

Awareness of plant-based diets and intermittent fasting: A cross-sectional among college-aged students in Kuwait.

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Abstract

A cross-sectional study was conducted on female students only aged 18-35 at college of life sciences, Kuwait University to investigate the correlation between the level of nutrition education and the knowledge, depth of knowledge, and accuracy of information of college-aged females regarding Intermittent Fasting (IF), Vegan and Vegetarian Diets (V/V). The participants were asked to fill out a self-administered survey that included demographics data and nutrition-related knowledge questions on IF and V/V diets. The study showed that the participants had demonstrated greater nutrition knowledge related to V/V nutrition compared to IF nutrition (n=195, n=153 respectively). Young participants reported seeking nutrition-related information on diets majorly from social media platforms compared with other sources. A statistically positive correlation was found between IF knowledge and source of information (r=0.169, N=153, p=0.037), while a non-positive correlation was shown between V/V knowledge and source of information (r=0.169, N=195, p=0.282). This study recommends designing nutrition education intervention tools to improve nutritional awareness among young people to prevent nutrition-related diseases in the future. Use social media platforms to provide credible, evidence-based health information online and to improve the young population's general nutritional knowledge.

Keywords: Nutritional awareness, Intermittent Fasting (IF), Vegan and Vegetarian Diet (V/V), Trendy diets, Nutrition interventions.

Introduction

Popular dietary trends have become a prominent part of the Arab community dietary practices, specifically the Gulf Corporate Countries (GCC) and Kuwait. Trends in the weight loss market are on the rise and forecasted to reach \$5 billion by the year 2024 [1]. This is in part due to the westernization of dietary patterns and nutrition transition [2]. Recent international surveys show that Intermittent Fasting (IF) and plant-based diets such as Vegetarian and Vegan Diet (VV) are the top diet trends in the U.S [3]. Intermittent fasting is a diet regimen that cycle between fasting and unrestricted eating, while plant-forward eating patterns focus mainly on food from plants [4, 5]. Such diet trends could impact dietary and lifestyle behaviors, in particular young adults [6]. The rise in these trends is driven by the impact of social media and the raising practice of seeking health and nutrition through online mediums.

It's estimated that there are 4.20 million social media users in Kuwait. Social media may have a significant impact on the dietary perception and behavior in young adults [7]. Poobalan et al., found that young adults' dietary behavior is strongly

influenced by their need to lose weight, look better, and feel great [8]. Despite the wide availability of reliable expert-based nutrition knowledge disseminated on the internet, nutrition confusion and wide dietary skepticism is on the rise as well. Further promulgated by the rise of seeking popular dietary advice on-line [9]. This may negatively affect public health dietary perceptions, behaviors, and adherence to evidence-based dietary information [10]. Young adults are unknowingly manipulated by social media, making them more susceptible to accepting nutrition related information as they receive it, without doubting or processing it. As a result, they are at a high risk of poor nutrition and diet-related diseases. Yet, both IF and VV dietary practices are supported by evidence for their health utility and wide cultural acceptability [2, 11-13]. Knowledge of these dietary trends may as well reflect a differing level of knowledge and reliability of source. However, there is a no data on knowledge of V/V and IF in the GCC. Similarly, level and source of knowledge of these dietary trends is similarly not explored. Social media is suggested to be a potential reliable medium for behavioral change [14] and dissemination of accurate health and diet information [15, 16].

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Therefore, the main aim of this study was to assess the knowledge and depth knowledge in relation to level of nutrition education in college age females. As well to assess accuracy of nutritional information obtained from various sources regarding V/V and IF diets. Accordingly, we hypothesized a positive correlation between the accuracy of nutritional information and the sources used to obtain information about V/V and IF diets.

Materials and Methods

Study population and Study participants

Kuwait is a small country with a population of 4.27 million. Approximately, 39% of the population is under the age of 25 years. The study population comprised of female students between 18 and 35 years old in college of life sciences, Kuwait University. A college-based, cross-sectional study was conducted on female students from one college at a public university, which were selected using a random sampling with a probability proportional to size. The sample allocation was based on the relative size which was approximately 20% of all female students assigned at that semester, which was total of 1013 students. They were from a range of different life science fields, and they were conveniently approached on the college campus to do the online survey.

All procedures involving research study participants were reviewed and approved by the Food Science and Nutrition Department at Kuwait University. Written informed consent was obtained from all participants.

Data collection

Data were collected by self-administered questionnaire. The data collection was approved by the college administration to carry out the study on campus. The questionnaire was distributed through proper online channels using a link. It included a brief description of the study, and a link to access the questionnaire online. It was then sent to participants *via* social media apps, such as WhatsApp and MyU, (A local mobile educational platform). The respondents were provided with a one-time link to access the online survey which requires less than 10 minutes to fill. In addition, all participants agreed to participate and were free to withdraw any time by during the survey. Participation was voluntary with no incentives given. The data collection duration was set to be a period of 2 weeks in which 204 questionnaires collected. A pilot study was conducted on a group of 25 students to test the scale of reliability and validity of the survey design. A web-based survey was used to collect the data anonymously.

Questionnaire

In particular, the survey questions were generated in different forms including multiple choice questions, single-selection questions, and text-entry questions. The survey consisted of 21 questions, generated using "google documents or google forms". The questionnaire was divided into three sections. The first section of the questionnaire asked about the demographic characteristics of the respondents including age, social status, year in college, monthly budget for foods and previous nutrition education. The second and third sections explored the

knowledge and perceptions of IF, and V/V diets. Nutritional knowledge of the respondents regarding IF/VV practices were assessed using 9 varied questions. For example, "What beverages are allowed during the fasting period in intermittent fasting?" and "A vegan/vegetarian diet prevents development of chronic diseases".

Data analysis

Data were double entered into specifically designed database using Excel and Statistical Package for Social Sciences (SPSS). Data were analyzed by SPSS for Windows version 23 (SPSS Inc.). New computed variables for mean scores were assessed for 9 questions of nutrition knowledge for IF and 14 questions for V/V diets. Missing variables were indicated by a value of "9". Correlation between mean scores of nutrition knowledge and source of information for IF and V/V diets were separately determined by Pearson correlation coefficient. One-Way Analysis of Variance (ANOVA) was used to determine the differences between mean score of knowledge with the levels of nutrition education, whether introductory, advanced, or non-level. The statistically significance level in this study was set at $p < 0.05$. In contrast, the results for descriptive statistics analysis were reported as the mean \pm Standard Deviation (SD).

Results

Study population

Out of 206 participants, 201 participants met the inclusion criteria and completed the survey. All participants were female students and most of them aged between 18-23 years. Out of all participants, 90% (n=182) were single and approximately 66% (n=132) had a monthly budget of less than 100 KD. Differences in years of study, academic major, and level of nutrition courses were observed among the study participants and the results were as follows: approximately 40% (n=80) in fourth year, 28% (n=56) in third year and the remaining were in second and first year. In addition, 33% (n=68) had taken an advanced nutrition course, 40% (n=81) had taken an introductory nutrition course, and 25% (n=51) did not take any. All the descriptive statistics of the demographic data are presented in **Table 1**.

Frequency

Out of 11 participants, 153 students reported familiarity with intermittent fasting. Those who had an advance or introductory nutrition course were familiar with the concept; almost equal at 41% for both. Whereas, the remaining 18% who were familiar with intermittent fasting did not take any nutrition courses at all. Similarly, the familiarity of vegan and vegetarian diets was assessed, and 195 participants reported familiarity. Approximately 41% of those participants had an introductory nutrition course, 35% had advanced nutrition courses and 24% had no nutritional background courses. Moving on, descriptive analysis and summary of ANOVA statistics indicated the following; the mean score of V/V knowledge for individuals with an advanced nutrition education background (M=0.79) was higher than those with introductory nutrition education background (M=0.69).

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Likewise, the IF knowledge scores for advanced courses ($M=0.52$) was higher than introductory courses ($M=0.45$). As mentioned in (Figure 1). Among participants who heard about intermittent fasting ($n=153$), 62% ($n=95$) took their information from social media, 20% ($n=31$) heard about it from a friend or a family member, and only 8% ($n=13$) used books or articles as a source of information. Likewise, among participants who were familiar with a vegan or vegetarian diet ($n=195$), 58% ($n=89$) relied on social media, 41% ($n=63$) used books or articles, and 16% ($n=25$) heard about it from a friend or a family member. Other sources were used to obtain information about the diets that represented approximately 10% of both populations. As mentioned in (Figure 2).

Nutrition knowledge

Means of nutrition knowledge scores according to diet type among different nutritional education levels are shown in (Figure 3). First, a new variable was created using the compute variable dialog box. It held the corrected answers for

some of the nutrition-related knowledge questions regarding IF/VV diet methods. A correct answer was recoded as a score of "1" and an incorrect answer was defined as "0". Then, two knowledge variables were created in which the correct answers were combined, and the knowledge mean scores were calculated. After that, the scores were compared in relation to the nutrition education level of the college students. The analysis revealed that there was no significant difference in mean scores regarding IF diet between introductory (0.4 ± 0.24) and advanced course (0.4 ± 0.21) compared to the non-level, which was relatively different yet lower in score ($3.9 \pm SD$). Meanwhile, the participants scored the highest mean score of correct answers regarding VV diets with an advanced course background (0.8 ± 0.12), and an introductory course level (0.7 ± 0.16) compared to the non-level course ($0.6 \pm SD$).

There was a significant difference in nutritional knowledge regarding VV diets between people who took an introductory nutrition course, and those who took an advanced one (p

Table 1. Demographics and Nutrition Knowledge of 201 Female Students at Kuwait University's College of Life Sciences.

Demographic Variable	n (%)
Age	
18-20 y	84 (41.8)
21-23 y	88 (43.8)
24-26 y	20 (10.0)
>26 y	9 (4.5)
Social Status	
Single	183 (91.0)
Married	15 (7.5)
Divorced	2 (1.0)
Monthly Budget	
<100 KD ^a	132 (65.7)
100-250 KD ^a	54 (26.9)
250-500 KD ^a	8 (4.0)
>500 KD ^a	3 (1.5)
Year of Study	
First Year	17 (8.5)
Second Year	41 (20.4)
Third Year	56 (27.9)
Fourth Year	80 (39.8)
Nutrition course level	
Introductory Level	81 (40.3)
Advanced Level	68 (33.8)
Non	51 (25.4)

a: Kuwaiti Dinar

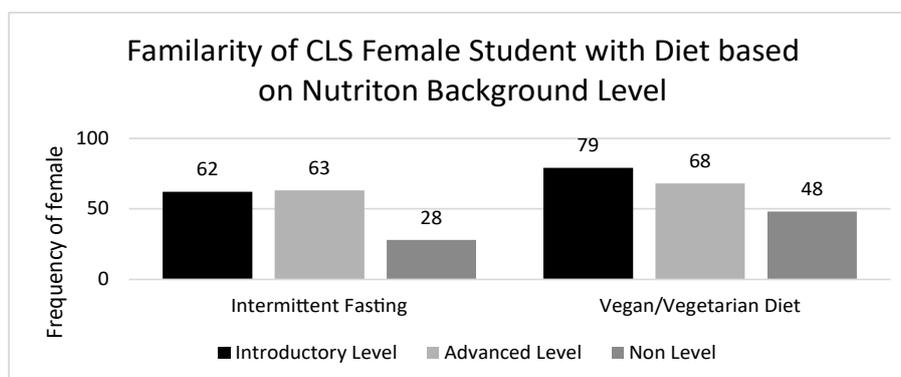


Figure 1. Nutritional Awareness of Female College Students at Kuwait University's College of Life Sciences: A Study on Trendy Diets.

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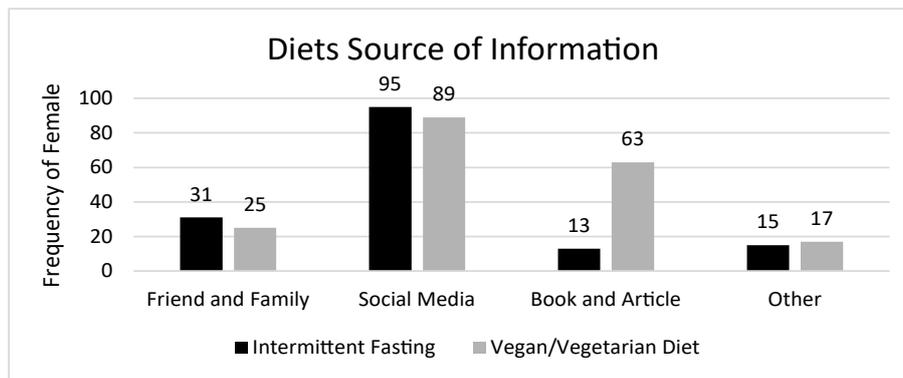


Figure 2. Frequency of Information Sources Used for Nutrition-Related Information among Female College Students.

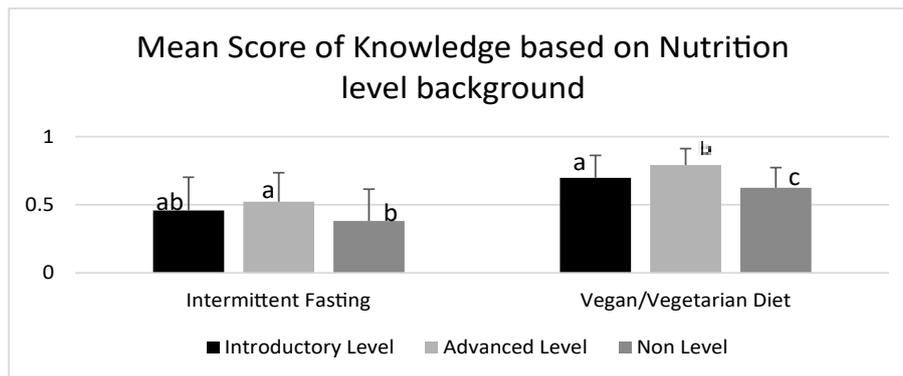


Figure 3. Displays the difference in means of nutrition knowledge regarding IF and VV diet types among different levels of nutritional education background. (N=201) The mean difference is significant at the 0.05 level.

= 0.000). In addition, there was a statistically significant difference determined by one-way ANOVA between groups of introductory nutrition level, and advanced level with those who had no previous nutrition courses taken ($p=0.006$), ($p=0.000$) respectively. Meanwhile, as seen in (Figure 3) people who took the advanced course, and those who did not take a nutrition course were found to have a significant difference in their nutrition knowledge regarding IF diet ($p=0.008$). However, analysis showed no differences in knowledge of nutrition between the groups that took the introductory course, and advanced course ($p=0.130$) as well as between the introductory course and those with no previous course taken ($p=0.140$).

Discussion

This study aimed to assess the knowledge depth of the study population in accordance to their level of nutritional education. We also explored the correlation between the accuracy and depth of nutritional knowledge, in parallel with the sources used by the study population to obtain information regarding the previous diets.

The results showed a representative sample of female students' familiarity about intermittent fasting and vegan/vegetarian diets. Approximately 76% of the study population were familiar with the concept of intermittent fasting, and 97% of the respondents of this study were familiar with the concept of vegan/vegetarian diet, all of which are single females with the majority aged 18-23 years old. Similar statistics were found in a recent cross-sectional study evaluating the

effect of intermittent fasting, vegan/vegetarian diet and other trendy diets on both men and women in Saudi Arabia. Female participants were higher than male participants by 90%, with the majority being single. On the other hand, their study population had a larger age group scale with different levels of education ranging from elementary school to university. This allowed them to have a more representative comparison. However, contrary to our results, most of their respondents were more familiar with the concept of intermittent fasting than vegan/vegetarian diet, as it is widely spread in Saudi Arabia due to religious reasoning [17].

Social media platforms were the most popular online source used to seek nutrition-related information about VV, and IF diets amongst the study population. The findings above were consistent with a similar study conducted in Accra metropolis - Ghana, which also concluded that young adults do prefer online sources as the first "go-to" for health-related information [10]. As such, the Kuwaiti young population also relies heavily on media platforms, which explains why apps like Facebook, Instagram, and YouTube ranked the top with millions of monthly active users. Yet, those apps made it easier for young people to access various health and nutrition information at their convenient time. Notably, several female participants reported using books and articles as a good second trustworthy source to acquire adequate, credible, and reliable nutrition information on V/V and IF-related nutrition. This act increases the potential of students having greater and more reliable nutritional knowledge about V/V diets than IF.

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This study shows that there is a higher nutritional awareness with adequate knowledge of plant-based diets compared to intermittent fasting. Most of the female participants correctly identified features of plant-based diets, where they scored higher in means of correct answers compared to IF questions. These findings do indicate that participants are more educated about V/V diets than IF, thus have a better knowledge base of plant-based nutrition. Nowadays, females appear to be increasingly aware and interested in plant-based diets, because they are more concerned about their health and weight. These diets are perceived as both environmentally sustainable and healthy since they are centered on plenty of organic, minimally processed foods that provide greater health benefits and promising weight loss results. Moreover, social media platforms played a major role in influencing a person's choice to follow a plant-based lifestyle. Hence, people, especially young women are constantly seeking health-related information on media platforms more than men. In addition, many female celebrities do actively endorse these diets as more relatable and healthier, which have tremendous benefits beyond merely nutritional. It makes sense that young females would be more affected by nutrition-related content stemming from online sources. Therefore, they are more likely to be interested in following a plant lifestyle rather than intermittent fasting, whether for health or ethical-based reasons.

Whereas, the popularity of intermittent fasting among the young population in Kuwait is yet lower, perhaps because of a lack of nutritional knowledge about this diet. In addition, because it is difficult to follow as it requires long hours of fasting with, or without foods or liquids, thus making it hard to maintain and adapt as a lifestyle. The findings from the previous studies verified the popularity of plant-based diets among the young populations. However, most of the existing research only focused mainly on a plant-based lifestyle and intermittent fasting concerning the health benefits, ethical considerations, and sustainability of such diets. Unfortunately, no studies have been carried out to explore the nutritional knowledge of the Arab population regarding IF and VV diets specifically. Moving on, nutritional knowledge differences regarding nutrition education background were apparent. These findings represent opportunities that female students with an advanced nutrition background are more knowledgeable compared to their fellow students. This also shows the effects of nutrition education, or any training received on key nutrition-related knowledge about various diet methods. In addition, it highlights the extent of nutrition education impacts not only on knowledge, but also on the development of permanent healthy lifestyle-related changes. With social media making nutrition-related information more digestible, accessible, and usable in everyday life.

In general, the young population are constantly looking for ways to improve their health. They do have good nutrition knowledge, yet they are sometimes misguided by inaccurate nutrition information presented in different sources. The study results suggested that using means of nutrition information sources helped to improve some of the understanding regarding IF nutrition, whereas the use of similar sources did not have the same effect on VV knowledge. Apparently,

the usage of different sources does affect the participant's knowledge depth differently when it comes to VV and IF diets. Sources of nutrition information not only have a greater influence on adopting healthy dietary habits but also, it consequently improves the nutritional knowledge of the young population. As far as we know, female sex, young age with a proper nutrition education background are socio-demographic variables affecting people's willingness to change their eating patterns, accompanied by adoption of a healthier diet style.

Strengths and Limitations

This is an exclusive online study, made specifically to fit the characteristics of the participants to support the aims of this study and provide robust results. Another innovative aspect of the study includes the ability to control the surveys in which each participant can only respond one time. This technique gave strength to the study's findings and made it easier to collect and interpret the data. A second strength of being an online-based study is the capability to reach a larger sample size, making it easier to represent most of the targeted population. The internet-based design of the study limited the number of measures collected. Although participants were well characterized, adding male participants would have given a better understanding of the study, which allows the differentiation between both genders in terms of their knowledge level differences. Furthermore, the study was conducted in a small-time frame, as it was an undergrad project. This resulted in potential errors in some of the questions in the survey yet limited the ability to conduct further statistical analysis and investigations.

Implications for Research and Practice

Young females were more familiar and knowledgeable about V/V diet than IF. Although, with the existence of many studies discussing the effect of VV and IF diets on health, none of them focused on exploring the nutritional knowledge regarding such diets. Therefore, further studies should be carried to explore the nutritional knowledge and perceptions of VV and IF among the young population in Kuwait, and worldwide. In the meantime, using various educational strategies to increase public knowledge and understanding of both diets is fundamental. For example, educational materials can be developed using appropriate social media channels to circulate credible nutrition information to any targeted age group.

Based on this study's findings, we recommend that researchers and practitioners design nutrition education interventions and materials to improve the nutritional awareness of young people and prevent future nutrition-related diseases. Specifically, we recommend that established health institutes around the world use social media platforms to circulate credible, evidence-based health and nutrition information online. This can help improve the general nutritional knowledge of the young population. Additionally, we recognize the need to conduct more research on trendy diets and their influence on people's eating attitudes and behaviors.

Policymakers should focus on enforcing policies, practices, and laws requiring mandatory and continuous health-related

education programs and training courses implementing preventive strategies starting at young school ages. Currently, there are efforts to modify established school food policies for the better. These initiatives, such as nutrition-friendly schools, aim to achieve this goal in the near future. Consequently, this will lead to the adoption of healthier lifestyle attitudes and behaviors by targeted age groups. Therefore, policymakers should ensure that nutritious foods are easily accessible to everyone to promote a healthier lifestyle at a population level

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