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RESEARCH ARTICLE

ADAPTATION AND VALIDATION OF DIABETES KNOWLEDGE QUESTIONNAIRE (DKQ- 24 ITEM) WITHIN GREEK POPULATION

Maria Chrysi[1], Dennis Vaidakis[2], Maria Gamvrouli[3], Maria Kapritsou[4]

1. RN, MSc, PhD(c), Hellenic Anticancer Oncological Hospital ''Saint Savvas'' Athens, Greece.
2. MD, MSc, PhD, Gynecologist and Obstetrician, Synesio Medical Center, Larnaca, Cyprus
3. RN, BSc, MSICP, PgDip(ED), General Hospital of Nikaia- Piraeus "Agios Panteleimon", Nikaia, Greece
4. RN, BSN, MSc, MSHCM, PhD, Postdoc, Hellenic Anticancer Oncological Hospital ''Saint Savvas'' Athens, Greece

Abstract

Background: The Michigan Diabetes Research and Training Centre develop, during the 80s, the Diabetes Knowledge Questionnaire in order to determine the level of diabetes knowledge. Providing insights both to researchers and health professionals as an aid to intervening and improving diabetes self-management.

Aim: The aim of this study was to translate, adapt and validate the Diabetes Knowledge Questionnaire (DKQ) to Greek Language.

Method and Material: The 24-item DKQ was administrated to a preselected sample of 40 patients with type 2 diabetes. The validation study was conducted from February to March 2020, in the diabetes clinic of a major Greek general hospital. The questionnaire was transcribed in Greek using "forward–backward" translation by two independent translators. Individuals' demographic data were recorded. The data is expressed as mean ± SD, in significant level 0.05.

Results: DKQ Cronbach's alpha had an adequate value. The intraclass correlation coefficient for average measures was significant, based on the 95% confident interval. Gender, profession and educational level did not correlate with the total score of the DKQ, individual's age though was correlated.

Conclusions: The Greek version of the DKQ is a reliable and credible instrument for assessing the level of diabetes knowledge in Greece.

Keywords: Diabetes mellitus; diabetes knowledge questionnaire; validation and DKQ- 24 item; translation and DKQ- 24 item; adaptation and DKQ- 24 item.

Corresponding Author: Kapritsou Maria RN, MSc, PhD, PostDoc, Chair of the Hellenic Perianaesthesia Nursing Organization, Chief Nurse of Anesthesiology Department, Hellenic Anticancer Oncological Hospital "Saint Savvas'' Athens, Greece. Sapfous 2 Kallithea, Athens, Greece, zip-code 17676, Tel. 0306976523789, Email: mariakaprit@gmail.com

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INTRODUCTION

Diabetes Mellitus (DM) is the most common chronic disease with almost 422 million people suffering worldwide. World Health Organization estimates that by the end of 2025 the number of patents with DM will be increased by 54.5%, while in Greece this percentage will reach 9.7% of the total of Greek population.[1] Estimates from International Diabetes Federation have shown that by 2040 the number of people with DM globally will reach 642 million.[2]

Changes in lifestyle, such as a healthy diet, weight loss, physical exercise, and smoking cessation can lead to a good glycemic control.[1] A study by Apostolakis et al. has indicated that women with DM had better glycemic control, as a consequence of a healthier diet or a combination of diet and medication therapy.[3]

The American Diabetes Association has ascertained that a series of pathological conditions, such as cardiovascular diseases, foot ulcers, blindness, renal failure and infections may appears in patients with diabetes (American Diabetes Association, 2013).[4] Personal values, belief and attitudes towards the disease, such as, physical and psychological response to therapy and blood glucose self-monitoring are playing a crucial role in DM management and could decrease the overall morbidity of the disease.[5]

Education, understanding and enhancing the knowledge are essential components of self-care for adults with DM.[4] Evaluation of this knowledge is essential for optimum treatment. The Diabetes Knowledge Questionnaire contributes in the evaluation of individual's knowledge and self-care management of DM. We decided to adapt and validate in Greek the Diabetes Knowledge Questionnaire (DKQ) developed for the Starr County Diabetes Education Study, so as to create an instrument for the Greek diabetic population. This questionnaire will give the opportunity to individuals to evaluate and to improve their knowledge towards DM, as well as the healthcare professionals to intervene where it will be necessary. In order to assess the knowledge of diabetes this tool was initially designed with 60 items and was later reduced to 24 items.[6]The later version focused on the evaluation of item performance at baseline and after 3 months. It was originally written and published in English and since then it has been translated and validated in many languages. In the Spanish translation, the aim was the development of a future questionnaire which would test individuals' health and culturally beliefs and cognitive adjustment.[7]

METHODS

Prospective study design was adopted in order to collect data. A target convenience sample of 40 patients with type 2 DM was estimated. This validation study was conducted from February to March of 2020 at a major hospital of Attica, Greece. The protocol study was approved by the Scientific Committee of the hospital (ID: 1295/31-01-2019), according to the Helsinki Declaration. Permission of usage and translation of the original questionnaire was obtained.

The questionnaire was translated to Greek using a standardized forward and backward translation procedure conducted by two independent translators. The respondents' reliability was assessed by completing the test once and retested two weeks later. Age, gender, educational level, place of residence and profession are also recorded. The total score of the questionnaire sums up the scores of all the correct items of each participant. Correct answers score 1 point whilst incorrect 0 points. Higher scores demonstrate greater diabetes knowledge.

Statistical analysis was carried out by SPSS 21 (IMB SPSS Software, Chicago, Illinois). Test/retest reliability (via interclass correlation coefficients-ICC) of DKQ- 24 was calculated. ICC values> 0.75 were considered as acceptable herein(8). It analyzed the parameters described above after conducting Shapiro-Wilk test of Normality. Comparisons were made using, Fisher Exact test, the chi-square test and Spearman rho correlation. The data are expressed as mean(SD), in significant level (P-value) 0.05.

RESULTS

The socio- demographic data of the participants are presented in Table 1. The mean(SD) of DKQ total score was 12.55(2.97), indicating a deficit in diabetes knowledge in Greek population.

The Cronbach's alpha index was calculated to 0.845, whose value was adequate and can be characterized as "good". Tables 2 and

3 present the results of DKQ distribution of each item score and the intraclass correlation coefficients (ICC), respectively.

The results of ICC showed that the 95% Confidence Interval = 0.74-0.89 of average measures ICC was 0.83, where the level of reliability could be regarded as "good' to "excellent" ($p<0.001$). The Wilcoxon signed ranks demonstrated that there was not a significant statistical difference ($z=0$, $p=1$) for DKQ-24 reliability test - retest in all items for both measurements.

The Spearman rho correlation has shown that age correlated with the DKQ total scores ($p=0.031$). (Table 4) Applying Univariate Analysis, group age 41-50 showed to correlate with the DKQ total scores (mean= 14.9, $B=4.56$, $p=0.015$), indicating a better diabetes knowledge in this age group, in comparison with the other age groups ($p>0.05$).

DISCUSSION

This research consists of 40 individuals with Type II Diabetes Mellitus and demonstrates that the Greek version of DKQ-24 item is a reliable and valid tool to the Greek population. The DKQ's Cronbach' alpha (or α) index was 0.845 and the ICC 0.83. These results are in consistency with other studies adapting the questionnaire in different languages. To be specific, Ahmad et al., 2010 translated the DKQ for the indigenous population in Malaysia, where Cronbach' alpha was 0.806. Researchers administrated the questionnaire to two groups, depending in their residence (rural and urban area) and Cronbach' alpha was acceptable had valid values(9). The Greek study is in coherence with the study contacted by Menino et al. who validated the questionnaire in Portuguese and noted high internal consistency index (10), as well as the study of Lopez - Lopez et al., which was carried out in Mexico and it was 0.78.[11]

In the present study the Cronbach' alpha was 0.845 and the internal consistency (IC) was characterized as "good". Results which are similar to the study of Dawson et al., 2017, where the IC was 0.75, and DKQ- 24 item was compared with two other scales; Michigan Brief Diabetes Knowledge Test (DKT), and the Kaiser DISTANCE Survey. Dawson et al. showed that high scores of DKQ was correlated with the better glucose control, while the correlation among the 3 scales was mediocre, being interpreted as they didn't exam the same aspects of DM.[12]

Likewise, our results noted that the mean score of DKQ- 24 item was 12.55, which demonstrated a lack in diabetes knowledge. Results which are in accordance with the study of Formosa et al., 2016, in Malta. The mean score was 14.4, showing that there is a gap in the diabetes self-management. Formosa et al noted that the educational level was positively correlated with the diabetes knowledge ($r = 0.374$, $p = 0.007$), in contrast to the present study ($p=0.147$).[13] These results show that health care professionals should promote education and guidance to patients with diabetes.

In 2019, Oba et al. administered the DKQ in a larger sample ($N=1019$) in order to validated it in Japanese. Oba mentioned that individuals aged 60 years old or older without previous diabetes diagnosis had better self-management due to better diabetes knowledge. On the contrary, Jawad Hashim et al., 2016 pointed out a negative correlation between age and total score of DKQ ($r= 0.196$, $p=0.017$).[14] In the present study, the age group 41-50 had better diabetes knowledge ($p=0.015$).[15], indicating that, for Greece, the educational programs should be mainly focused on the rest age groups, in order to achieve better self-management of diabetes.

This study shows that educational level, profession, place of residence or gender are not correlated with DKQ scale. These results are in accordance with the study by Syed et al., 2019. Syed et al. showing that gender and educational level did not have a significant correlation but the place of residence was correlated with the score of DKQ ($p=0.05$).[16]

The interpretation of this study's results is of paramount importance as health care professionals can evaluate the degree of each individual's diabetes knowledge, thus guide them to a better diabetes self-management. We shouldn't fail to mention though the limitations of this study. The collected data came from a single-center hospital. Also, the convenience sampling, as well as, the results are exclusively based on self-report data, which might be biased by several methodological factors.

CONCLUSIONS

Due to these reasons it is utterly crucial for adults suffering from DM to fully understand their condition and enhance their diabetes knowledge in order to acquire a suitable and advantageous self-care. The findings of this study illustrate that the Greek version of DKQ-24 item is a valid and reliable tool for assessing the diabetes knowledge within the Greek population.

Implications/Relevance for Diabetes Care

- DKQ-24 item was validated in Greek language
- Assess the knowledge of Greek patients with diabetes
- Improve patients' knowledge for a more effective diabetes management

Conflict of interest

None.

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ANNEX

TABLE 1. Socio- Demographic Data of Participants.

N (%)	**N=40**
Gender	
Male	18(41.9)
Female	22(51.2)
Age (yrs)	
18-30	6(15)
31-40	16(40)
41-50	10(25)
51-60	5(12,5)
61-70	3(7.5)
Educational level	
Junior high school	2(5)
High school	13(32.5)
University	15(37.5)
MSc/ PhD	10(25)
Profession	
Unemployment	8(20)
Employee	29(72.5)
Retired	3(7.5)
Place of Residence	
Urban	40(100)

TABLE 2. Distribution of Item scores.

Item No	Mean(SD)	Correct answer(%)	Item No	Mean(SD)	Correct answer(%)
1	0.55(0.5)	55	**13**	0.7(0.46)	70
2	0.7(0.46)	70	**14**	0.43(0.5)	42.5
3	0.6(0.49)	60	**15**	0.48(0.5)	47.5
4	0.1(0.3)	10	**16**	0.5(0.5)	50
5	1(0.0)	100	**17**	0.48(0.5)	47.5
6	0.48(0.5)	47.5	**18**	0.9(0.37)	87.5
7	0.5(0.5)	50	**19**	0.15(0.36)	15
8	1(0.0)	100	**20**	0.55(0.5)	55
9	0.65(0.48)	65	**21**	0(0.0)	0
10	0.55(0.5)	55	**22**	0(0.0)	0
11	1(0.0)	100	**23**	0.4(0.49)	40
12	0.5(0.5)	50	**24**	0.32(0.47)	32.5

TABLE 3. DKQ- 24's Intraclass Correlation

	Intraclass correlation	**95% Confidence Interval**		**p-value**
		Lower Bound	**Upper Bound**	
Single Measures	0.89	0.055	0.149	<0.001
Average Measures	0.83	0.746	0.897	<0.001

TABLE 4. Socio- Demographic Data and DKQ-24 Total Score Correlation

	Mean(SD)	**p-value**
Gender		0.761
Male	12.39(2.76)	
Female	12.68(3.19)	
Age (yrs)		0.031
18-30	12(1.78)	
31-40	12.25(2.93)	
41-50	14.9(2.76)	
51-60	10.8(1.64)	
61-70	10.33(4.04)	
Educational level		0.147
Junior high school	13(1.41)	
High school	11(3.29)	
University	13.47(2.64)	
MSc/ PhD	13.1(2.76)	
Profession		0.938
Unemployment	12.88(3.75)	
Employee	12.45(2.94)	
Retired	12.67(1.15)	