Knowledge of Dietary Supplements among Women in the Aseer Region of the Kingdom of Saudi Arabia

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Authors’ contributions
This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: A significant growth in dietary supplement usage has occurred and this trend is particularly evident among females. This underlines the need to establish current knowledge levels among a female participant cohort based in the Aseer Region of the Kingdom of Saudi Arabia (KSA), along with determining the types of products being used and the typical reasons cited for their consumption.

Methods: A total of 173 participants drawn from various age groups took part in this descriptive cross-sectional survey design. The survey was conducted over a three-month period from September to November 2019, using a structured online questionnaire.

Results: The results of this research show that dietary supplement usage was highly prevalent

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1. INTRODUCTION

A dietary supplement is defined by the Dietary Supplement Health and Education Act (DSHEA, 1994) as any pill, tablet, liquid, or capsule that contains one or more dietary ingredients (including amino acids, herbs, vitamins, or minerals) [1]. The purpose of dietary supplements is to improve nutritional intake. Over the past ten years, dietary supplements (especially vitamins) have become increasingly popular in developing countries [2]. However, despite the absence of any conclusive evidence proving the effectiveness of such supplements, preliminary data do indicate that they can enhance health and immunity [3–5]. Furthermore, research data suggest that stress levels can be reduced through the consumption of dietary supplements, as well as also protecting against malnutrition [6–8]. According to scientific reports, the key reasons cited for taking supplements include ensuring adequate nutrition, maintaining good general health, improving physical appearance, and weight loss [9]. However, data are often inconclusive in this field, as the marketplace is completely flooded with dietary supplements which have no empirical evidence to support their usage [10]. Customers can buy these supplements off the shelf and take them without receiving any medical advice [10,11]. Safety issues (including drug interactions) are an increasing concern as the demand for dietary supplements and their over the counter use continues to increase [12,13].

The Asia-Pacific Region has the largest market for dietary supplement sales, followed by Europe and North America which represents 30.1% and 25.4% of the market share, respectively [14]. In line with other Middle Eastern countries, especially Gulf Cooperation Council (GCC) states, the KSA was identified as an emerging dietary supplement market in the region [15–19]. The latter market in the KSA now accounts for approximately 4% of total pharmaceutical sales, with a current total value of approximately USD80 M and it is expected to reach a minimum of USD232 by 2021 [15,19].

In terms of iron consumption and various other products, women have different nutritional requirements than men [20]. According to global statistical data, the majority of women do not receive sufficient micronutrients from their consumed diets in order to maintain an optimal standard of health [20]. The World Health Organization suggests that folic acid and iron supplements should be taken by women, particularly during pregnancy [1]. Vitamin D supplements are also very important in countries and societies where there is insufficient exposure to day light; however, women must not consume excessive amounts of vitamin D, as this can cause further health issues; [2] renal complications can also be caused by consuming excessive quantities of calcium [9]. Liver problems and central nervous system problems are also associated with taking high doses of vitamin A [9]. In this respect, it is important to consult a healthcare professional prior to consuming supplements so as to ensure that the correct amount of the supplement is taken and that there are no contraindications [19].

People use many different sources to access information about supplements and to decide whether or not they will take these products [9]; however, they are usually unaware of the credibility and reliability of the information that they receive [9]. Such sources include media (television, magazines, newspapers, and the Internet), doctors, pharmacists, nutritionists, and word-of-mouth recommendations from friends [9].

Recently, there is a growing need for consumers to be provided with detailed and accurate information on food ingredients due to dietary restrictions, allergies, and drug interactions [21]. Up to 98,000 people die every year as a result of preventable medical errors, including ingesting the wrong medications, which indicates that reducing human error in healthcare still remains a significant concern [21].

Previous research has indicated that nutritional health claims made on the packaging of a product have only minimal or moderate effects on health [22]. It has also been found that the taste and cost of the product play a more
significant role in influencing consumer food choices than the product's health benefits [22]. Hence, consumers’ ability to understand the information presented on food packaging is important in increasing health and safety knowledge [21]. It can also allow them to make informed choices based on sustainability, personal principles, and values [21]. Consumers typically prefer to read short and concise nutritional information about food products and supplements, which does not contain any scientific terminology [22].

Several studies have revealed gender differences, where higher consumption levels were found to occur among women [23,24]. In Korea, dietary supplementation is most popular among female high school students [25]. In a study based in the northern borders of KSA, it was reported that 62% of participants had previously used vitamin supplements. Usage was equally popular among professional athletes and adolescents [26,27], with an emerging trend in evidence for multivitamin and vitamin C supplement use [27,28]. Therefore, the aim of this research is to evaluate dietary supplement knowledge levels, along with the types usually consumed and the typical reasons cited among a female participant cohort residing in the Aseer Region of the KSA.

2. METHODOLOGY

Given the objectives of the present study, we selected research methods that could assist us to understand participant knowledge and to gather data at one specific time period. Using these data, this study analyzed the relationship between the identified variables. Thus, we adopted a survey method commonly employed when assessing knowledge levels within a specific population.

Participation in the study was entirely voluntary, with full anonymity maintained. Additionally, participants were not required to reveal any sensitive information. They were informed of the purpose and objectives of the research, as well as how these data would be used. Furthermore, they were clearly informed that any information collected would only be used for the purposes of the current research.

2.1 Research Design and Setting

The survey administration service, Google Forms, was used to create a survey, as part of a cross-sectional study conducted over a three-month period from September to November 2019. A number of different social media platforms (Twitter and What’s App) were used to draw upon a sample of female participants based in the Aseer Region. To reach the female population of Aseer region, the questionnaire was disseminated among different female What’s App groups of different activities as well as through twitter. Aseer region is an area measuring 81,000 square meters located in the southwest of Saudi Arabia. A self-report structured questionnaire was initially designed and subsequently pilot tested to validate its quality and the comprehensiveness of its items. In addition, three experts working within this field provided advice regarding this process. The questionnaire comprised two sections, with the first focusing on gathering demographic information, while the second contained fifteen closed questions which sought to gain an understanding of participants’ knowledge of dietary supplements. The questionnaire contained questions with closed and highly structured responses, where many items could be answered using a five-point Likert scale (1: strongly disagree; 2: disagree; 3: neutral; 4: agree; 5: strongly agree) [Appendix 1].

Altogether, 173 female participants took part in our questionnaire, which they accessed as a soft copy via an electronic link. Once results from the pilot study were analyzed, minor amendments were made to its language and structure in order to ensure that it was easy for participants to understand, thus ensuring that the objectives of the research would be met. The pilot study results are not included in the present research. All information received by the participants (anonymized data) was held in the strictest confidence, whereby the information provided was coded and used only for the purposes outlined in the present research. The investigative team had exclusive access to the anonymized data.

2.2 Study Participants

Respondent inclusion criteria: Adult females ≥ 18 years old, living in the Aseer Region.

Respondent exclusion criteria: Females who did not agree to participate in the study, and/or females< 18 years old. A total of 173 female participants took part in this study.

2.3 Sample Selection

Based on the aforementioned inclusion criteria, all participants selected were females, aged 18
years and over, living in the Aseer Region of Saudi Arabia. Questionnaires were distributed online through Google Forms.

Based on statistical data provided by the Saudi General Authority regarding the Aseer Region, there are approximately 1,100,000 females residing in this area. The optimal sample size was calculated to be 150 participants, with a confidence interval of 95% and an 8% margin of error. This was determined using the Raosoft sample size calculator.

2.4 Data Analysis

The data obtained from the survey were organized, coded, and analyzed using the statistical software IBM SPSS, Version 22 (SPSS, Inc. Chicago, IL). All statistical analyses were carried out using a two-tailed test. A p-value of less than 0.05 was considered to be statistically significant.

Descriptive analysis, based on frequency and percentage distribution, was carried out for all variables, including demographic data, knowledge, and participant practice and attitude. Cross-tabulation was used to assess the distribution of awareness according to participants’ data and sources of information. Relations were tested using Pearson’s chi-square test. The latter test was used to determine the degree of difference in categorical variables between two groups, in relation to their opinions on dietary supplements. Statistical results were considered to be significant at \( p \leq 0.05 \).

3. RESULTS

A total of 173 female participants responded to the study questionnaire. Table 1 presents participant demographic data. The results indicate that 40 participants from each age group responded to the questionnaire, with the exception of the over 55 years age group, where only 13 survey responses were received. The majority of participants were either students or employed (n=58 within each group). Most respondents (71.1%) were supplement users.

Table 2 displays self-reported reasons for dietary supplement usage. Pregnancy (37%) and osteoporosis (16.8%) were the two most common motivators.

Typical reasons cited for dietary supplement intake among a female population are illustrated in Fig. 2. The two most frequently occurring include the need to address vitamin and mineral nutritional deficiencies, as well as pregnancy-related requirements.

Multivitamins were the most common supplement used by participants in this study (35%), followed by vitamin D (34%), and iron (27%). Vitamin C and omega users comprised less than 20% of all respondents. No participant reported herbal supplement usage. Overall, good supplement indication knowledge was recorded among 8.7% of participants, whereas 17.9% recorded good knowledge regarding supplement type. Overall, good knowledge levels were recorded in 16.8% of study participants.

Table 1. Demographic data of the survey participants

<table>
<thead>
<tr>
<th>Demographic data</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age in years</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24</td>
<td>39</td>
<td>22.5%</td>
</tr>
<tr>
<td>25-34</td>
<td>36</td>
<td>20.8%</td>
</tr>
<tr>
<td>35-44</td>
<td>43</td>
<td>24.9%</td>
</tr>
<tr>
<td>45-54</td>
<td>42</td>
<td>24.3%</td>
</tr>
<tr>
<td>55+</td>
<td>13</td>
<td>7.5%</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not working/ retired</td>
<td>55</td>
<td>31.8%</td>
</tr>
<tr>
<td>Student</td>
<td>58</td>
<td>33.5%</td>
</tr>
<tr>
<td>Non-health care</td>
<td>58</td>
<td>33.5%</td>
</tr>
<tr>
<td>Healthcare provider</td>
<td>2</td>
<td>1.2%</td>
</tr>
<tr>
<td><strong>Do you have any supplement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>123</td>
<td>71.1%</td>
</tr>
<tr>
<td>No</td>
<td>50</td>
<td>28.9%</td>
</tr>
</tbody>
</table>

74
Table 2. Participants' knowledge regarding supplements and its use

<table>
<thead>
<tr>
<th>Domain</th>
<th>Knowledge items</th>
<th>No</th>
<th>%</th>
<th>Yes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indication of using supplements</td>
<td>Osteoporosis</td>
<td>144</td>
<td>83.2%</td>
<td>29</td>
<td>16.8%</td>
</tr>
<tr>
<td></td>
<td>Pregnancy</td>
<td>109</td>
<td>63.0%</td>
<td>64</td>
<td>37.0%</td>
</tr>
<tr>
<td></td>
<td>Breastfeeding</td>
<td>163</td>
<td>94.2%</td>
<td>10</td>
<td>5.8%</td>
</tr>
<tr>
<td></td>
<td>Prevention</td>
<td>160</td>
<td>92.5%</td>
<td>13</td>
<td>7.5%</td>
</tr>
<tr>
<td>Total awareness</td>
<td>Poor</td>
<td>158</td>
<td>91.3%</td>
<td>15</td>
<td>8.7%</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Types of supplements</td>
<td>Multivitamins</td>
<td>112</td>
<td>64.7%</td>
<td>61</td>
<td>35.3%</td>
</tr>
<tr>
<td></td>
<td>Vitamin C</td>
<td>142</td>
<td>82.1%</td>
<td>31</td>
<td>17.9%</td>
</tr>
<tr>
<td></td>
<td>Vitamin D</td>
<td>115</td>
<td>66.5%</td>
<td>58</td>
<td>33.5%</td>
</tr>
<tr>
<td></td>
<td>Iron</td>
<td>127</td>
<td>73.4%</td>
<td>46</td>
<td>26.6%</td>
</tr>
<tr>
<td></td>
<td>Fish oils/ Omega fatty acids</td>
<td>149</td>
<td>86.1%</td>
<td>24</td>
<td>13.9%</td>
</tr>
<tr>
<td></td>
<td>Herbal Supplements</td>
<td>173</td>
<td>100.0%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Total Knowledge</td>
<td>Poor</td>
<td>142</td>
<td>82.1%</td>
<td>31</td>
<td>17.9%</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Knowledge</td>
<td>Poor</td>
<td>144</td>
<td>83.2%</td>
<td>29</td>
<td>16.8%</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Fig. 1. Source of information regarding supplements utilization](image)

Physicians were the most commonly recorded source of vitamin and supplement information (42%), followed by the Internet (31%) and recommendations from friends and family (4%). In this study, nutritionists and pharmacists were found to play a relatively insignificant role (10%) (Fig. 1). No participants reported relying on health magazines for this information.

As illustrated in Table 3, approximately half of all participants agreed that vitamins are necessary to maintain a healthy lifestyle, whereas 44.5% were neutral as to whether or not most supplements are effective. Approximately 50% of participants disagreed with the idea that supplements were a waste of money. In this study, 56% of participants agreed that most...
people receive the recommended daily allowance of vitamins from their standard diet alone. Over half of all participants (57.8%) disagreed with the use of supplements as part of a regular diet. Table 3 shows that most participants agreed that supplements could be beneficial for the human body. The majority of the participants agreed that supplements can assist to enhance an individual's immunity and prevent common illnesses, e.g., flu and chronic disease. The majority of participants also disagreed with routine daily supplement intake, believing instead that supplements should only be used during periods of ill health. Table 3 clearly shows that most participants agreed that consultation with a doctor is important prior to commencing supplement intake, as unnecessary supplement use could be detrimental to health. The majority of participants agreed that negative information acquired through published articles had prevented them from using vitamins and supplements.

Findings on the relationship between age and dietary supplement usage are presented in Table 4. A significant difference was found to occur between their consumption and two other variables, namely respondent occupation and reasons cited for supplement intake (see Table 5). Interestingly, respondent knowledge levels were clearly associated with age, gender, and information source (Table 6). These data show that young females (18–24 years), who recorded different sources of information, had significantly higher knowledge levels as compared to all other age groups (p<0.001 vs. other participants).

4. DISCUSSION

The primary finding in this study was that the majority of participants (71.1%) use nutritional supplements on a regular basis. Notably, the recorded number of dietary supplement users in this study was larger than in other published studies comprising data gathered in a Saudi Arabian-based population [9]. This may be attributable to the reported widespread and continuous increase of supplement use in Saudi Arabia [15].

In line with other publications, this study found that pregnancy-related requirements were a commonly cited reason for personal dietary supplement use. Publications also noted that general health and the maintenance of a healthy lifestyle were often sufficient reason for people to choose to use dietary supplements, as well as seeking to strengthen their immune systems in order to protect themselves against everyday ailments [29]. A study in India also noted that maintaining general good health and obtaining essential nutritional requirements were commonly cited reasons for supplement intake [30]. Earlier research conducted to establish dietary supplement knowledge levels among health science students as compared to a wider population group sample revealed that these products are typically consumed during pregnancy or in the recovery phase following an illness (43% as opposed to 38%) [9]. These findings concur with those emerging from the current research.

Fig. 2. Distribution of the studied cases according to reason (n=173)
Table 3. Knowledge to vitamin supplements among the study participants

<table>
<thead>
<tr>
<th>Attitude items</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Vitamins are necessity for optimal life</td>
<td>78</td>
<td>45.1%</td>
<td>57</td>
</tr>
<tr>
<td>Most supplements not beneficial</td>
<td>13</td>
<td>7.5%</td>
<td>77</td>
</tr>
<tr>
<td>Supplementation is a waste of money</td>
<td>4</td>
<td>2.3%</td>
<td>71</td>
</tr>
<tr>
<td>People get all required vitamins from their standard diet alone</td>
<td>98</td>
<td>56.6%</td>
<td>36</td>
</tr>
<tr>
<td>I use supplements as part of my regular diet</td>
<td>37</td>
<td>21.4%</td>
<td>36</td>
</tr>
<tr>
<td>Supplements can be beneficial to human body</td>
<td>140</td>
<td>80.9%</td>
<td>24</td>
</tr>
<tr>
<td>Supplements can help prevent common illnesses such as the (flu) and common illness</td>
<td>71</td>
<td>41.0%</td>
<td>55</td>
</tr>
<tr>
<td>I take a supplements everyday/most day</td>
<td>38</td>
<td>22.0%</td>
<td>36</td>
</tr>
<tr>
<td>I use supplements once I become sick</td>
<td>80</td>
<td>46.2%</td>
<td>27</td>
</tr>
<tr>
<td>I ask my doctor or health professional for advice before having supplements</td>
<td>123</td>
<td>71.1%</td>
<td>25</td>
</tr>
<tr>
<td>It's possible to overdose on vitamins and cause harm</td>
<td>147</td>
<td>85.0%</td>
<td>15</td>
</tr>
<tr>
<td>Any negative articles on particular vitamin supplements stops me from taking it</td>
<td>118</td>
<td>68.2%</td>
<td>35</td>
</tr>
</tbody>
</table>

Table 4. Relation between age and causes

<table>
<thead>
<tr>
<th>Causes</th>
<th>Age (years)</th>
<th>18-24 (n = 39)</th>
<th>25-34 (n = 36)</th>
<th>35-44 (n = 43)</th>
<th>45-54 (n = 42)</th>
<th>≥55 (n = 13)</th>
<th>χ²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Body Building</td>
<td>15</td>
<td>38.5</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Feeling tired</td>
<td>34</td>
<td>87.2</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Lack of vitamin and mineral</td>
<td>39</td>
<td>100.0</td>
<td>36</td>
<td>100.0</td>
<td>43</td>
<td>100.0</td>
<td>14</td>
<td>33.3</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>29</td>
<td>74.4</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>39</td>
<td>100.0</td>
<td>25</td>
<td>69.4</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Breastfeeding</td>
<td>10</td>
<td>25.6</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Prevention</td>
<td>13</td>
<td>33.3</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

χ²: Chi square test, MC: Monte Carlo,
p: p value for association between different categories
*: Statistically significant at p ≤ 0.05
### Table 5. Relation between occupation and causes

<table>
<thead>
<tr>
<th>Causes</th>
<th>Unemployed (n = 43)</th>
<th>Retired (n = 12)</th>
<th>Student (n = 58)</th>
<th>Employed (n = 58)</th>
<th>Employed (healthcare provider) (n = 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Body Building</td>
<td>15</td>
<td>34.9</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Feeling tired</td>
<td>34</td>
<td>79.1</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Lack of vitamin and mineral</td>
<td>43</td>
<td>100.0</td>
<td>12</td>
<td>100.0</td>
<td>58</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>29</td>
<td>67.4</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>43</td>
<td>100.0</td>
<td>12</td>
<td>100.0</td>
<td>9</td>
</tr>
<tr>
<td>Breastfeeding</td>
<td>10</td>
<td>23.3</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Prevention</td>
<td>13</td>
<td>30.2</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
</tbody>
</table>

$\chi^2$: Chi square test  
MC: Monte Carlo  
$p$: p value for association between different categories  
*: Statistically significant at $p \leq 0.05$
Table 6. Distribution of participants Knowledge regarding supplements according to their personal data and source of information

<table>
<thead>
<tr>
<th>Personal data</th>
<th>Overall Knowledge level</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Poor No</td>
<td>%</td>
</tr>
<tr>
<td>Age in years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24</td>
<td>10</td>
<td>25.6%</td>
</tr>
<tr>
<td>25-34</td>
<td>36</td>
<td>100.0%</td>
</tr>
<tr>
<td>35-44</td>
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<td>100.0%</td>
</tr>
<tr>
<td>45-54</td>
<td>42</td>
<td>100.0%</td>
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<tr>
<td>55+</td>
<td>13</td>
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</tr>
<tr>
<td>Occupation</td>
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<td></td>
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<tr>
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<td>26</td>
<td>47.3%</td>
</tr>
<tr>
<td>Student</td>
<td>58</td>
<td>100.0%</td>
</tr>
<tr>
<td>Non-health care</td>
<td>58</td>
<td>100.0%</td>
</tr>
<tr>
<td>Healthcare provider</td>
<td>2</td>
<td>100.0%</td>
</tr>
<tr>
<td>Do you have any supplement</td>
<td></td>
<td></td>
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<tr>
<td>yes</td>
<td>94</td>
<td>76.4%</td>
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<td>100.0%</td>
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<tr>
<td>Internet source</td>
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<tr>
<td>Yes</td>
<td>26</td>
<td>47.3%</td>
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<tr>
<td>Nutritionist source</td>
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<td>92.3%</td>
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<tr>
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<td>0.0%</td>
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<tr>
<td>Doctor</td>
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<td></td>
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<tr>
<td>Friends &amp; family</td>
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<tr>
<td>Yes</td>
<td>13</td>
<td>31.0%</td>
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P: Pearson X² test, * P < 0.05 (significant)
In this study, multivitamins were found to be the most commonly used dietary supplements. This is in line with other publications based in different countries, such as Jordan, India and Malaysia [27,30,31]. Vitamin D was the second most commonly ingested supplement in this study. These findings are consistent with a previous study undertaken by Aljohani in 2018, where the study population was also drawn from a Saudi Arabian population [31]. Research undertaken in the United States exploring patterns of multivitamin usage in women of childbearing age failed to detect any significant changes among those trying to conceive (2006: 40.2%; 2012: 38.3%; p = 0.19) [32]. These findings mirror those emanating from the current research, with regard to type of vitamin intake, as well as the reasons cited for their usage.

This study found that participants were most likely to use physicians as their source of information. This is an encouraging finding, as healthcare professionals are the most trusted source of information, possessing an awareness and understanding of an individual’s nutritional needs [33]. They are also in a position to steer their patients towards reliable and trustworthy secondary sources of information [33]. Additionally, they can provide their patients with information on how to evaluate the effects of their dietary supplements, and inform them of any adverse events they may need to be aware [33]. These findings are consistent with studies from other regions, for example, from Jordan, where both pharmacists and physicians were identified as the most common source of information regarding vitamin and mineral benefits [27]. Another publication from Pakistan reported slightly broader findings, showing that the participants were most likely to heed dietary supplement usage advice from doctors, friends/relatives, and the media [34]. In the current study, there were no self-reports of accessing health information through magazines, despite respondents in the 18–24 years age group displaying high levels of dietary supplement knowledge. This may be attributable to the fact that this cohort may be unaware of the key role health magazines can play in terms of communicating new and up-to-date information and research, along with indicating the strength of such evidence.

The majority of respondents believed that dietary supplements were beneficial in maintaining a healthy lifestyle and preventing chronic disease; again, these findings are consistent with several other publications [9]. Additionally, observational studies corroborate the reasons cited by these respondents, where certain chronic diseases (e.g., osteoporosis and atherosclerosis) demonstrate a correlation with vitamin deficiencies [35]. Furthermore, vitamin D supplement intake has been linked with mortality reduction in one of the largest meta-analyses of its kind [9].

Although 57.8% of respondents in this study disagreed with the notion that the use of regular dietary supplements would be a waste of time, Braun and Venter reported a higher rate (79.1%) of supplement usage, on a regular basis, among participants [36].

Excessive vitamin intake can result in adverse effects, [15]; therefore, a finding of particular importance emerging from this study is that the majority of respondents (85%) believed that excess consumption of vitamins is harmful. This also corroborates the findings of several other publications [34]. Short, simple, and concise information on the product packaging would help consumers to avoid excessive nutritional intake [21,31]. A high percentage of this study’s respondents noted that supplements should only be taken during periods of illness in order to improve their health. Again, this is in line with the findings of other publications, where the main motivators cited for dietary supplementation were to improve health, boost energy levels, supplement an inadequate diet, or to improve their immune system so as to avoid contracting an illness in the first instance [31,37].

Encouragingly, almost half of the study respondents highlighted the importance of seeking the advice of healthcare professionals when taking dietary supplements; however, there is a need to further increase general awareness around the importance of medical advice in the consumption of dietary supplements, as this would reduce the potential for adverse effects. It is these adverse effects that have been cited by respondents as the most common reason as to why they would choose not to take dietary supplements, having read articles highlighting their associated risks.

Those in the 18–24 years age group demonstrated higher levels of dietary supplement knowledge as compared to all other age groups. A further positive finding was that this cohort were more likely to access information from reliable sources, most notably, their doctor, thus
improving overall health outcomes by improving user knowledge of these products, reducing the likelihood of adverse effects occurring, and advising against the consumption of any unneeded supplements.

5. CONCLUSION AND RECOMMENDATIONS

This study has clearly shown that the participants in fact have a very varied range of knowledge, very often according to age, about the use of dietary supplements. 18–24-year-olds demonstrated higher levels of dietary supplement knowledge compared to the other age groups. There was generally a high and random usage of dietary supplements among the study participants. Multivitamins were the most common supplements used by the participants in this study. The most common reason for self-administering dietary supplements was to meet specific pregnancy requirements. The study also revealed the need for greater specialization in this domain to enhance people’s knowledge of dietary supplements usage.

This study highlights that further research is imminently warranted to establish vitamin and other dietary supplement product usage. Furthermore, it is imperative that research is undertaken to not only assess their associated health benefits, but also to identify any potential risks, particularly among a Saudi Arabian-based female population. Therefore, additional studies should be conducted to further investigate this area, including the impact of these products on varying sample size cohorts, geographical locations, and across different time spans.

6. STUDY LIMITATIONS

While this study produced interesting results, a number of associated limitations have also been identified. Firstly, the study was conducted over a relatively short time frame and was also only based in one specific region of the KSA; therefore, its results cannot be generalized to the KSA population as a whole. Further studies are warranted, spanning across longer timeframes, with larger population cohorts, and incorporating a more diverse group of regions. Additionally, as all information collected within this study was self-reported, recall bias clearly presents as a risk. Nevertheless, it is very encouraging that, as a whole, the results of this study concur with those obtained in other available publications.

CONSENT AND ETHICAL APPROVAL

The study proposal was reviewed and approved by the Ethics Committee, Ministry of Health, Abha, Aseer Region, Saudi Arabia, Registration number REC-NO: 4-11-2019, with the first step comprising each respondent agreeing to participate in the survey questionnaire process. Participants’ written consent has been collected and preserved by the author(s).

ACKNOWLEDGEMENTS

I would like to express our special thanks for all Participants who sharing in this study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX 1

Questionnaire

This questionnaire measures the awareness of the female in Aseer Region using the supplements, thank you for your participation.

You agree to participate in this study
1-Yes 2- No

Are you from Aseer Region
1-Yes 2- No

1. Age?
1. 18 to 24
2. 25 to 34
3. 35 to 44
4. 45 to 54
5. 55 or older
2. Occupation

1. unemployed
2. retired
3. student
4. non-healthcare
5. Healthcare provider

3. Do you take any vitamin or mineral supplement?

1. Yes
2. No

4. What is the indication of using vitamins supplement?

1. Bodybuilder
2. Feeling tired
3. Due to lack of minerals and vitamin
4. Osteoporosis
5. Pregnancy
6. Breastfeeding
7. prevention

5. Which vitamin and mineral supplement packs do you buy?

1. Multivitamins
2. Vitamin C
3. Vitamin D
4. Iron
5. Fish oils/ Omega fatty acids
6. Herbal Supplements

6. Where do you get your information on vitamin and mineral supplements from?

1. Internet
2. Nutritionist
3. Pharmacist
4. Health magazine/newspaper article
5. Doctor
6. Friends family recommendations

What is your opinion about the following:

7. 'Vitamins are a necessity for an optimal life'

1. Strongly agree
2. Agree
3. Natural
4. Disagree
5. Strongly disagree

8. 'Most vitamin supplements don't work'

1. Strongly agree
2. Agree
3. Natural
4. Disagree
5. Strongly disagree
9. 'Vitamin supplementation is a waste of money'
   1. Strongly agree
   2. Agree
   3. Natural
   4. Disagree
   5. Strongly disagree

10. 'Most people get all their necessary levels of vitamins from their standard diet alone'
    1. Strongly agree
    2. Agree
    3. Natural
    4. Disagree
    5. Strongly disagree

11. 'I use vitamin supplementation as part of my regular diet'
    1. Strongly agree
    2. Agree
    3. Natural
    4. Disagree
    5. Strongly disagree

12. 'Vitamin supplements can be beneficial to the human body'
    1. Strongly agree
    2. Agree
    3. Natural
    4. Disagree
    5. Strongly disagree

13. 'Vitamin supplementation can help prevent common illnesses such as the flu'
    1. Strongly agree
    2. Agree
    3. Natural
    4. Disagree
    5. Strongly disagree

14. 'I only supplement once I become sick/unwell or notice a problem with my health'
    1. Strongly agree
    2. Agree
    3. Natural
    4. Disagree
    5. Strongly disagree

15. 'Before I use a vitamin supplement I ask my doctor or health care professional for advice'
    1. Strongly agree
    2. Agree
    3. Natural
    4. Disagree
    5. Strongly disagree
16. 'It's possible to overdose on vitamins and cause harm'
1. Strongly agree
2. Agree
3. Natural
4. Disagree
5. Strongly disagree

17. 'I take a multi-vitamin everyday/most days'
1. Strongly agree
2. Agree
3. Natural
4. Disagree
5. Strongly disagree

18. 'Any negative articles and studies on a particular vitamin stops me from supplementing it'
1. Strongly agree
2. Agree
3. Natural
4. Disagree
5. Strongly disagree

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