 points for the wrong answers or

for the answer "I DON'T KNOW". The answers in sections (O) and (H) are not taken into account.

The reliability and internal consistency, and relevance of the questionnaire were calculated using Cronbach's alpha coefficient. For the first recording, the factor gave the value a = 0.853 (N = 47), while for the second a = 0.735 (N = 47). The rates of the statistical factor for each section are presented separately for the first and the second recording.

Data analysis

The questionnaires were collected in two phases, the pilot phase, and the main phase. In both cases, the responses were recorded on an MS excel Computer Sheet and then transferred to the IBM SPSS v.21 database (Windows environment version) for processing.

The frequency of statistically significant differences in the mean according to the participant's responses to the various categories of their demographic data was carried out using statistical tests with a significance level of 95% ($\alpha = 0.05$). Statistical tests were selected on a case-by-case basis based on the data type.

The Independent T-test was used for the nominal variables with two subcategories. The Pearson x2 test was performed for the nominal variables with two or more groups. The One-Way Analysis of Variance (ANOVA) procedure was performed for the categorical variables with three or more categories. Finally, the Kruskal-Wallis method was used to test statistically significant differences in the score of the participants of 4 different age groups.

Furthermore, comparisons between 1st and second entries were grouped by calculating the mean of each question, both because the participants in the 2nd entry were fewer (8 people did not return the questionnaire completed) and the creation of pairs between the first and second measurement was impossible while maintaining the absolute anonymity of the participants.

Therefore, the average score of the correct answers for each question was calculated separately and was named En for the 1st recording and E'n for the 2nd recording, with n fluctuating between 1 and 47, i.e. how many data were measured in the calculation of the total score obtained. In this way, the conditions required for the comparison of dependent samples were ensured.

Initially, the normality of the En and En'variables was checked, and the difference $\Delta E = En=E'n$ was calculated. Then, the two recordings' mean score of the 2 recordings was compared through the T-test paired Samples to ensure statistically significant differences between them.

Data collection procedure

Initially, the unanswered questionnaires were given to the participants who were in the Open Care Centers for the elderly (KAPI) of the Municipality of Xanthi. Participants were given 30 minutes to complete them. As soon as everyone had completed the questionnaire, the respondent returned the questionnaire to the researcher. The researcher was not involved in completing the questionnaires. After the completion of the questionnaires by the 85 participants, an educational lesson was followed by the researcher for diabetes mellitus.

After four weeks, the researcher returned to Open Care Centers for the elderly (KAPI) of the Municipality of Xanthi and requested that the same questionnaire be re-completed. The questionnaires were filled and returned to the researcher by 77 people. The survey was conducted in August 2019.
The time required to complete the questionnaire did not exceed 30 minutes.

The lesson that followed after the first distribution of the questionnaires lasted about 30 minutes. The time required for an older adult to participate in the survey was meticulously reviewed so as not to tire the participants and discourage them from volunteering for the research. Consequently, despite the fact that the research was carried out in 2 phases, none of the cases did it harm the daily lives of the people who frequently visit Open Care Centers for the elderly (KAPI) of the Municipality Xanthi or tired them mentally.

Ethics and deontological issues

The research was carried out very carefully and followed all the rules of ethics and deontological issues. Before conducting the survey, the researcher had a telephone conversation with the Municipality of Xanthi and the management department of Open Care Centers for the elderly (KAPI) of the Municipality of Xanthi to give her oral permission. Then, the participants signed a consent form for participation in the research when they were given the questionnaires. Aside from this, the confidentiality of the participant's personal data was kept confidential as the questionnaires were filled in anonymously.

Clear instructions were given for the completion of the questionnaires, while the statements included in them were clearly stated so that they could not be misinterpreted. Finally, participants were given the right to withdraw from the research at any stage they might want to. The research did not involve

exposure of participants to risks or suffering (physical or mental).

RESULTS

In the research sample (Table 1, Figure 1), for the 1st record, men were 31 (36.5%) significantly less than women who were 45 (52.9%) [Missing: 9, Valid: 76].

In the second recording, the percentages of men and women appear significantly lower, as many of the participants did not record their gender. However, women are still more than men (43.5% versus 28.6%).

Table 1. Demographic characteristics of the sample

		1st Register		2st Register	
		CROWN (N)	**RATE %**	**CROW (N)**	**RATE %**
SEX	MALE	31	36,5	22	28,6
	FEMALE	45	52,9	37	43,5
	Missing	9	10,6	18	27,9
	TOTAL PARTICIPANTS	*85*	*100,0*	*77*	*100,0*
EDUCATION	PRIMARY SCHOOL	39	45,9	37	48,1
	SECONDARY SCHOOL	34	40,0	28	36,4
	HIGH SCHOOL	12	14,1	12	15,5
	TOTAL PARTICIPANTS	*85*	*100,0*	*77*	*100,0*
AGE	65 AGE	9	10,6	7	9,1
	70 AGE	28	32,9	15	19,5
	72 AGE	25	29,4	16	20,8
	80 AGE	12	14,1	12	15,6
	Missing	11	13,0	27	35,0
	TOTAL PARTICIPANTS	*85*	*100,0*	*77*	*100,0*
DIABETIC IN THE ENVIRONMENT	DO NOT KNOW	10	11,8	8	10,4
	YES	28	32,9	18	23,4
	NO	43	50,6	44	57,1
	Missing	4	4,7	7	9,1
	TOTAL PARTICIPANTS	*85*	*100,0*	*77*	*100,0*

Most participants had completed primary school (N = 39, 45.9%). Fewer had completed junior high school (N = 39, 40.0%) and much fewer had completed senior high school (N = 12, 14.1%). During the second recording, the distribution did not change. Specifically, 37 (48.1%) had completed primary school, 28 (36.4%) junior high school and 12 (15.5%) senior high school.

The age of the participants ranges from 65 to 80 years. More specifically, in the first recording, 9 (10.6%) were 65 years old, 28 (32.9%) were 70 years old, 25 (24.9%) were 72 years old, and 12 (14.1%) 80 years old [Missing: 11, Valid: 74]. As shown (Graph 3), 70 and 72 represent the most significant part of the sample. It is noteworthy that the incomplete answers reached 35%; that is, the participants neglected to fill in the specific demographic information.

11.8% of the participants (N = 10) did not know if there was a diabetic person in their extended family. In addition, 32.9% (N = 28) answered that they have a person and 50.6% (N = 43) who do not have a person with DM in their wider family environment [Missing: 4, Valid: 81]. Thus, this question did not reverse the proportion of answers given between the first and second recordings. In contrast, the percentage of incomplete data is higher in the second recording but remains significantly lower. In any case, the majority of participants do not have a person in their wider environment (relatives, friends, acquaintances).

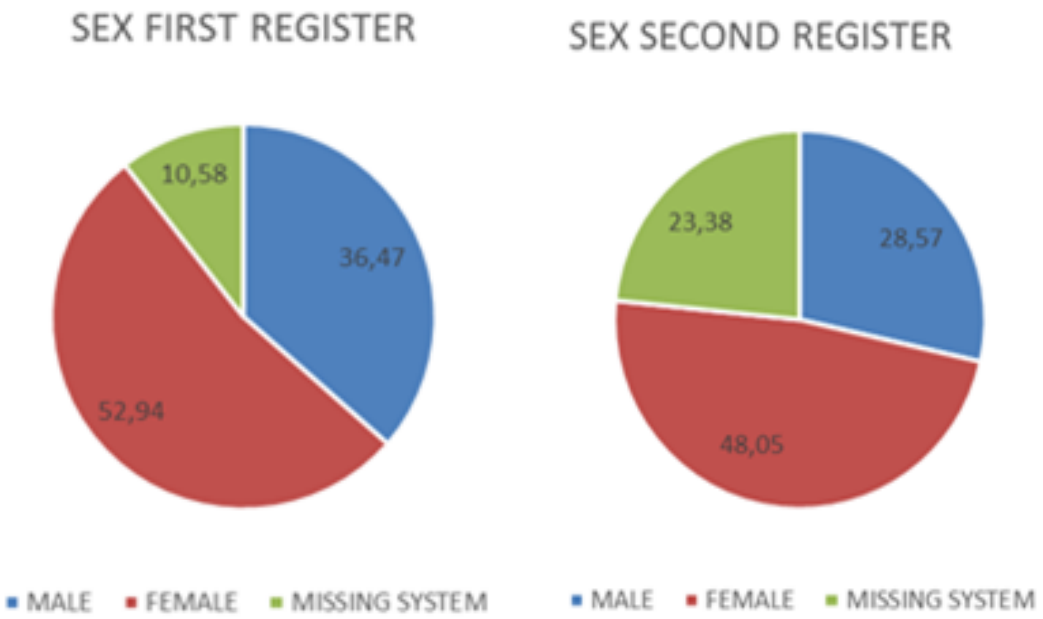

Figure 1. The composition of the sample by sex

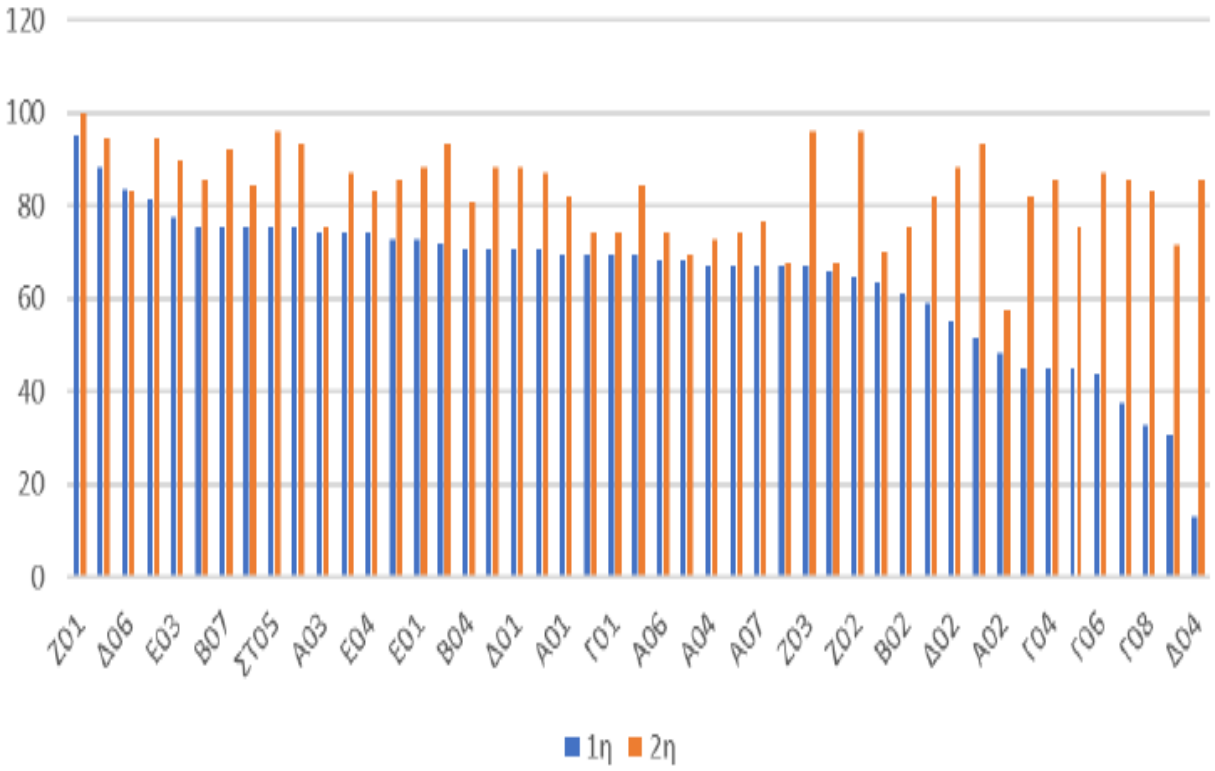

Figure 2. Distribution of total scores in the 1st and 2nd recordings. Overall score per question (1st and 2nd recording)

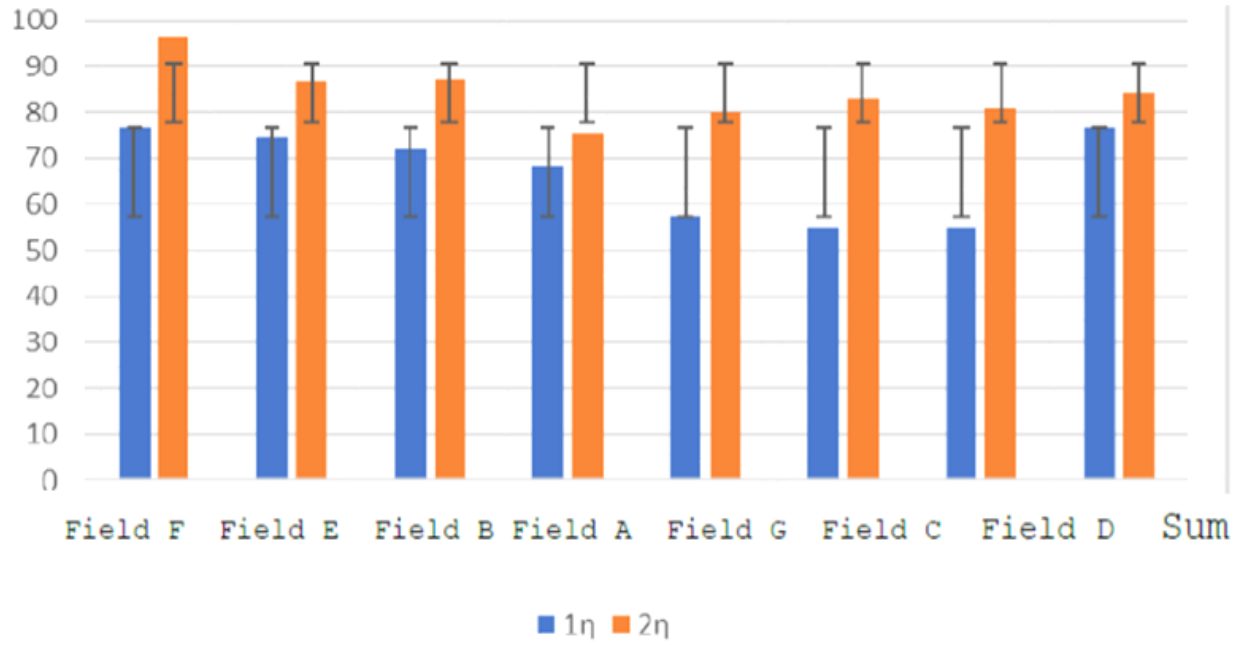

Figure 3. The average score of % of all questions in each field. The average score of 1st and 2nd recording

In the first field of the questionnaire, the general knowledge of the participant about DM includes 11 questions that are evaluated as correct, wrong, or ignorant of the answer.

For the first recording, the average percentage of correct answers in field A for the 1st recording is 68.5%, the average score of the score is (mean) = 7.3, the 95% CI: (6.3-8.2), Std.D = 4.6, the median value (median) = 10, min-max = 0-11 successful answers.

In the 2nd recording, the average percentage of correct answers is 75.2%, the average score of the score is (mean) = 7.2 and 95% CI: (6.3-8.1), Std.D = 4, 3, the median value (median) = 9, min-max = 0-11 successful answers.

The percentage of the score of the correct answers of the women is higher than that of the men, in all the statements of the first field (A). This difference is also present in the second recording. Moreover, this difference is statistically significant, as evidenced by the Independent T-test between the mean values of the percentage score of the correct answers per gender question.

Similarly, there is a statistically significant difference between the sexes through the Pearsons x2 test in the answers per participant and question score.

In the second field of the questionnaire, the participant's knowledge about the risk factors for DM is searched. It includes seven statements, where the participant answers correctly, incorrectly, or I do not know.

For the 1st recording, the average percentage of correct answers is 72%, the average score is (mean) = 5 and 95% CI: (4.5-5.5), S.D. = 2.2 and the median value = 6, min-max = 0-7 successful answers.

In the 2nd recording, the average percentage of correct answers is 87.2%, the average score of the score is (mean) = 6, the 95% CI: (5.6-6.3), S.D. = 1.4 and the median value (median) = 6, min-max = 1-7 successful answers.

The percentage of the score of the women's correct answers is much higher than that of the men in all the questions of the field (B) during the first recording.

As for the 2nd recording, the result is similar, with the only exception of statement B2, where the percentage of the score of the correct answers of the men is slightly higher than that of the women. However, the resulting differences are not considered statistically significant after completing the Independent T-test between the mean values of the scores of the correct answers per gender question.

Similarly, there is no statistically significant difference between the sexes after the Pearson's x2 test is applied to the answers per person and question score.

In the third field of the questionnaire, the respondent's knowledge is investigated regarding the recognition of the symptoms of DM. It includes eight statements where three answers are available: right, wrong, or I don't know.

In the 1st recording, the average percentage of correct answers is 54.6%, the average score of the score is (mean) = 4.3 and 95% CI: (4 - 4,6), Std.D = 1.8 , while the median = 5, min-max = 2-6 successful answers.

In the 2nd record, the average score is 82.9%, the average score is (mean) = 6.5 and 95% CI: (6.3-6.8), Std.D = 1 , 2 and the median = 6, min-max = 4-8.

The percentage of scores of women's correct answers is generally higher than that of men. An exception is statement C01, where during the first recording, the men collected a higher score of correct answers, statement C05 during the first and second recording, and statement C08 during the second recording. This difference was considered statistically significant for the statements C3, C4, C5, C6 of the first recording and the C7 statement of the second recording after an Independent T-test between the mean values of the scores of the correct answers per question of the two sexes.

There is also a statistically significant difference between the sexes with the application of the Pearson's x2 test in the score of the answers.

In the fourth field of the questionnaire, a relevant investigation of the participants' knowledge about the DM took place. This field consisted of 6 statements where the answer options were right, wrong, or I don't know.

For the 1st recording, the average score is 54.6%, the average score is (mean) = 3.4, 95% CI: 3.1-3.6, Std.D = 1, 2 and the median value (median) = 4, min-max = 0-5 successful answers. In the 2nd recording, the average score is 80.9%, the average score is (mean) = 5.2, 95% CI: 4.9-5.4, Std.D = 1.1 and the median value = 6, min-max = 1-6 successful answers.

It turns out that except for statement D06, the percentages of correct answers increased during the second recording. Also, apart from the D02 statement, where during the first recording, the men get a higher percentage in the score of the correct answers, the women get a better score.

During the first recording, statistically significant differences in the averages of the 2 sexes emerged in the statements D02 and D04 after an Independent T-test between the mean values of the scores of the correct answers per question of the two sexes. For the second recording, no such statistically significant differences arise. Therefore, no significant differences were found between sex.

In the fifth field of the questionnaire, the respondent's knowledge about the treatment and management of SD is searched. Field (E) includes five formulated expressions, and the participant states whether it is correct, incorrect, or not.

For the 1st recording, the average score is 74.7%, the average score is (mean) = 3.9 the 95% CI: (3.5-4.1), Std.D = 1 , 5 the median = 5 and min-max = 0-5 successful answers.

In the 2nd recording, the average score is 87%, the average score is (mean) = 4.5, 95% CI: (4.3-4.7), Std.D = 0.9 the median = 5 and the min-max = 1-5 successful answers.

Except for statement D01 of the first recording, women have a higher percentage of correct answers. Also, in all the statements, the percentage of correct answers of the second recording exceeded the percentage of the first one.

During the second recording, statistically significant differences in the averages of the two sexes emerged in the statement D03 after an Independent T-test between the mean values of the scores of the correct answers per question of the two sexes.

As for the differences between the Pearsons $\chi 2$ test in the score of the answers between the sexes were not considered statistically significant.

In the sixth field of the questionnaire, the respondent's knowledge about things that diabetics are allowed or are not allowed to do is searched. It includes five statements, and the participant states whether he agrees, disagrees, or does not know.

For the 1st recording, the average score is 57.4%, the average score is (mean) = 6.9 and 95% CI: (6.3-7.5), S.D. = 2.6 and the median value (median) = 8, min-max = 1 - 10 successful answers.

In the 2nd recording, the average score is 80.1%, the average score is (mean) = 4.1 and 95% CI: (3.8-4.3) Std.D = 1, 1 the median value = 4, and min-max = 0-5 successful answers.

The percentage of scores of women's correct answers is higher than that of men. Also, the score of the correct answers is higher in the second than in the first recording.

During the first recording, there are no statistically significant differences from the Independent T-test between the mean values of the score of the correct answers per question of the two sexes, but statistically significant differences in the statements F02 and F03 of the two sexes with the application of the test Pearsons $\chi 2$ in the score of the answers.

In the second recording, there is a statistically significant difference in the F02 statement from the Independent T-test between the mean values of the scores of the correct answers per question of the two sexes.

However, there is no statistically significant difference between the sexes applying the Pearson's x2 test in the answer score.

In the seventh field of the questionnaire, the participant's knowledge is investigated regarding the control that a patient with DM must perform to regulate the difficulties that arise from the disease. It includes five statements where the participant answers correctly, incorrectly, or I do not know.

For the 1st recording, the average score is 76.8%, the average score is (mean) = 10.7 and 95% CI: (10 - 11), S.D. = 3.2 median = 11 and min-max = 2-11 successful answers.

In the 2nd recording, the average score is 96.1%, the average score is (mean) = 4.6, 95% CI: (4.5 - 4.8), Std.D = 0 , 7 the median = 5 and the min-max = 3-5 successful answers.

The percentage of the score of the correct answers of the women is higher than that of the men in all the statements except for the statement Z04. Also, the percentages of the total correct answers are higher in the second recording compared to the first one. The difference in the average score of correct answers is considered statistically significant between men and women in the Z03 statement of the 1st recording after an Independent T-test. There is also a statistically significant difference between the sexes with the application of the Pearson's x2 test in the score of the responses of the Z05 statement of the 2nd record.

DISCUSSION

The educational level of the participants was quite low, as they were graduates of primary, junior high school, or senior high school. According to the results of research, the better the educational level of the individuals, the better their knowledge about DM [18-24]. The study results did not lead to statistically significant differences in participants' responses to the level of education they have completed. Thus, any information they know about insulin is likely to arise from their conversation with a doctor or nursing staff, from the media, or their family / friendly environment [5,25]. It has been argued that the presence of diabetics in a person's environment enhances their level of knowledge about the disease [24,26]. Of course, only 32.9% of the participants had a person with DM in the broader family environment, minimizing the possibility that their knowledge came from them. In contrast, this fact did not lead to statistically significant differences.

It has also been found that age is related to a person's level of knowledge about DM. Polymeneas et al. (2016), Fenwick et al. (2014), and Rafique et al. (2006) argue that younger ages have better knowledge than older ones [18,21,24,27,28]. However, in the present study, no statistically significant differences were found in the participants' responses to their four age groups. The present differentiation of the results may be due to the differentiation of the sample's composition of the above research and the rest of their demographic information [18,21,24].

The gender factor has been a point of contention within the scientific community and the level of knowledge of men and women about DM Specifically, Poulimeneas et al. (2016) argue that gender does not create statistically significant differences, Murata et al. (2003), Moodley et al. (2007) and Saleh et al. (2012) argue that women are more informed than men. In contrast, Mufunda et al. (2012), and Rafique et al. (2006) argue the opposite, namely that men are more informed. The findings of this study agree with Murata et al. (2003), Moodley et al. (2007), and Saleh et al. (2012), as women were significantly more informed than men even though the difference in the mean of their responses was not considered statistically significant [18,24,29-32].

According to the results of the first recording, older people know that people with diabetes need to measure their blood glucose frequently (G01, 95.3%) and have to be careful with their feet care (E05, 88.2%). Additionally, they know that one of the complications of DM is the induction of high blood pressure (D06, 83.1%), the average value of blood sugar for three months cannot be ascertained by any examination (Z05, 81.2%) and how people with diabetes should pay attention to their weight (E03, 77.6%). Furthermore, participants were well aware of four risk factors: a) pregnancy (B07, 75.3%), b) lack of exercise (B06, 74.1%), c) obesity (B03, 72.9%), and d) age over 45 years (B02, 61.2%).

Taking the data above into account, the elderly seem to have a good level of Knowledge regarding Diabetes Mellitus. However, in no case can this level of knowledge be considered sufficient as the symptoms of DM do not appear to be known to the participants. More specifically, several participants were aware of the symptom of fatigue and weakness (C07, 51.8%), fewer knew about the symptom of insomnia (C05, 44.7%), frequent headaches (C04, 44.7%), weight loss (C03, 44.7%) and the slow healing of cuts or wounds (C06, 43.5%). Only a few participants knew the symptom of blurred vision (C08, 32.9%), while ignorance was observed in the complications caused by DM. The most typical example is that cirrhosis of the liver is not one of them (D04, 12.9%) [Graph 2].

The teaching intervention managed to increase the level of knowledge of the elderly in a short period of time. Thus, distorted knowledge or ignorance has been transformed into knowledge which is translated as the best score of the correct answers in the questionnaire. Interventional programs such as those

implemented by Ackermann et al. (2008) and Kirkman et al. (2002) chose to "train" participants and evaluate their knowledge based on structured questionnaires. In any case, the results of the interventions were the desired ones as they managed with the counseling or the training to increase the levels of knowledge for the SD [33,34].

Also, it is worth mentioning that in most cases, the standard deviations decreased, and the score increased in each of the individual fields of the questionnaire and its entirety. The largest increase is observed in the fields where a total score of 50% - 60% was collected during the first recording [Figure 3].

LIMITATIONS OF RESEARCH

The research sample represents only the elderly population of Greece and not the general population. These individuals have completed up to the level of secondary education while they are several years away from the field of education. Therefore, it makes sense to ignore basic knowledge about the hormone insulin taught in school or acquired through higher education and the personal search for information from various sources.

Finally, the sample is relatively small and comes only from a geographical area of Greece. This event may have affected the results. In short, a larger sample of seniors with different places of residence was likely to lead to conclusions that differed from those in this study. However, this would make the process of completing the intervention very difficult.

CONCLUSIONS

The contribution of the questionnaire to the increase of knowledge of the elderly is great. The increase in score indicates the success of the intervention and the research tool used. The training course, combined with the short and formulated questionnaire, made it easy to correct the mistakes made by the participants during the first recording. Improving knowledge from the first to the second recording cannot be disputed. This score improvement is due to participants' interest in learning about the prevention of DM disease, recognizing its symptoms, and its treatment. In addition, the short-term training course did not make the intervention process time-consuming to keep the participants' interest alive.

Finally, the cost of this intervention is small, as the money spent was only on printing the questionnaires and not regarding the use of some equipment or the invitation of experts who may have incurred a financial burden.

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Conflicts of interest

The authors declare that they have no conflict of interest.

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