KIDMED Score Calculator: A computer program that evaluates adherence to the Mediterranean Diet for children and youth

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ABSTRACT

Aim: Development of a computer program that can easily calculate KIDMED score. **Methods:** KIDMED is an index that estimates the adherence level to Mediterranean diet in children and youth. In this work we present a computer program that can easily calculate this diet index using a Food Frequency Questionnaire rationale. **Results:** A software program was developed for the calculation of the KIDMED score using Microsoft Visual Studio 2019 (Version 16.4.3) in Microsoft Visual Basic 16.0. **Conclusions:** This user-friendly software might be a useful tool for research purposes but also for the prevention of diseases related with dietary habits during childhood. ***Hellenic J Nutr Diet 2023, 14(1):27-32***

Key words: *Software, Mediterranean Diet, Childhood Obesity, Healthy Eating, Nutrition Index*

ΠΕΡΙΛΗΨΗ

KIDMED Score Calculator: Ένα πρόγραμμα υπολογιστή που αξιολογεί τη συμμόρφωση στη Μεσογειακή Διατροφή για παιδιά και νέους

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Σκοπός: Ανάπτυξη ενός προγράμματος υπολογιστή που μπορεί εύκολα να υπολογίσει τη βαθμολογία KIDMED. **Μεθοδολογία:** Το KIDMED είναι ένας δείκτης που εκτιμά το επίπεδο προσκόλλησης στη Μεσογειακή Διατροφή σε παιδιά και νέους. Σε αυτήν την εργασία παρουσιάζουμε ένα πρόγραμμα για υπολογιστή που μπορεί εύκολα να υπολογίσει αυτόν τον δείκτη διατροφής επί τη βάσει ερωτηματολογίου συχνότητας κατανάλωσης τροφίμων. **Αποτελέσματα:** Ένα πρόγραμμα λογισμικού αναπτύχθηκε για τον υπολογισμό της βαθμολογίας KIDMED χρησιμοποιώντας το Microsoft Visual Studio 2019 (Έκδοση 16.4.3) στη Microsoft Visual Basic 16.0. **Συμπεράσματα:** Αυτό το φιλικό προς το χρήστη λογισμικό μπορεί να είναι ένα χρήσιμο εργαλείο για ερευνητικούς σκοπούς αλλά και για την πρόληψη ασθενειών που σχετίζονται με διατροφικές συνήθειες κατά την παιδική ηλικία. ***Hellenic J Nutr Diet 2023, 14(1):27-32***

Λέξεις κλειδιά: *Λογισμικό, Μεσογειακή Διατροφή, Παιδική Παχυσαρκία, Υγιεινή Διατροφή, Δείκτης Διατροφής*

Introduction

A healthy diet during childhood is fundamental for optimum growth and development during early years of life and may prevent diseases related with dietary habits during childhood[1,2] as well as childhood overweight and obesity, associated with a range of psychosocial and medical complications[1-3]. Therefore, monitoring dietary intake among children is essential for identifying deviations between actual and recommended intake and developing dietary interventions aiming to improve children's nutritional and health status[4].

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One way to study overall diet is by diet quality indices (DQI's). These scores provide nutritional information based on a numeric scale. The development and application of these tools evolves rapidly, along with the exploration of the relationship between these indices and disease[5]. Dietary scores could be useful tools to evaluate the level of adherence to well-studied dietary patterns known for their beneficial role regarding health outcomes such as Mediterranean Diet[6,7].

The Mediterranean Diet is a healthy plant-based dietary pattern, in which fruits, vegetables, olive oil, whole grains, cereals, legumes/nuts are consumed in high amount and frequency, consumption of fish, poultry, eggs and dairy products is moderate while red meat, processed meats, sugar and fat rich foods are allowed only in small amounts[8,9].

The Mediterranean Diet is also beneficial to children, as an inverse association between Mediterranean diet pattern and childhood overweight and obesity as well as diseases such asthma and metabolic syndrome has been described[10-16]. A well-known dietary index in order to assess adherence to a Mediterranean-like dietary pattern in children is the Mediterranean Diet Quality Index (KIDMED)[17].

Primary data source of DQI's are individual dietary data collection tools[18]. A widely used data collection tool in nutritional epidemiology studies are food frequency questionnaires (FFQ's). The FFQ's widespread use is due to their advantage of being a low cost method of obtaining data from a large number of participants with easy completion, suitable to estimate dietary intake over a long period of time[19]. However, a typical FFQ does not provide prompt information on adherence to healthy dietary patterns such as the Mediterranean.

The aim of the present work was to develop a computer program that could rapidly calculate the KIDMED score by using an FFQ rationale.

Methods

The work from Serra-Majem et al[20,21] proposed a diet score that evaluates children's adherence to the Mediterranean diet pattern using a 16-point scale. Dietary habits denoting high adherence scored with +1; dietary habits indicating deviation from the pattern scored with –1 and dietary habits with neutral association scored with 0. Based on the score which ranges from -4 to 12, the adherence to the Mediterranean diet is classified in three levels: ≤3, very low-quality diet; 4-7, diet which needs improvement to conform Mediterranean patterns; ≥8, optimal Mediterranean Diet.

Since KIDMED test uses a 16-item questionnaire to evaluate the adherence to the Mediterranean Diet, in this study 11 main food groups that correspond to KIDMED test were used: fruits, vegetables, fish, legumes/pulses, nuts, dairy, starchy foods, fats/oils, baked goods/pastries, sweets and fast-food . Following an FFQ structure, each main food group further categorized into multiple indicative food items, commonly found in various FFQ's.

In the present program an FFQ rationale was used to calculate KIDMED, thus it was necessary to match the FFQ and the KIDMED questions. For the consumption of each food item the values 0, 0.05, 0.571, 1 and 2 were assigned when a participant reported "never" (no consumption), "1-2 times/month" (rare), "2-6 times/week" (weekly), "1 time/day" (daily) and "2 times/day" (twice a day), respectively. For breakfast consumption the available options are "never", "1-2 times/month", "2-6 times/week" and "1 time/day" (Table 1) . These assigned values correspond to the daily consumption of each food item. The overall food category sum was then compared with the threshold intake and the respective score was recorded, as proposed by the KIDMED scoring system. It should be noted that in accordance with KIDMED test, portion sizes are not included in the present program.

Results

A software program (Figure 1) was developed for the calculation of the KIDMED score using Microsoft Visual Studio 2019 (Version 16.4.3) in Microsoft Visual Basic 16.0.

By clicking the "Start" button, the user is asked to state the consumption frequency of every listed food for each food category by clicking at the respective option button (Figure 2). When an option button is selected the respective circle turns from white to black indicating that the selection has been made. By clicking "Next" and "Back" buttons, the user can navigate through the food categories as well as change the options.

By clicking the "Finish" button, the program automatically calculates the KIDMED score, according to the method described above (Figure 3). Moreover, it can calculate the level of adherence to the Mediterranean Diet based on the assumption that if a score equal to 12 represents 100% adherence then a score equal to k represents (k/12) ×100 % compliance to the

TABLE I. KIDMED scoring adaptation to FFQ frequency categories

How often do you consume?	Frequency of consumption					
	Never	1-2 t/month	2-6 t/week	1 t/day	2 t/day	Min/Max Score
Fruits	0	0	0	1	2	0/2
Vegetables	0	0	0	1	2	0/2
Fish	0	0	1	1	1	0/1
Legumes/Pulses	0	0	1	1	1	0/1
Nuts	0	0	1	1	1	0/1
Dairy						
Milk	0	0	0	1	1	0/2
Yogurt	0	0	0	1	2	
Cheese	0	0	0	1	1	
Starchy foods	0	0	0	1	1	0/1
Fats /Oils						
Olive oil	0	0	0	1	1	0/1
Other	0	0	0	0	0	
Baked Goods/Pastries	0	0	0	-1	-1	-1/0
Sweets	0	0	0	-1	-1	-1/0
Fast-Food	0	0	-1	-1	-1	-1/0
Breakfast	-1	-1	-1	0	-	-1/0

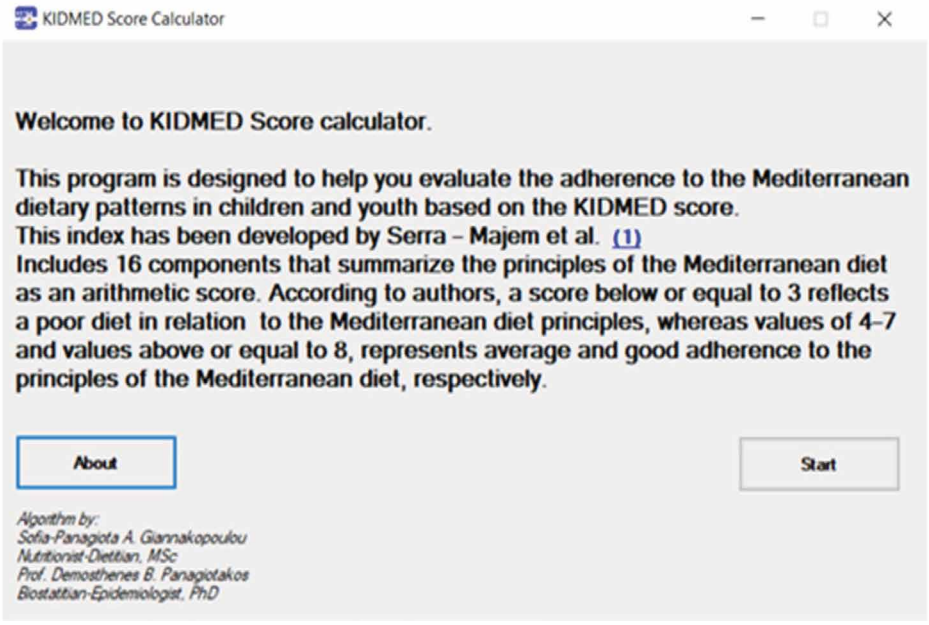

Figure 1. Welcome screen.

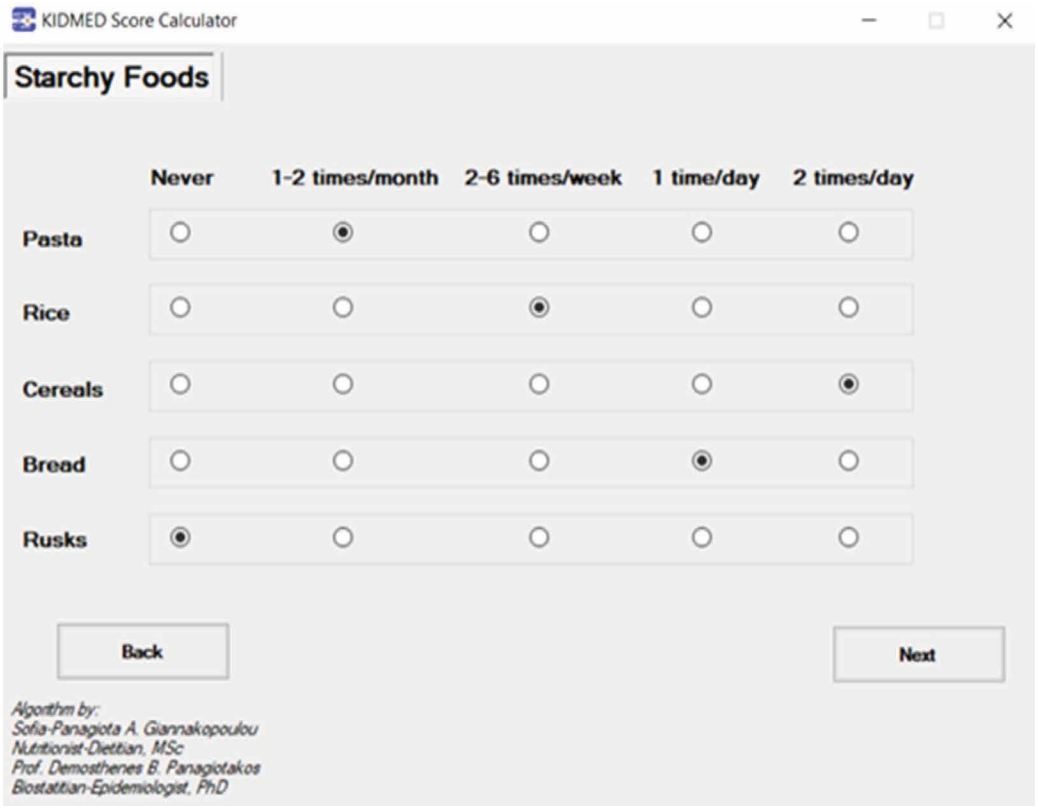

Figure 2. Sample of the main form of the program.

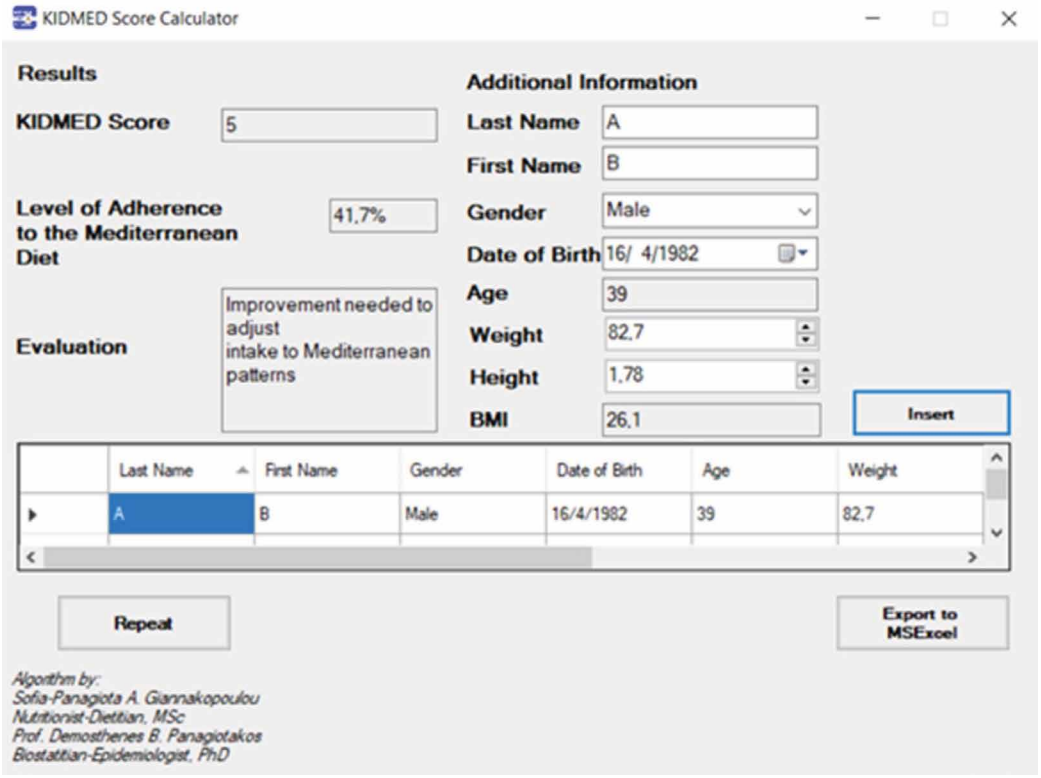

Figure 3. Results screen.

Mediterranean dietary pattern.

The present program is also suitable for research purposes. It allows the user to enter additional information such as name, age, gender, height, and weight. Also, Body Mass Index (BMI) is automatically calculated. This information along with the KIDMED calculation, the level of adherence and the evaluation of the diet according to the KIDMED can be inserted into a table, allowing the user to save the results and start over again.

All the above information by clicking the "Export" button can be transferred to an Excel sheet (Figure 4), providing the ability to create a database.

The program is developed for the PC/Windows and was compatible with PC's running Windows 7 and Windows 10 Home operating system, and is available on demand from the authors.

Discussion

The software allows the user to rapidly calculate the level of the adherence to the Mediterranean dietary pattern according to KIDMED index, without the requirement of special computer skills on behalf of the user, since only mouse usage is needed. It is also suitable for research purposes, due to its ability to create databases and determine the level of adherence to the Mediterranean diet even based on previously obtained FFQ's. The application of this score in the pediatric population might be useful for the improvement of diet quality and the prevention of diseases related to diet during childhood.

Conflicts of interest

The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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	A	B	C	D	E	F	G	H	I	J	K
1	**Last Name**	**First Name**	**Gender**	**Date of Birth**	**Age**	**Weight**	**Height**	**BMI**	**KIDMED Score**	**Evaluation**	
2	A	B	Male	16/4/1982	39	82,7	1,78	26,1	5	Improvement needed to adjust intake to Mediterranean patterns	
3	C	D	Female	27/6/1990	31	67,8	1,72	22,9	9	Optimal Mediterranean diet	
4	E	F	Female	14/10/1999	22	76,8	1,73	25,7	2	Very low quality diet	
5											
6											

Figure 4. Sample of the generated Excel file with the exported data.

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