

**PATTERN AND DETERMINANTS OF KNOWLEDGE, ATTITUDE AND PRACTICE
TOWARDS VITAMINS ABUSE AMONG PEOPLE IN SAUDI ARABIA.**

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Abstract

Background: Dietary supplement (DS) intake has been increasing worldwide despite no consensus evidence for the efficacy and safety of disease prevention, control, or treatment.

Objectives: To explore the pattern and determinants of knowledge, attitude, and practice towards Dietary supplements among the population in Saudi Arabia.

Method A cross-sectional study was conducted on 324 subjects via an online Google Form questionnaire. It provided information on personal and sociodemographic characteristics, morbid history, and KAP towards DS. Principal component factor analysis was used.

Results: The present study included 324 respondents; the mean age was 29.36 ± 9.104 years.

It was found that 84% of the subjects were aware of DS. About 80% of the subjects had taken vitamin supplements. The best-known vitamin was Vitamin C, while the least-known was Vitamin K. 50% of the subjects were unaware of the harmful effects of vitamin supplements. The results also showed that 81% of the study population had taken vitamin supplements, and 50% of the participants considered that vitamin supplements could be helpful. Taking vitamin supplements as a compensation for the deficiencies in the body was the most frequently chosen answer (72%) as the reason for the use of vitamin supplements. On the other hand, a majority of the population was unaware of the indications for the use of vitamin supplements.

Conclusion: This study displays a very important but neglected area of DS. Since the KAP towards the use of DS seems to be lacking in Saudi Arabia, we therefore recommend that this be addressed either by conducting health education programs to educate the general population through the media or by health care professionals. The results of this study signify that further studies are needed to assess the overuse of DS and the factors related to the description of multivitamins by doctors to their patients.

Key words: Dietary supplement, Vitamin intake, Saudi Arabia

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Introduction

A vitamin is a compound that is vital for the life of an individual. It is usually needed in small amounts to perform essential functions in the living body. [1,2] However, several studies revealed controversial results about the impact of DS on chronic disorders. [3,5] Inappropriate, excessive intake of drugs is considered a major health problem that could result in an increased chance of the occurrence of unwanted drug effects and interactions with prescribed drugs that may have a harmful impact on health. The increased number of hidden DS polypharmacy imposes a major public health problem and may complicate the patient's process. [6] The increased prevalence of DS intake among the general public and the lack of control over this process add to the complexity of the situation. [7] This process imposes major issues on the economies of developing countries with low health care indicators, which are coupled with underdeveloped infrastructure. [8] Moreover, concerns arise due to insufficient regulation of DS, leading to potential issues such as contamination, improper dosing, interactions with medications, lack of efficacy, and undetermined safety profiles. These considerations underscore the importance of informed and cautious use of dietary supplements. [9] Dietary supplements (DS) are believed to play a role in the management of chronic non-communicable disorders. [2] Vitamin A is important for the function and health of the eye. [10, 11] Vitamin E is important for the health of the cardiovascular system. [12, 13] Vitamin B complexes are important for the health and integrity of the peripheral nervous system. [14, 15] Vitamin A is important for skin and hair. [16] Vitamin E has a role in inflammatory autoimmune skin diseases such as psoriasis, vitiligo, and atopic dermatitis. [17] Most water- and fat-soluble vitamins are essential for the health and integrity of the body. [18 - 26] due to the scarcity of studies about the knowledge of the population in Saudi Arabia about the role of vitamins and DS use. [5], the present study is conducted to assess the knowledge, attitude, and practice of the subjects towards the use of DS.

Methodology

Subjects and methods: Study design: It was a cross-sectional study where an anonymous, Arabic-language electronic survey was distributed nationwide through social media networks. The sampling method was a non-probability-convenient one.

Study subjects: The required Sample size was calculated using G-Power software according to effect size = 0.3, $\alpha = 0.05$, power = 0.95, and degree of freedom (df) = 5. The expected sample size was found to be 277 subjects. For the present study, all subjects who completed and returned the questionnaire were included in the study; the enrollment number of participants was 324.

Data collection: A questionnaire was used to provide information on the sociodemographic as well as personal characteristics and morbidity histories of the participants. It also included a validated questionnaire on the knowledge, attitude, and practice (KAP) of the participants towards DS. [27] It included three sections: one about attitude towards DS; the second is a section about attitude; and the third is about the practice of the participants towards DS. The responses to the questions were yes or no. Responses to these questions were subjected to a reliability study, and we found that Cronbach alpha was high (0.788).

Data management and analysis

SPSS was used to analyze the data. The Chi square test of significance, t-test, and reliability study to calculate Cronbach's alpha were employed. The principal component factor analysis was used to study the association between KAP responses and sociodemographic characteristics. A loading of 0.3 or more on a factor means that its correlation with this factor is moderate or higher and was considered significant. The level of significance for the present study was 0.05.

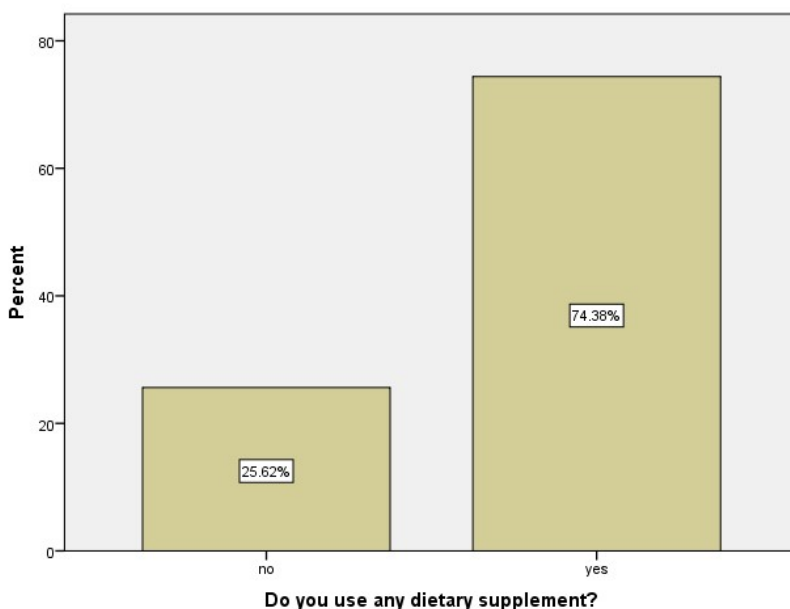
Results

The present study included 324 respondents; the mean age was 29.36 ± 9.104 years. Details of the sociodemographic characteristics are included in (Table 1).

Table.1 Sociodemographic characteristics and Use of dietary supplement

<i>Variable</i>	<i>Category</i>	<i>Total</i>	
		<i>N</i>	<i>%</i>
<i>Gender</i>	<i>Male</i>	136	42.0
	<i>Female</i>	188	58.0
<i>Marital status</i>	<i>Single</i>	184	56.8
	<i>Married</i>	140	43.2
<i>Nationality</i>	<i>Saudi</i>	299	92.3
	<i>Others</i>	25	7.7
<i>Smoking habits</i>	<i>Yes</i>	106	32.7
	<i>No</i>	218	67.3
<i>Educational level</i>	<i>Below university</i>	67	20.7
	<i>University or more</i>	257	79.3
<i>Occupation</i>	<i>Not working</i>	146	45.1
	<i>Manual work</i>	11	3.4
	<i>Medical services</i>	61	18.8
	<i>Clerical work</i>	47	14.5
	<i>Others</i>	59	18.2

Fig 1. Distribution of studied subjects according to use of DS



The majority of the studied respondents used dietary supplements (74.38%).

The majority of the respondents knew what DS were (84%), particularly vitamins B, C, and D. Details of the recognition by the respondents of the different commercially available vitamins are provided in (Table 2). Half of the respondents did not know the harmful effects of vitamins on the body.

Table 2: Knowledge of the studied subjects towards DS and recognition of the commercially available vitamins

Variable	Category	Number	Percent
Do you know what dietary supplement are?	Yes	272	84.0
Awareness of which of the following vitamin supplements: Vitamin A	Yes	200	61.7
Awareness of which of the following vitamin supplements: Vitamin B	Yes	227	70.1
Awareness of which of the following vitamin supplements: Vitamin C	Yes	292	90.1
Awareness of which of the following vitamin supplements: Vitamin D	Yes	274	84.6
Awareness of which of the following vitamin supplements: Vitamin E	Yes	174	53.7
Awareness of which of the following vitamin supplements: Vitamin K	Yes	130	40.1

Awareness of which of the following vitamin supplements: Multivitamin	Yes	176	54.3
Awareness of harmful effects of vitamin supplementation?	Yes	165	50.9

The awareness of the respondents about the role of vitamins in preventing diseases of the different systems is given in (Table 3). In general, the knowledge of the respondents about the function and role of vitamins and their importance for the different systems of the body was very low. Only Vitamin C and its role and importance for the body were appreciated by a high proportion of the respondents. However, the knowledge of those who take DS was a little bit higher than that of those who do not use it.

Table.3 Knowledge about the importance of vitamins for systems of the body

Variables	Correct answer	Use of dietary supplements				Total [N = 324]		P. value
		Yes [N=241]		No [N=83]				
		N	%	N	%	N	%	
Vitamin(s) prevent blindness								
Vitamin(A)	Yes	149	61.8	43	51.8	192	59.3	0.109
Vitamin(s) lower the risk of coronary heart disease								
Vitamin(E)	Yes	80	33.2	13	15.7	93	28.7	0.002**
Vitamin(s) are important for preventing numbness or tingling								
Vitamin(B)	Yes	135	56.0	41	49.4	176	54.3	0.296
Vitamin(s) are important for healthy skin								
Vitamin(A)	Yes	90	37.3	30	36.1	120	37.0	0.845
Vitamin(E)	Yes	115	47.7	23	27.7	138	42.6	0.001**
Vitamin(s) are required for the integrity of the immune system								
Vitamin(C)	Yes	155	64.3	40	48.2	195	60.2	0.010**
Vitamin(D)	Yes	72	29.9	26	31.3	98	30.2	0.804
Vitamin(s) lower the risk of cancer								
Vitamin(D)	Yes	84	34.9	19	22.9	103	31.8	0.044*
Vitamin(s) prevent flu/cold								
Vitamin(C)	Yes	199	82.6	55	66.3	254	78.4	0.002**
Vitamin(s) prevent birth defects								
Vitamin(B)	Yes	94	39.0	29	34.9	123	38.0	0.511
Vitamin(s) should be given in pregnancy								
Vitamin(B)	Yes	104	43.2	32	38.6	136	42.0	0.464
Vitamin(s) should be avoided in pregnancy								
Vitamin(A)	Yes	132	54.8	30	36.1	162	50.0	0.003**

The attitude of the respondents towards DS is provided in (Table 4). The majority of the respondents believe that DS has benefits for the body, and a great proportion also believe that DS could interact with each other and with drugs.

Table 4: Attitude of the studied subjects towards DS

Variable	Category	Number	Percent
Do you think that DS can prevent chronic diseases?	Yes	136	42.0
Do you think that DS can treat chronic diseases?	Yes	87	26.9
Do you believe that DS have benefits?	Yes	292	90.1
Do you think that taking a drug, food or drinks with the dietary supplement might interact with each other?	Yes	236	72.8

Details of the practices of the respondents towards DS are included in (Table 5).

The majority of the respondents use DS (74%), and 87% use vitamins. The majority use vitamins to improve their health, and only half of the respondents use vitamins according to the advice of the treating doctor. Only 60% use vitamins according to the recommended dose. A minority of the subjects were interested in attending workshops on DS (12.3%).

Table 5: Practice of the studied subjects towards DS

Variable	Category	Number	Percent
Have you attended any Health campaign/workshop on dietary supplement?	Yes	40	12.3
Do you use any dietary supplement?	Yes	241	74.4
I always look for a professional medical help, when taking dietary supplement?	Yes	204	63.0
Sources of awareness of vitamin supplements?	doctor	192	59.3
	Friends or Relatives	40	12.3
	Media or Newspaper	60	18.5
	Other	32	9.9
Are Vitamin supplements helpful?	Yes	283	87.3
Why do you take vitamin supplement?	To improve general health	233	71.9
	To replenish energy	149	46.0
	Required during pregnancy or lactation	101	31.2
	For recovery from disease	62	19.1
	To improve skin condition	175	54.0
	To prevent hair loss	172	53.1
Taken vitamin supplements?	Yes	264	81.5
Recommendation of vitamin supplements use by?	doctor	187	57.7
	Friends or Relatives	67	20.7
	Others	70	21.6
Frequency of vitamin supplement use?	Once daily	196	60.5
	Twice daily	28	8.6
	Others	60	18.5
	Don't know	40	12.3

Taken the recommended dose of vitamin supplements?	Yes	212	65.4
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Details of the loadings (weights) of the variables on the factors in principal component factor analysis are included in (Table 6). Most of the variables reflecting KAP towards DS are significantly loaded on factors 1 and 2 (loadings higher than 0.3). However, these variables were not significantly related to age, gender, smoking habit, marital status, or occupation (loadings were less than 0.3). On the other hand, the variables age, gender, smoking habit, and occupation were significantly loaded on factor 4 (loadings greater than 0.3). Few variables about knowledge of the vitamins were more increased in males; however, regarding vitamins that protect hair, the knowledge was significantly higher in females.

Table 6: Principal component factor analysis for socioeconomic characters and variables on KAP towards DS.

Variables on sociodemographic characteristics and KAP towards use of DS	Factors and variable loadings			
	F1	F2	F3	F4
Age	-.126	.069	.234	.312
Gender	.177	.196	-.325	-.628
Marital status	-.123	.088	.181	.119
Nationality	.023	.055	-.025	-.068
Smoking habits	.126	.136	-.143	-.403
Educational level	-.035	.228	.171	.121
Occupation	-.091	.006	.391	.464
Do you know what dietary supplement are?	.290	.551	.207	.103
Do you think that DS can prevent chronic diseases?	.074	.254	-.180	-.103
Do you think that DS can treat chronic diseases?	-.049	.053	-.282	.118
Do you believe that DS have benefits?	.198	.258	.115	.157
Do you know what dietary supplements are?	.256	.502	.208	.074
Have you attended any Health campaign/workshop on dietary supplement?	.010	.027	-.391	.201
Do you use any dietary supplement?	.167	.473	.251	-.086
I always look for a professional medical help, when taking dietary supplement?	.092	.174	-.232	-.171
Do you think that taking a drug, food or drinks with the dietary supplement might interact with each other?	.168	.221	-.117	-.151
Sources of awareness of vitamin supplements?	-.032	.026	.308	.220
Are Vitamin supplements helpful?	.003	-.232	.188	-.110
Taken vitamin supplements?	.129	.364	.073	-.075
Recommendation of vitamin supplements use by?	-.076	-.208	.269	.369
Frequency of vitamin supplement use?	.022	-.085	-.040	-.083
Awareness of which vitamin supplements: Vitamin A	.297	.279	-.325	.316

Awareness of which vitamin supplements: Vitamin B	.370	.311	-.067	.267
Awareness of which vitamin supplements: Vitamin C	.304	.343	.156	.002
Awareness of which vitamin supplements: Vitamin D	.317	.393	.247	.040
Awareness of which vitamin supplements: Vitamin E	.311	.215	-.310	.300
Awareness of which vitamin supplements: Vitamin K	.258	.239	-.279	.458
Awareness of which vitamin supplements : Multivitamin	.155	.366	-.194	.474
Awareness of harmful effects of vitamin supplementation?	.160	.411	-.319	.070
Vitamins are used to overcome deficiencies	.161	.147	-.150	.339
Vitamins are used to improve general health	.102	.225	.242	-.020
Vitamins are used to replenish energy	.266	.175	.061	.102
Vitamins are required during pregnancy or lactation	.137	.110	-.208	-.139
Vitamins are used for recovery from disease	.117	-.072	-.195	.206
Vitamins are used to improve skin condition	.343	.259	-.189	-.243
Vitamins are used to prevent hair loss	.346	.271	-.123	-.316
Does vitamin(A) prevent blindness?	.272	.297	-.187	.040
Does vitamin(B) prevent blindness?	.088	-.285	-.098	-.194
Does vitamin(C) prevent blindness?	.255	-.315	-.008	-.103
Does vitamin(D) prevent blindness?	.226	-.200	.068	-.070
Does vitamin(E) prevent blindness?	.085	-.220	.307	.004
Does vitamin(A) lower the risk of coronary heart disease?	.070	-.173	.106	-.045
Does vitamin(B) lower the risk of coronary heart disease?	.082	-.033	-.180	.112
Does vitamin(C) lower the risk of coronary heart disease?	.324	-.169	-.035	.044
Does vitamin(D) lower the risk of coronary heart disease?	.352	-.131	.141	.036
Does vitamin(E) lower the risk of coronary heart disease?	.226	.090	.076	-.131
Does vitamin(A) lower the risk of cancer?	.256	-.330	.035	-.084
Does vitamin(B) lower the risk of cancer?	.290	-.192	.015	-.150
Does vitamin(C) lower the risk of cancer?	.207	-.090	-.063	.103
Does vitamin(D) lower the risk of cancer?	.360	.062	.080	.081
Does vitamin(E) lower the risk of cancer?	.273	-.119	.197	-.108
Is vitamin(A) required for the integrity of the immune system?	.365	-.267	.036	.083
Is vitamin(B) required for the integrity of the immune system?	.244	-.369	-.155	.060
Is vitamin(C) required for the integrity of the immune system?	.331	.228	.268	-.092
Is vitamin(D) required for the integrity of the immune system?	.491	-.113	.091	.020
Is vitamin(E) required for the integrity of the immune system?	.298	-.331	.057	.190
Is vitamin(A) important for healthy skin?	.440	-.011	.072	.133
Is vitamin(B) important for healthy skin?	.393	-.275	-.075	-.069

Is vitamin(C) important for healthy skin?	.424	.054	-.098	-.246
Is vitamin(D) important for healthy skin?	.389	-.231	.103	-.036
Is vitamin(E) important for healthy skin?	.510	.202	.124	-.048
Does vitamin(A) prevent flu/cold?	.307	-.370	.017	.162
Does vitamin(B) prevent flu/cold?	.214	-.359	-.358	.137
Does vitamin(C) prevent flu/cold?	.289	.330	.456	-.150
Does vitamin(D) prevent flu/cold?	.479	-.279	-.139	.105
Does vitamin(E) prevent flu/cold?	.399	-.363	-.048	.057
Does vitamin(A) prevent birth defects?	.322	-.052	.223	-.128
Does vitamin (B) prevent birth defects?	.371	.016	-.150	-.039
Does vitamin (C) prevent birth defects?	.361	-.380	-.088	.091
Does vitamin (D) prevent birth defects?	.312	-.178	-.115	.079
Does vitamin (E) prevent birth defects?	.228	-.244	.250	-.021
Should vitamin (A) be given in pregnancy?	.145	-.294	.245	-.115
Should vitamin (B) be given in pregnancy?	.421	.125	-.004	-.018
Should vitamin (C) be given in pregnancy?	.360	-.099	-.030	-.125
Should vitamin (D) be given in pregnancy?	.354	.135	.184	-.070
should vitamin (E) be given in pregnancy?	.269	-.239	.196	-.108
should vitamin (A) be avoided in pregnancy?	.354	.192	-.037	-.065
should vitamin (B) be avoided in pregnancy?	.055	-.439	-.228	.076
Should vitamin (C) be avoided in pregnancy?	.317	-.396	.019	.115
should vitamin (D) be avoided in pregnancy?	.207	-.289	.037	.104
should vitamin (E) be avoided in pregnancy?	.120	-.164	.282	.013

Discussion

Vitamins are essential for the proper functioning of the different body organs. All functions of the body, including metabolism, immunity, growth, and overall body functions, depend on vitamins. They support the body in numerous aspects, such as acting as cofactors in enzymatic reactions. The consumption of a daily multivitamin among people all over the world has dramatically increased in recent years. [28] However, excessive intake or deficiency may result in several health complications. As the body can't produce these substances on its own in sufficient quantities, optimal health depends on the intake of foods containing the right amounts of vitamins. [27] The body needs several vitamins to maintain its proper functioning, as indicated by the National Institute of Health of America [29]. Thus, this study aimed at studying the KAP of the population in Saudi Arabia and the importance and need for DS. We found that the majority of the respondents were aware of DS (84%), almost all of them had taken DS (74%), and a great proportion had taken vitamin supplements (81%). These findings support the basis of the present study that DS use is common in our community. This finding is in line with a previous study. [27] The present study

revealed that most of the respondents (54%) got their information about DS from the doctors, and a small proportion got it from the media and newspapers. This is in line with previous studies [5]. Vitamins are taken mainly to improve health, replenish energy, and care for the skin and hair [27]. This is in line with the findings of the present study. About one-fifth of the respondents did not know the right frequency of vitamin intake, while the majority had taken the vitamins once per day. Also, 60% had taken the recommended dose per day. This is in line with findings from a previous study. [5, 27]. This is a particularly important finding, as overdosing on vitamins can have bad consequences for your health. However, 49% of the subjects did not know the harmful effects of overusing vitamins. Most people believe that if vitamins are not effective, at least they are safe. However, the long-term health consequences of vitamin consumption are unknown. [28] In the present study, some subjects suggested some vitamins for preventing specific indications; for example, vitamin "E" is important for healthy skin. Vitamin "A" prevents blindness, Vitamin 'B' prevents birth defects and numbness, and Vitamin C improves flu/cold. Although no solid evidence is available in the literature suggesting these specific indications, marketing statements and health-related articles in newspapers have made a significant contribution to these perceptions. [27, 29]

Limitation

This study has several limitations that need to be addressed. Since the study was a cross-sectional study, the association between variables could not be studied. Secondly, most of the study participants were highly educated (university education), so their knowledge about vitamin supplementation might be different from that of the less educated or illiterate population, which may have biased the study results.

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Author Contributions

F.G. contributed to the study design, analyzing data, and writing the draft. A.R., AA, S.A.R.,A.A., and A.M. contributed to collecting data and writing the draft. All authors have read and agreed to the published version of the manuscript.

Institutional Review Board Statement

The IRRB of Ibsina National College approved the study for medical studies. (No. H-03-09062021, approval date: September 6, 2021).

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

Dara for the present study is embedded in the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

Funding

The authors declare that no funds were received from any bodies.

Conclusion

This study displays a very important but neglected area of DS. Since the KAP towards the use of DS seems to be lacking in Saudi Arabia, we therefore recommend that this be addressed either by

conducting health education programs to educate the general population through the media or by health care professionals. The results of this study signify that further studies are needed to assess the overuse of DS and the factors related to the description of multivitamins by doctors to their patients.

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