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Cardiovascular Diseases Healthy Diet Related Knowledge among a Sample of the General Population in Egypt

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Abstract

BACKGROUND: Little is known about the extent of Egyptians' awareness regarding the relationship between nutrition and cardiovascular health.

AIM: This study seeks to evaluate people's awareness through an online cross-sectional survey to determine the knowledge gaps.

METHODS: This cross-sectional study was conducted through an online survey using a convenience sampling technique. The participation required being an adult Egyptian (≥18 years old). A pre-tested electronic-questionnaire included three sections: Socio-demographic data, a self-reported history of chronic and cardiac diseases, and 15 questions addressing dietary risk factors and protective factors. Six hundred and thirty-two participants completed the questionnaire.

RESULTS: The mean age was 28 ± 8 years. More than 80% of the participants were males. Of 632 participants, 233 had poor awareness. The median knowledge percent score was 62 with interquartile range (52, 71). About 85.4% of the participants were ready to change their eating habits and follow a healthy diet to maintain their health. The participants were interested in knowing more about healthy food and how to prepare healthy balanced meals (71.7% and 62.2%, respectively). Females, university-educated, employed, and Upper Egypt residents demonstrated deep awareness (p-value = 0.02, 0.011, 0.05, and 0.012, respectively). Intriguingly, friends and social media were the primary sources of nutritional knowledge.

CONCLUSION: The participants' knowledge is poor regarding the relation between nutrition and cardiovascular health. This study emphasizes the urgent need to raise public awareness as a precaution against cardiovascular diseases.

Introduction

Nowadays, non-communicable diseases (NCDs) represent a great challenge, resulting in a global death of 41 million people (71%) yearly. Low- and middle-income countries are the most affected, with 85% of premature deaths occurring between 30 and 69 years annually [1]. Cardiovascular diseases (CVDs) are responsible for the most NCDs deaths. Almost one-third of all global deaths in 2019 were attributed to CVDs [2]. NCDs are a critical public health issue in Egypt because they are responsible for 85% deaths. CVDs, alone, account for 40% of NCDs' mortality [3].

The risk of NCDs is attributed to modifiable behavioral risk factors, such as unhealthy diet, smoking, physical inactivity, and drinking alcohol. Furthermore, metabolic risk factors, including high blood pressure, obesity, hyperglycemia, and hyperlipidemia, are associated with increasing the risk of NCDs. Hypertension alone is responsible for 19% of global deaths [4]. The modifiable behavioral risk factors are responsible for 80% of CVDs, concurrently with the metabolic risk factors, hence increasing the individual's chance to develop CVDs [5].

The STEPS survey of NCDs, which was carried out in 2017 in Egypt, tracked the risk factors for NCDs and revealed the following findings: 35.7% prevalence of obesity, 8.9 g/day mean salt intake, 90% eating <5 servings of fruits and vegetables on a daily average, 29.5% elevated blood pressure, 8.9% high cholesterol, and 15.5% high blood glucose [6].

The WHO has spread the public health awareness of diet and physical activity as the "best buy" to overcome the global NCDs increase [7]. Therefore, behavioral modification, as an adoption of a healthy lifestyle, is a crucial strategy to prevent many primary and secondary cardiovascular events. A healthy diet should include vegetables, fruits, nuts, whole grains, lean animal protein, and fish. Moreover, it minimizes the intake of transfats, red meat and processed red meats, refined carbohydrates, and sweetened beverages [8].

Rare knowledge is available about the extent of Egyptians' awareness regarding the relationship between nutrition and cardiovascular health. As a result, this study aims to evaluate people's awareness through an online cross-sectional survey.

Designs and Methods

Study design

The present study is an exploratory population-based e-open survey performed by a representative sample to assess their CVDs related knowledge within the study duration from May to August 2021. The research was carried out following the Checklist for Reporting Results of Internet E Surveys guidelines [9].

Sample size and sampling technique

We used a convenient sampling technique. As there was no prior study focusing on knowledge regarding CVDs, we considered the best assumption (p) as 50% for the present study. The sample size was calculated using the following formula, (1) $n = \left[\frac{Z_{\propto/2}}{E} * P(1-P)\right]$, n = required sample size, $Z_{\propto/2}$ = 1.96, p = prevalence of the outcome (50%), and E = Margin of error; 0.05. A total of 632 participants completed the questionnaire. The inclusion criterion was to be an adult Egyptian resident (≥18 years old).

Data collection tool

Due to the COVID-19 pandemic, we used an online data collection method. A Google form was created, and the participants were invited to complete and submit it. The questionnaire link was shared with groups on Facebook and WhatsApp. Requests were sent to the administrators of these groups to obtain permission to share the survey. A pre-tested two-page (screen) e-questionnaire was used to collect data from the study participants. It included three sections:

The first section was meant for determining socio-demographic characteristics: Age, sex, education, occupation, marital status, governorate, and self-reported weight and height. The second included a self-reported history of chronic and cardiac diseases. The third evaluated the participants' knowledge regarding CVDs, comprising 15 items addressing dietary risk factors and protective factors. The questions were formatted in a close-ended with "Yes," "No," and "do not know" options.

Different choices, including scientific websites, colleagues, health-care providers, medical studies, television, internet, Facebook, and WhatsApp, were available to determine the sources of knowledge. The questions in this section were adapted from the existing literature [10], [11], [12], [13]. Language experts translated the questions into Arabic. Then, they were translated back to English by two independent language experts.

A pilot test was conducted with ten participants (not included in the study) to assess the clarity of the questions. Furthermore, four faculty members are experts in public health validated the questionnaire's content, and the necessary adjustments were made. The respondents were able to review and change their answers through a back button.

Statistical analysis

Statistical Package for Social Science version 24.0 was used for statistical analysis [14]. Variables were examined for normality. Categorical variables were expressed in proportions and percentages. Quantitative variables were expressed using mean, standard deviation, median, and interquartile range. Moreover, the Mann–Whitney U and Kruskal–Wallis tests of significance were used for comparison. P = 0.05 was considered significant. Correct answers received a score of one, while incorrect answers or "I do not know" answers received a score of zero. The total raw score (if all answers were correct) was 15. The scoring percentage was calculated by dividing the raw score by 15 (the maximum achievable score) and multiplying the result by 100.

As performed in a previously published study, the scores were divided into tertile (poor, fair, and good) [15]. Knowledge score percentage <60% was poor, 60–70% was fair, and more than 70% was good.

Ethics approval and consent to participate

The ethical review board revised and approved the study. Study participants provided electronically signed informed consent. Those who agreed to participate completed the submission process, and those who declined were excluded from the study by submitting an empty form after answering "Not willing to participate." The data confidentially were maintained according to the deceleration of Helsinki.

Results

Six hundred and thirty-two participants completed the questionnaire. The mean age of them was 28 ± 8 years. More than 80% of the participants were males and had a university education. About 67% were employed, 35.3% were married, 70% were from

Table 1: Socio-demographic characters of the participants (n = 632)

Socio-demographic characteristics	Value
Age (years) mean±SD	28 ± 8
Gender n (%)	
Male	514 (81.3)
Female	118 (18.7)
Education n (%)	
University	506 (80.1)
Below university	126 (19.9)
Occupation n (%)	
Working	423 (66.9)
Not working	209 (33.1)
Marital status n (%)	
Married	223 (35.3)
Not married	409 (64.7)
Residence n (%)	
Urban	443 (70.1)
Rural	189 (29.9)
Governorate n (%)	
Greater Cairo	188 (29.7)
Lower Egypt	211 (33.4)
Upper Egypt	207 (32.8)
Canal governorates	26 (4.1)

urban areas, and 66.2% were from Upper and Lower Egypt (Table 1).

Regarding smoking, 70% were non-smokers. The body mass index (BMI) of the participants was normal in 35%, while 36.8% were overweight. Only 10% suffered from cardiac diseases, mainly hypertension (76.6%) (Table 2). The median knowledge percentage score was 62 (52, 71). About 88% agreed that the diet impacted cardiovascular health, while 51% were against that drinking coffee being good for heart health.

Table 2: Participants medical history relevant to heart diseases

Medical History	n (%)
Smoking status	
Yes	161 (25.5)
No	442 (69.9)
Ex-smoker	29 (4.6)
BMI2	
Under-weight (<18.5)	16 (2.5)
Normal (18.5–24.9)	221 (35.0)
Overweight (25–29.9)	232 (36.8)
Class I obesity (30–34.9)	99 (15.7)
Class II obesity (35–39.9)	36 (5.7)
Class III obesity (>40)	27 (4.3)
Chronic diseases	
No	525 (83.1)
Yes	107 (16.9)
DM	22 (20.6)
Liver diseases	2 (1.9)
Kidney diseases	3 (2.8)
Hyperlipedema	32 (29.9)
Others	38 (35.5)
History of cardiac disease	
No	568 (89.9)
Yes	64 (10.1)
Hypertension	49 (76.6)
CHD	8 (12.5)
Valvular diseases	8 (12.5)
Heart failure	3 (4.7)
Rheumatic heart	5 (7.8)
Family history of CVDs	
Yes	119 (31.5)
Do not know	35 (5.5)
No	398 (63)

BMI: Body mass index, CVD: Cardiovascular disease, CHD: Coronary heart disease, DM: Diabetes mellitus.

Figure 1 illustrates that more than 75.6% were often interested in reading the ingredients of a food product to know what they ate. As displayed in Figure 2, 85.4% of the participants were ready to change their eating habits and follow a healthy diet. Participants demonstrated a poor awareness regarding healthy food for cardiovascular health and how to prepare healthy balanced meals (71.7% and 62.2%, respectively), as shown in Figure 3.

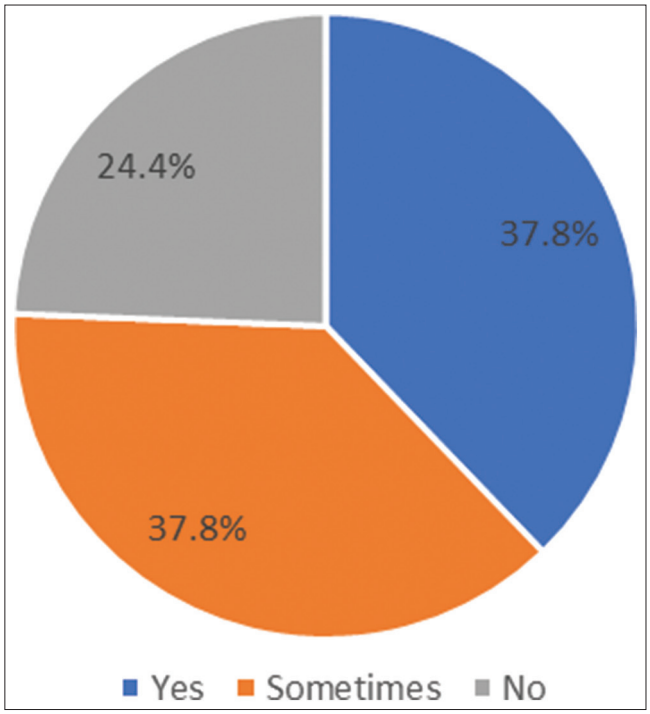

Figure 1: Participants who are interested in reading the ingredients of a food product to know what you are eating

The primary sources of knowledge for the participants were their friends and social media (53.3% and 40.8%, respectively) as shown in Figure 4. The minor source was the direct search on the internet (2.5%). As shown in Table 5, females, university educated, employed, and upper Egypt

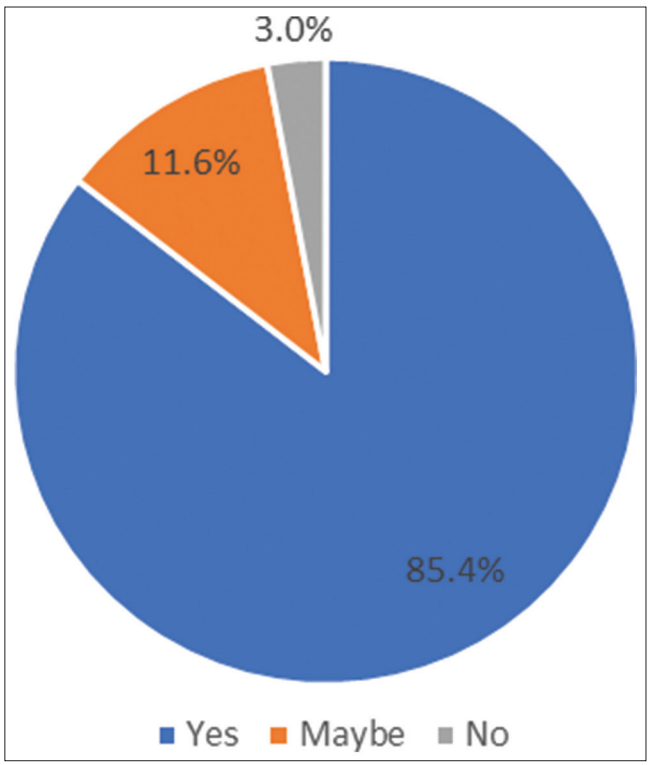

Figure 2: Participants who are ready to change your eating habits and follow a healthy diet to keep your heart healthy

residents demonstrated increasing awareness (p = 0.02, 0.011, 0.05, and 0.012, respectively). More than one third of the enrolled participants had poor knowledge as shown in Figure 5.

Discussion

The present study revealed the poor awareness of Egyptians regarding the association between nutrition and cardiovascular health, with a median score of 62 (52, 71). This finding is consistent with Ahmed *et al*. study, which revealed the poor knowledge of the public Pahang, Malaysia, regarding the modifiable risk factors of a heart attack. However, our findings contradict those revealed from a study on metabolic syndrome patients who demonstrated overall moderate mean knowledge scores of cardiovascular risk factors [15], [16].

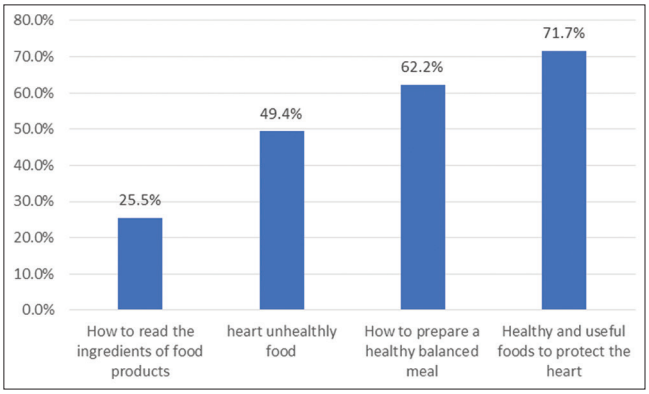

Figure 3: Information which participants like to know more about

Almost all the participants believed in the link between an unhealthy diet and CVDs. Half of the participants agreed that processed meat, such as sausage and hot dogs, could elevate blood cholesterol, negatively affecting cardiovascular health. Nearly two-thirds of participants considered eating foods rich in fats and sugars (such as fried pastries and sweets), drinking alcohol, and high salt intake, as harmful for cardiovascular health. Moreover, the association of obesity with heart diseases was well known by 88% of participants.

On the other hand, it was considered that a diet rich in fibers (86%), low fat and fat-free products (61%), omega-3 at least twice a week (83%), and vegetable proteins instead of animal proteins (72%) was a preventive measure to reduce the risk of CVDs. Nevertheless, more than half of the participants believed that the high cholesterol levels required medications, with no relation to dietary. Besides, they did not know the different sources of cholesterol in foods and their effects, besides the healthy amount of caffeine.

Amarasekara *et al*. demonstrated similar results with a higher knowledge score toward high salt consumption and hypertension 90%, but they showed a lower score for vegetables as a positive factor for CVDs reduction [15]. More than two-thirds of participants in the Aminde *et al*. study reported the unhealthy diet, obesity, and high blood pressure as potential risk factors for CVDs [17].

American studies, conducted among adults aged 18–26 years old and American Indian women with the previous gestational diabetes, showed a high knowledge score for weight reduction (78.5%) and emphasized the role of diet and cholesterol on the risk of CVDs. In addition, women in the French West Indies

Table 3: Percent distribution of the enrolled participants by CVD health diet related knowledge (n = 632)

Question	Response n (%)		
	Yes	Do not know	No
Do you think the only source of cholesterol is animal food products?*	120 (19)	185 (29)	327 (51)
Do you think anyone with high cholesterol should take medication to lower it?*	230 (36)	121 (19)	281 (44)
Do you think overweight people are more likely to have heart disease?	557 (88)	34 (5)	41 (6)
In your opinion, heart disease has nothing to do with eating foods rich in fats and sugars (such as fried pastries and sweets)?*	86 (13)	79 (12)	467 (73)
Do you think that foods rich in natural cholesterol (e.g., eggs/meat/full-fat dairy products) may lead to an increase in the level of cholesterol in the blood?*	339 (53)	114 (18)	179 (28)
Do you think that eating processed meat such as luncheon meat, sausage, and hot dogs has no effect on cholesterol levels in the blood?*	219 (34)	101 (16)	312 (49)
Do you think that eating foods rich in salt negatively affects the health of the heart?	408 (64)	129 (20)	95 (15)
In your opinion, drinking alcohol has nothing to do with heart health?*	149 (23)	126 (19)	357 (56)
In your opinion, is there a significant impact of diet (eating) and the risk of chronic diseases such as high pressure and heart disease?	566 (89)	39 (6)	27 (4)
Do you think that following a diet rich in fiber (which comes in whole fruits with the skin and vegetables such as cucumbers and lettuce) reduces your chance of developing heart disease?	548 (86)	53 (8)	31 (4)
Do you agree that complex carbohydrates, such as those found in whole wheat and oats, contribute to reducing the risk of heart disease?	360 (57)	196 (31)	76 (12)
Do you agree that eating low-fat or fat-free dairy (such as non-fat milk and yoghurt) is better for heart health and protection than eating full-fat dairy?	390 (61)	117 (18)	125 (19)
In your opinion, do you think that eating fish (especially fish rich in omega-3 such as salmon and sardines) at least twice a week is important for heart health and protection?	530 (83)	76 (12)	26 (4)
In your opinion, is it possible to rely on vegetable proteins (such as lentils, chickpeas, and peanuts) as an alternative to red meat on some days of the week?	455 (72)	79 (12)	98 (15)
In your opinion, drinking coffee and caffeinated drinks (a maximum of 4 cups/day) is good for heart health?	200 (31)	109 (17)	323 (51)

*No is the correct answer.

identified eating less fat (42%) and drinking less alcohol (26%) as positive factors for heart health [18], [19], [20].

Table 4: Heart disease dietary risk factors and protective factors knowledge score and knowledge score percent

Dietary Knowledge Score	Median (IQR)
Knowledge score	13 (11, 15)
Score percent	62 (52, 71)

The studies conducted in Kuwait and the United Arab of Emirates (UAE) displayed high knowledge scores considering the behavioral and metabolic risk factors of CVDs. Unlikely, most elderly living in Bangi demonstrated poor to average knowledge scores toward the dietary risk factors, especially the consequences of eating food rich in salts on blood pressure.

Table 5: Relation between socio-demographics, medical history of the participants, and the knowledge score

Attributes	Knowledge			
	Poor n (%)	Fair n (%)	Good n (%)	p-value
Age group				
<30	152 (37.3)	108 (26.5)	147 (36.1)	0.258
≥30	81 (36.0)	73 (32.4)	71 (31.6)	
Gender				
Male	206 (40.1)	141 (27.4)	167 (32.5)	0.002*
Female	27 (22.9)	40 (33.9)	51 (43.2)	
Education				
Read and write	4 (80.0)	1 (20.0)	0 (0.0)	0.011*
Primary	0 (0.0)	2 (50.0)	2 (50.0)	
Preparatory	4 (44.4)	3 (33.3)	2 (22.2)	
Secondary	41 (50.6)	15 (18.5)	25 (30.9)	
Above intermediate	10 (37.0)	13 (48.1)	4 (14.8)	
University	174 (34.4)	147 (29.1)	185 (36.6)	
Occupation				
Not working	91 (43.5)	54 (25.8)	64 (30.6)	0.05*
Working	142 (33.6)	127 (30.0)	154 (36.4)	
Marital status				
Married	79 (35.4)	72 (32.3)	72 (32.3)	0.32
Not married	154 (37.7)	109 (26.7)	146 (35.7)	
Residence				
Urban	156 (35.2)	130 (29.3)	157 (35.4)	0.419
Rural	77 (40.7)	51 (27.0)	61 (32.3)	
Governorate				
Greater Cairo	73 (38.8)	64 (34.0)	51 (27.1)	0.012*
Lower Egypt	79 (37.4)	63 (29.9)	69 (32.7)	
Upper Egypt	72 (34.8)	44 (21.3)	91 (44.0)	
Canal governorates	9 (34.6)	10 (38.5)	7 (26.9)	
Smoking status				
Yes	71 (44.1)	47 (29.2)	43 (26.7)	0.084
No	151 (34.2)	124 (28.1)	167 (37.8)	
Exsmoker	11 (37.9)	10 (34.5)	8 (27.6)	
BMI				
<18.5	5 (31.3)	8 (50.0)	3 (18.8)	0.148
18.5–24.9	84 (38.0)	58 (26.2)	79 (35.7)	
25–29.9	83 (35.8)	62 (26.7)	87 (37.5)	
30–34.9	33 (33.3)	36 (36.4)	30 (30.3)	
35–39.9	12 (33.3)	11 (30.6)	13 (36.1)	
>40	16 (59.3)	6 (22.2)	5 (18.5)	
Chronic diseases				
No	191 (36.4)	152 (29.0)	182 (34.7)	0.847
Yes	42 (39.3)	29 (27.1)	36 (33.6)	
History of cardiac disease				
No	211 (37.1)	162 (28.5)	195 (34.3)	0.909
Yes	22 (34.4)	19 (29.7)	23 (35.9)	

*Significant, BMI: Body mass index.

In Malaysia, only half of the participants identified obesity as a risk factor for heart attack [16], [21], [22], [23]. The variation of knowledge scores between countries could be strongly associated with spreading awareness. For example, Kuwait and the UAE governments significantly invest in raising the public's awareness of healthy lifestyles and cardiovascular risk factors. However, other countries, such as Malaysia, have launched many health education initiatives, but they still need effective well-planned awareness campaigns, especially on cardiovascular risk factors [16], [23], [24].

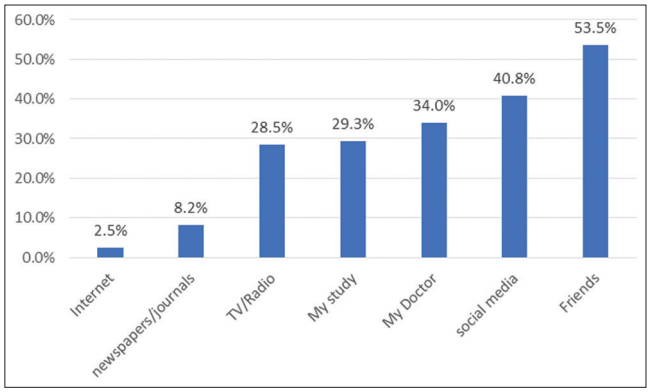

Figure 4: Percent distribution of the studied participants by source of knowledge

Female participants were significantly more knowledgeable than males, and 43.2% had good knowledge scores. This finding is consistent with similar studies, which demonstrated increasing awareness of females about CVDs risk factors rather than males. In addition, an American study stated that the level of American females' awareness increased by two folds in the past decade [17], [25], [26], [27]. However, males showed higher knowledge scores in a study in Saudi Arabia [28]. Our findings are consistent with the studies emphasizing that females were more aware of asymptomatic and symptomatic CVDs [29]. Inversely, males do not pay much attention to risk factors; they usually believe their health status is better than females [30], [31].

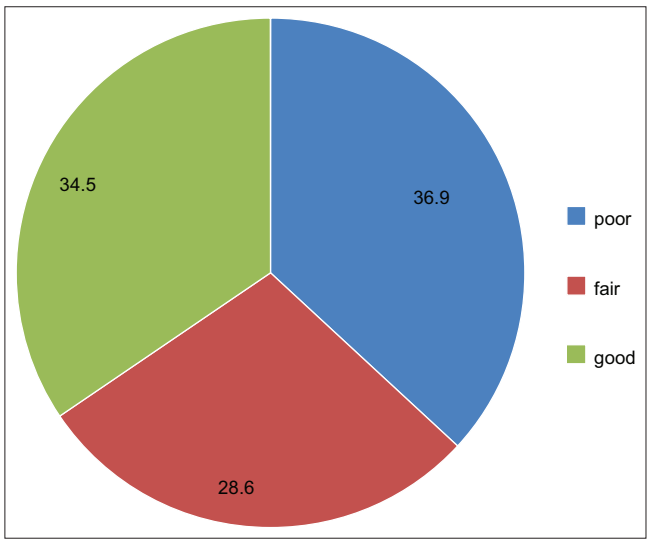

Figure 5: The percent distribution of the overall knowledge score among participants

Highly educated and employed participants demonstrated higher knowledge scores. This finding is consistent with similar studies that revealed an increased awareness of CVDs by increasing education, being employed, and becoming economically stable [17], [32]. This implication can be explained by assuming that highly educated people are more aware and capable of understanding health-related information.

Besides, participants of Upper Egypt showed higher knowledge scores. This finding could be attributed to their traditions, nutritional habits, climate, working routine, and exposure to different external factors. Unlikely, Lower Egypt has witnessed a strong desire for modernization, reflected in high purchasing power, and accessibility to junk foods [33]. Non-smokers displayed more awareness of CVDs risk factors, as they tried to adopt a healthy lifestyle by avoiding smoking [34]. This finding agrees with a study conducted in Cameroon and disagrees with a Northern Irish study that found no association between smoking and the awareness of CVD risk factors [17], [35].

Regarding the primary sources of nutritional knowledge, 53.5% of participants stated friends, 40.8% mentioned social media, and 34% reported physicians. Consistent with an Italian study, television and physicians were the significant sources of information, with those depending on medical sources demonstrating better awareness of CVDs [36]. Consequently, these findings highlight the need to determine the reliability of the information on social media. In addition, a reliable source for sharing medical information regarding the dietary role in preventing and controlling NCDs must be established.

A healthy diet, as a pivotal factor for cardiovascular health, needs to be emphasized more. It is worth mentioning that 85.5% of participants desired to change their eating habits in favor of their cardiovascular health. Moreover, more than two-thirds were enthusiastic to know the foods enhancing cardiovascular health, besides following healthy balanced meals. Furthermore, one-quarter of the participants showed interest in learning how to read the nutritional labels to figure out the food ingredients. Therefore, physicians should spread nutritional awareness.

Conclusion

The overall nutritional knowledge of the participants regarding the protective and risk factors for cardiovascular health was poor. Although the majority identified unhealthy diets and obesity as significant risk factors for CVDs, only two-thirds knew the kinds of foods that could negatively affect cardiovascular health. Three-quarters recognized that having food rich in fibers, vegetable proteins, or omega-3 twice/week contributed to protecting from CVDs. Friends and social media were the primary sources of nutritional information. This study highlights the need to raise public awareness to reduce the prevalence of CVDs. The health sectors can collaborate with the medical faculties to conduct health awareness campaigns. The collaboration will guarantee the spread of awareness, on a broader scale, filling the knowledge gaps revealed in the earlier and present studies. Further well-established studies on a broader scale are needed to investigate nutritional behavior.

Study Limitations

Data were collected through an online questionnaire; therefore, the anthropometric measurement could not be assessed. The BMI was determined using self-reported height and weight. The food quantity and frequency of meals were not determined. Data represent only those who have accessibility to the internet and are familiar with filling online forms.

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Authors Contribution

All authors have contributed significantly to the content of the manuscript. M.Z. contributed to data analysis and interpretation. A.T. wrote the methodology and revised the discussion and conclusion. A.S. contributed to data collection. N.H. wrote the introduction and discussion. All authors read and approved the final manuscript.

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