Journal of Pioneering Medical Sciences
Received: February 03, 2025 | Accepted: March 03, 2025 | Published: April 27, 2025
Volume 14, Issue S01, Pages 68-76

DOI https://doi.org/10.47310/jpms202514S0109

Multivitamin- Multimineral (MVMM) Use Among Saudi Adults In Al-Majmah, Saudi Arabia: Prevalence and associated Factors

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Abstract **Introduction:** A nutritious diet is essential for sustaining good health and preventing illness. Globally, billions of people take dietary supplements like Multivitamin-Multimineral (MVMM) preparations to improve their health, prevent diseases, or fill vitamin and mineral shortages. This current study was carried out to determine the prevalence and characteristics of Multivitamin- Multimineral (MVMM) use among Saudi populations in Al-Majmaah, Saudi Arabia. **Methods:** A descriptive cross-sectional study as conducted in Majmah, Saudi Arabia, where all adults age above 18 years old were enrolled in this study, data was collected by using properly designed an online survey and collected data, was analyzed using Statistical Package for Social Sciences (SPSS 24). **Results:** The study included 347 participants, of whom about 55% were male and 45% were female adults. Most of participants did not follow any special diets behavior, 34% had vegetables and fruits regularly and only 20% had regular physical activity. About 47% of participants (Male 46.3% and Female 53.7%, p-value .001 significant statistical relationship between genders) used vitamins and minerals in their daily life, for those who using these products, about 51% used multiple vitamins and minerals, 42% used Vit D, 7% used Folic Acid, 7% used Ferrous, 5% used Vit B and 5% used other vitamins or minerals. About 47% of participants used it daily and 34% on weekly basis. Our study found a significant statistical relationship between, age group (18-28 years; 53.7%, 29-39; 16.5%, 40-50; 26.8% and more than 50; 3.0%; p-value .009 significant statistical relationship between age groups) marital status (Married; 45.7%, Single; 45.7%, Divorced; 2.4%, Widowed; 0.6%; p-value .000 highly significant statistical relationship between marital status groups), while there was no statistical relationship between educational level groups with p-value >0.05. **Conclusion:** The study revealed a high prevalence of MVMM use among the general population in Saudi Arabia, reporting a significant statistical relationship with gender, age group and marital status. Most participants (more than two-thirds) thought that MVMM supplements were used to enhance health. They obtained MVMM directly from the pharmacy without a prescription, as part of a hospital prescription. These findings show the need for greater awareness on the importance of balanced nutrition and physical exercise, in addition to supplement use, in improving general well-being in the Saudi population. The study's findings are intriguing but have limitations. Its online survey approach and Al-Majmaah City restriction could have introduced bias. Therefore, a broad population and more comprehensive methodological approaches might be used in future research.

Key Words Multivitamin-Multimineral (MVMM), Al-Majmaah, nutritional supplements, chronic diseases, special diet, physical activity

INTRODUCTION

Sustaining optimal health and preventing illness requires a balanced diet. Dietary supplements, such as multivitamin-multimineral (MVMM) preparations or multivitamin-multimineral supplements (MVMS), are used by enormous numbers of people worldwide to boost their general well-being or alleviate vitamin and mineral deficiencies [1]. According to estimations by the World

Health Organization (WHO), deficiencies in vitamins and minerals affect over 2 billion people globally [2]. The world faces an imminent risk of micronutrient deficiencies, as 821 million people worldwide are malnourished, according to a recent report from five United Nations (UN) organizations [3]. In the United States of America alone, about 170 million people consume nutritional supplements to boost their overall state of fitness and health [4]. As a result, the global market for dietary supplements continues to explode and is currently valued at 130 billion US dollars [5]. MVMS is particularly prevalent in Saudi Arabia, where most assume supplements will help them stay fit and healthy [6]. A dietary supplement is a potent version of nutrients that are incorporated into the regular diet to achieve physiological or nutritional benefits. These supplements might be sold in several forms, such as liquids, tablets, or capsules. A dietary supplement may include one or more nutrients. Nutritional supplements must contain vitamins, minerals, amino acids, herbs, or extracts for body benefits. A balanced diet provides sufficient nutrients and energy for the body's needs adequately [7].

Maintaining health, seeking energy and minimizing certain diseases are only a few of the benefits of MVMM. It is essential to balance the body's needs and supplement intake. Replenishing micronutrient deficiencies is highly recommended to prevent an array of diseases. Vitamin deficiencies are ubiquitous around the world, making the populace vulnerable to illnesses spurred by such deficiencies. Deficiencies in vitamins A, B, C and D are associated with osteomalacia, rickets, megaloblastic anemia, scurvy and night blindness, respectively [8,9]. Similarly, deficiencies of iron, iodine, zinc and folate contribute to iron deficiency anemia, goiter, stunted development and anomalies of the neural tube, respectively [10,11]. These shortcomings can be rectified using MVMM or MVMS. Inappropriate use of these supplements might result in toxicities that adversely affect the body's functioning far more than they are beneficial to it. The main disadvantage of utilizing dietary supplements such as MVMM or MVMS is that there are no international standards that ensure the quality and standard of these compositions [5]. The knowledge available currently is inadequate to assess the advantages and disadvantages of using MVMM to reduce morbidity and mortality from illnesses such as cardiovascular disease, cancer, liver failure and renal failure. As a result, using dietary supplements has some risk and individuals might endure adverse long-term effects. Research studies have revealed that consuming herbal supplements to develop muscle and lose weight has adverse consequences [12]. Excessive consumption of MVMS has been associated with adverse effects such as photosensitivity and neurotoxicity, which have been caused by pyridoxine overdose [12]. Excess vitamin D has a deleterious effect on bone development and may contribute to congenital anomalies if taken during pregnancy [13]. Appropriate guidelines need to be established to guarantee the safety, efficacy and nutritional value of these dietary supplements. It has been revealed that many demographic factors, including age, material status, societal position and level of education, precisely reflect these variations. Previous research revealed that dietary supplement consumption was more prevalent in women and the elderly than in males and youngsters [14,15]. Also, the number of dietary supplements consumed depends on economic class and education level. Those who are more affluent and have higher education are more likely to consume more MVMM since they are more aware of its benefits to their health [16]. Li *et al.* [17] study observed trends in MVMM use among Americans with diabetes. The results of the study revealed that between 1999 and 2004, the incidence and trends of dietary supplements and minerals were consistently stable [18]. The study discovered a modest decline in MVMM use. Additionally, Cowan et al. assessed how often MVMM is used by adults over the age of 19 [18]. The results of the study revealed that 52% of participants had used one or more dietary supplements in the month prior. In addition, it was found that those with higher incomes and people who had access to food were significantly more likely to use MVMM [18].

Although global research on the prevalence of MVMM has been conducted, but studies and data are scarce available for Al-Majmaah City, Saudi Arabia. Hence, the main purpose of this study was to fill a research gap concerning the usage and prevalence of MVMM in Al-Majmaah City, Saudi Arabia. The study focuses on the prevalence of the use of multivitamins and minerals among study participants without actual clinical chronic illnesses. In addition, assess the pattern of the usage, its association with their sociodemographic data and their general health status.

MATERIALS AND METHODS

Study Design and Sample Size

A cross-sectional, questionnaire-based study was conducted to determine the prevalence of usage, frequency and usage of vitamins and minerals among participants in Al-Majmaah, Saudi Arabia from December 2022 to June 2023.

Sampling Technique

The study involved both male and female participants aged 18 years and above from Al-Majmaah, Saudi Arabia. A simple convenience sampling technique was used for the sampling.

Sample Size Estimation

According to a recent similar study conducted by Alwalan *et al.* [19] in Riyadh, which found the usage or prevalence rate of vitamins and minerals at 47%, the sample size was calculated accordingly with the following equation: $n = z^2pq/m^2$. taking z-value (1.96 for 95% confidence level); p (47%, assumed proportion); q (53% ,1-p complementary); m (0.05, margin of error); n (sample size). So, the sample size was equal to (1.96) 2*0.47*0.53/(0.05) 2 = 284.

After designing the questionnaire, the validity of the questionnaire was determined by a pilot study selecting a group of 5 participants and accordingly, the questionnaire was finalized with a few modifications.

To increase the validity and for analytical convenience, 385 subjects included in the study. Out of 385 participants approached, 11% (38 participants) were excluded due to incomplete or inappropriate questionnaire form submission. A total of 347 participant data was included in the data analysis.

Data Collection Tool

Data was collected by the study team using a properly designed online survey. Participants were reached through multiple social media such as WhatsApp, email, etc. and were requested to fill the electronic Google form questionnaire.

Data Analysis

After reviewing and coding the collected data, it was analyzed using Statistical Package IBM® SPSS Statistics for Windows, version 24 (IBM Corp., Armonk, N.Y., NY). Descriptive statistics such as frequency and percentage (%) were used to present the data. The chi-square test was used for association to determine the variables among participants. The significance level was 95% degree of freedom with a p-value of 0.05.

Inclusion and Exclusion Criteria

Both male and female, Al-Majmaah City above the age of 18 and willing to volunteer to participate in the survey were included in the survey. Participants below 18 years and for whatever reason, refused to take part, or who did not complete the questionnaire were considered non-respondents.

Ethical Consideration

Ethics Statement

The present study protocol was conducted in accordance with the Declaration of Helsinki and approved by The Majmaah University for Research Ethics committee (MUREC) (HA-O1-R-088) with ethical number MUREC-Dec.1 5/CONI-2022/21-5 approval on 5l- 12-2022.

The present study protocol was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board of Majmaah University.

Participants received a short briefing on the purpose of the study prior to the commencement of the survey and were informed of the advantages of partaking in the survey, not only to themselves but also to the community. Informed consent was obtained from the respondents before enrollment in the survey and documented.

Confidentiality of personal data was protected and assured. Each participant had the right to withdraw from the study at any time.

RESULTS

A total of 347 (55% male and 45% female) participants took part in the present study. The participants were aged 18 and above, most of them between 18 and 28 years old (62.8%). More than half of the participants were single (60.8%), while 36.6% were married, only 1.4% were widowed and 1.2% were divorced. Two-third of the participants (74.1%) were university graduates (Table 1).

About 83.3% of participants were not suffering from any types of chronic diseases; While 16.7%, of those who suffered from chronic diseases had 17.2% diabetes mellitus; 13.8% hypertension and heart diseases; 5.2% anemia and blood related diseases; 6.9% hypothyroidism; 29.3% asthma and respiratory illness; 6.7% osteoporosis; 3.4% skin and psoriasis; 1.7% dyslipidaemia and 15.5% others (GIT, allergies etc.,) (Figure 1).

Most of the participants (87.3%), were not following any special diets, only 35.4% had vegetables and fruits regularly and 19.6% did regular physical activity. About 47.3% of participants used vitamins and minerals in their daily life as supplements. (Table 2).

From 47.3% those using MVMM supplements, 53.1% used Vit B complex; 6.56% used Folic acid; 29.51% used

Table 1: Sociodemographic characteristics of participants

Variables		Frequency	%
Gender	Male	191	55.0
	Female	156	45.0
Age group (years)	18-28	218	62.8
	29-39	48	13.8
	40-50	72	20.7
	>50	9	2.6
Marital status	Married	127	36.6
	Single	211	60.8
	Divorced	4	1.2
	Widowed	5	1.4
Educational level	Primary	7	2.0
	Elementary	17	4.9
	Secondary	54	15.6
	University	257	74.1
	Postgraduate	12	3.5

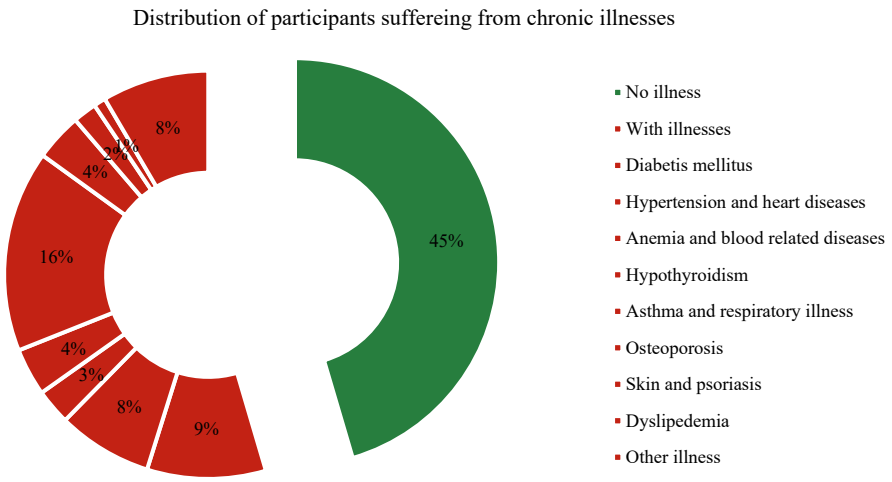

Figure 1: Distribution of participants according to their medical history (n = 347)

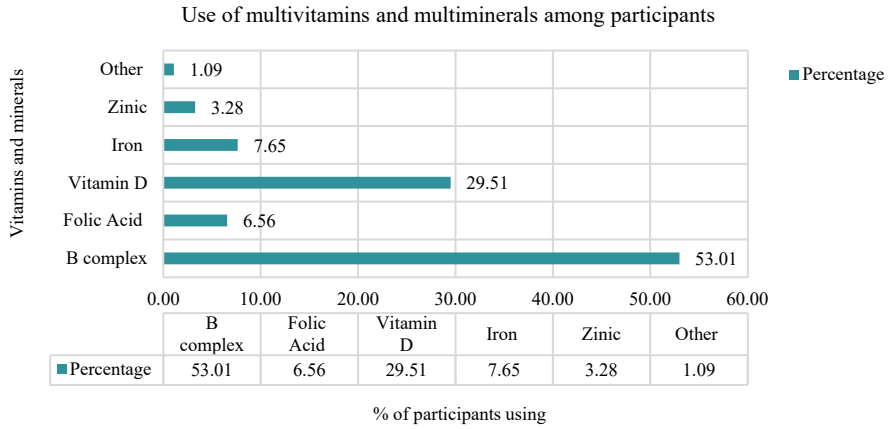

Figure 2: Type of MVMS used by the participants (n = 164)

Table 2: Lifestyle and type of MVMM use in the daily life among participants (N = 347)

Variables	YES No. (%)	NO No. (%)	TOTAL No. (%)	Chi sq.	P value
Do you follow any special diet?	44 (12.7)	303 (87.3)	347 (100)	193.3	<.00001**
Do you eat vegetables and fruits regularly?	12 (35.4)	224 (64.6)	236 (68)	29.4	<.00001**
Do you do regular physical activity?	68 (19.6)	279 (80.4)	347(100)	128.3	<.00001**
Do you use any kind of vitamins and minerals?	164 (47.3)	183 (52.7)	347(100)	1.04	0.31

Vit D; 7.65% used Iron supplements; 3.28% used Zinc supplement and 1.09% used other vitamins or minerals (Figure 2).

As shown in the Figure 4 about 47% of participants used vitamins and minerals on daily basis; 32.9% weekly,18.3% on monthly basis while 0.6% every 5 years and 1.2% used as when they remembered (Figure 3).

Of the total 347 participants, 189 responded about the source MVMM, of which most participants either obtained from the pharmacy without a prescription (42%), or from the hospital as a prescription (38.6%), while 11.6% obtained them from websites, followed by health or food supplement stores (4.8%) and club coach and friends (1.1 %and 1.6%) each (Figure 4).

About 205 mentioned the reasons for using the MVMM, of which more than half (66.8%) used vitamins and minerals for their health promotion, 60.98% used as nutritional supplements, 55.6% to improve their physical structure, 16% as part of general treatment with other diseases, 12.7% used to prevent specific diseases and while 4.4% post-surgeries for obesity (Figure 5).

About 46% of participants perceived using of MVMM had great benefit to the body, 44% thought it benefit the body and 9% revealed there is not harm taking them (Figure 6).

Majority of the participants (84%) thought consuming MVMM will help in health promotion while 15.3% were unaware of the benefits and only few 0.6% thought it will help in preventing cancers (Figure 7).

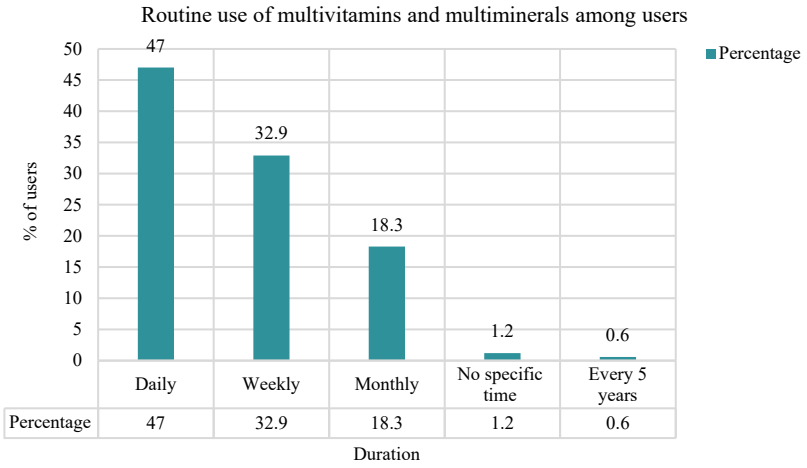

Figure 3: Routine use of MVMM and minerals by the participants (n = 164)

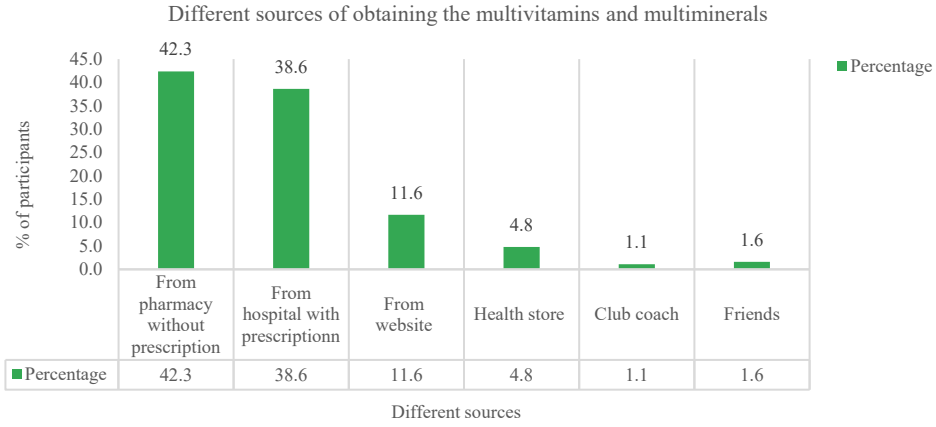

Figure 4: Sources of obtaining MVMM (n = 189)

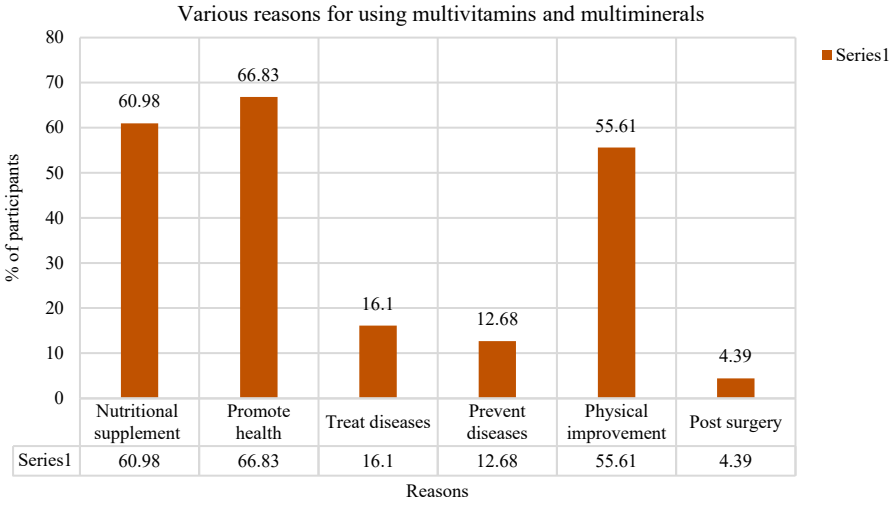

Figure 5: Reasons for using MVMM (n = 205)

The majority of participants (84%) mentioned that they took multivitamins and minerals for health promotion purposes.

There was significant statistical relationship between gender and using any kind of vitamins and minerals, p-value <0.05 (Table 3).

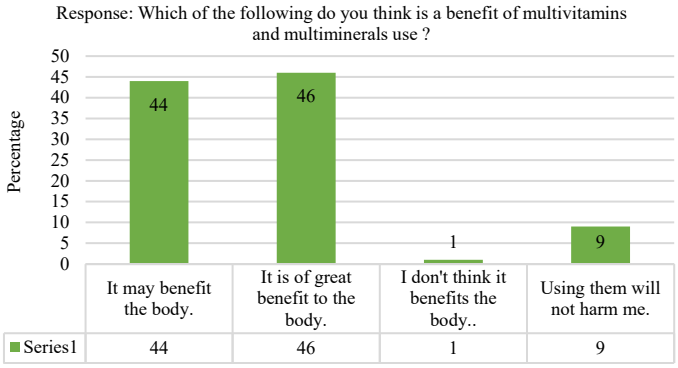

Figure 6: Perception of benefit of use of MVMM among participants (n = 238)

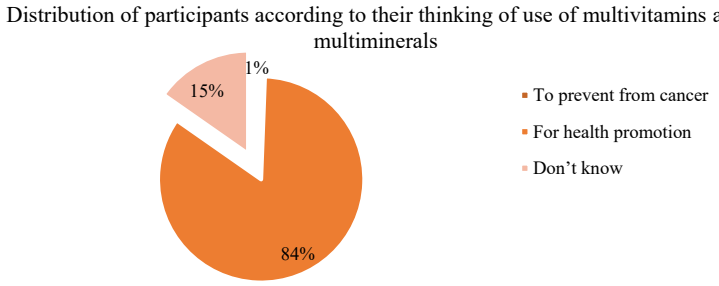

Figure 7: Benefits of use of MVMM (n = 347)

Table 3: Gender comparasion depending on use of MVMM

Variables	Gender			Total	p-value
	Count	Male	Female		
Yes		76	88	164	0.001*
	% within Q8	46.3%	53.7%	100%	
	% of Total	21.9%	25.4%	47.3%	
No	Count	115	68	183	
	% within Q8	62.8%	37.2%	100%	
	% of Total	33.1%	19.6%	52.7%	
Total	Count	191	156	347	
	% within Q8	55%	45%	100%	
	% of Total	55%	45%	100%	
*p-value <0.05 = statistically significant					

Table 4: Comparasion of age groups and use of MVMM

Variables		Age group in years				Total	p-value
		18-28	29-39	40-50	>50		
Yes	Count	88	27	44	5	164	0.009**
	% within Q8	53.7%	16.5%	26.8%	3.0%	100%	
	% of Total	25.4%	7.8%	12.7%	1.4%	47.3%	
No	Count	130	21	28	4	183	
	% within Q8	71.0%	11.5%	15.3%	2.2%	100%	
	% of Total	37.5%	6.1%	8.1%	1.2%	52.7%	
Total	Count	218	48	72	9	347	
	% within Q8	62.8%	13.8%	20.7%	2.6%	100%	
	% of Total	62.8%	13.8%	20.7%	2.6%	100%	
*p-value <0.05 = statistically significant							

There was significant statistical relationship between age group and using any kind of vitamins and minerals, p-value <0.05 (Table 4).

There was significant statistical relationship between age group and using any kind of vitamins and minerals, p-value <0.05 (Table 5).

Table 5: Comparasion between maratial status and use of MVMM

Response		Marital status				Total	p-value
		Married	Single	Divorced	Widowed		
Yes	Count	75	84	4	1	164	0.000**
	% within Q8	45.7%	51.2%	2.4%	.6%	100%	
	% of Total	21.6%	24.2%	1.2%	.3%	47.3%	
No	Count	52	127	0	4	183	
	% within Q8	28.4%	69.4%	.0%	2.2%	100%	
	% of Total	15.0%	36.6%	.0%	1.2%	52.7%	
Total	Count	127	211	4	5	347	
	% within Q8	36.6%	60.8%	1.2%	1.4%	100%	
	% of Total	36.6%	60.8%	1.2%	1.4%	100%	
*p value < 0.05 = statistically significant							

Table 6: Comparasion between educational level and use of MVMM

Variable		Educational level					Total	p-value
		Primary	Elementary	Secondary	University	Postgraduate		
Yes	Count	4	6	23	125	6	1	0.7
	% within Q8	2.4%	3.7%	14.0%	76.2%	3.7%	100%	
	% of Total	1.2%	1.7%	6.6%	36.0%	1.7%	47.3%	
No	Count	3	11	31	132	6	183	
	% within Q8	1.6%	6.0%	16.9%	72.1%	3.3%	100%	
	% of Total	0.9%	3.2%	8.9%	38.0%	1.7%	52.7%	
Total	Count	7	17	54	257	12	347	
	% within Q8	2.0%	4.9%	15.6%	74.1%	3.5%	100%	
	% of Total	2.0%	4.9%	15.6%	74.1%	3.5%	100%	

No statistical relationship was observed between educational level and using any kind of vitamins and minerals, p-value >0.05 (Table 6).

DISCUSSION

The present study demonstrated that about 347 subjects participated in this study, of whom about 55% were males and 45% were females. The majority of participants (63%) were within the age group of 18-28 years, 14% within the age group of 29-39 years, 21% within the age group of 40-50 years and only 3% within the age group of above 50 years. More than half of the total participants (61%) were single, while married, divorced, or widowed were 37%, 1% and 1%, respectively. Considering the education, most of the participants (74%) completed university, 16% attended secondary schools, 5% finished elementary, 4% were postgraduate and only 2% completed primary schools.

In terms of participant lifestyle, most participants did not follow any special diets, while 34% consumed vegetables and fruits regularly and 20% did regular physical activity.

The current study showed that about 47% of participants used MVMM in their daily lives. Among those who were using these products, 51% used MVMM, 42% used Vit D, 7% used Folic Acid, 7% used Ferrous, 5% used Vit B complex and 5% used other vitamins or minerals. The findings were similar to a previous study conducted among Saudi populations in Riyadh city in 2022 by Alwalan S. and his colleagues, which indicated that the prevalence of MVMM supplement use turned out to be 47% [19,20].

The present study revealed that about 47% of participants used vitamins and minerals daily and 34% on a weekly basis. The majority of participants (84%) mentioned that they took MVMM for health promotion purposes. It was also found that the majority of participants either obtained vitamins and minerals from the pharmacy without a prescription (42%), or from the hospital with a prescription (40%), while 11% obtained them from websites. These findings were consistent with Alwalan, 57.9% of participants used MVMM daily, followed by weekly (27.1%) and monthly (14.9%) usage. In addition, 57.9% of MVMM users received prescriptions from hospitals, while 25% purchased them over the counter at pharmacies. The majority of individuals (32.2%), (29.4%) and (16%) utilized MVMM for illness treatment and diet supplements. Most research participants did not report having any chronic illnesses. Nonetheless, the individuals' most often reported chronic illnesses were diabetes (4.1%), dyslipidemia (4.8%), anxiety (5%) and hypertension (5.2%) [19].

About 67% of the participants used vitamins and minerals for health promotion; 61% took them as nutritional supplements; 16% to improve their physical structure; 16% to treat a disease; and 13% to prevent a specific disease. Prior research conducted in 2022 revealed more evidence in support of these findings, indicating that more than fifty percent of the participants considered MVMM supplements to be utilized to boost their overall wellness and they reportedly consumed them as prescribed by hospital prescriptions. A third of the subjects utilized MVMM for illness treatment, diet supplements and health promotion [19,21]. The present study also demonstrated that most participants thought that using multivitamins and minerals had a great benefit to the body (46%), may benefit the body

(44%) and would not harm them (9%). These findings were similar to the Blumberg JB study in 2018, which found that more than half of the study participants believed in the health benefits of MVMM use. Vitamins and minerals have been shown in studies to reduce the incidence of cancer [22], protect fetuses from some congenital anomalies. Oral magnesium supplementation may help reduce blood pressure in people with essential hypertension. Magnesium supplementation may lower blood pressure due to decreased systemic vascular resistance and left ventricular function [23]. However, the evidence on the role of MVMM use in maintaining health and the primary prevention of diseases remains controversial [24].

The study found a significant statistical relationship between gender, age group, marital status and using any kind of vitamin or mineral, while there was no statistical relationship between educational level and using any kind of vitamin or mineral. The present study supported the findings of two previous studies, which indicated a statistically significant association between MVMM use and gender and marital status [17]. In another study, it conducted a cross-sectional survey in Hail, Saudi Arabia with 310 participants found that 441.76% of them consumed MVMM on a regular basis. 48.9% took it via hospital as a prescription. The most common reason for taking it was to improve health (38.71%). 41.21% used on a daily basis. Vitamin B complex as most used with 20.65% followed by others.

However, in the subsequent trial, all the participants were females, who utilized substantially more dietary supplements than males. The rationale for women's higher use of dietary supplements than men's can be attributed to calcium and vitamin D supplements to prevent osteoporosis [25]. Folic acid supplementation is also advised for women before and throughout pregnancy.

CONCLUSIONS

The current determined prevalence and characteristics of Multivitamin-Multimineral (MVMM) use among populations in Al- Majmah, Saudi Arabia. The study revealed a high prevalence of MVMM use among the participants, reporting a significant statistical relationship with gender, age group, and marital status. More than two-thirds of the participants believed that MVMM supplements were used to promote health, and they used MVMM as they were prescribed on hospital prescriptions, taking it directly from the pharmacy without any medical prescription.

Recommendation

This study highlights the scope of the usage of MVMM supplements without clinically observable benefits. This study emphasizes the use of MVMM supplements in the absence of clinically evident advantages. Further research is required to explore the long-term benefits and possible risks of their consumption. Furthermore, it is essential to create awareness of the importance of food sources in providing the necessary vitamins and minerals, since a well-balanced diet can provide the same benefits without the need for supplementation. By emphasizing whole meals, individuals may be able to improve their health while lowering risks associated with taking excessive supplements. Awareness can be achieved by conducting webinars, awareness campaigns, and displays banners at public places. Finally, at Government level, can set guidelines and policies to ensure the safety, efficacy, and nutritional value of dietary supplements, thereby limiting their free and inappropriate use. Thus, bringing the improvement in the populations health and lifestyle in total.

Limitations

Although the current study provides some intriguing results, there are a few shortcomings to be considered. Firstly, the effects of the estimate in the model are based on interventional and prospective observational studies. This study did not include the economic status of the participants. The researchers concluded that a selection bias based on economic status was unlikely because access to health care and thus selection into the study, did not depend on economic status.

Secondly, the questionnaire-based study and the fact that the study was limited to one city might have introduced bias. However, the researchers emphasized the importance of interpreting the findings within the context of these limitations. Therefore, further future studies include a more diverse population and utilize a broader methodological approach to enhance the generalizability of the results; this may offer more insights into the topic of interest. Lastly, need further research, to give more details about the association of chronic disease and factors that lead to the use of MVMM.

Acknowledgement

The authors would like to convey their sincere gratitude to The Deanship of Scientific Research for allowing us to conduct research and provide valuable guidance throughout this research. The authors would like to extend their gratitude to the participants who volunteered to participate in the research with their valuable time and information.

Conflicts of Interest

The authors declare that they have no competing interests.

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