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The effect of consuming multivitamin/mineral supplements on elderly quality of life: Based on randomized control trial

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Abstract:

BACKGROUND: Clinical trials concerning the effect of supplements or multivitamin on improving the quality of life have proven different results. The present study was conducted to examine the effect of multivitamin supplement on quality of life of the elderly.

MATERIALS AND METHODS: Sixty-four old people over 65 years of age in Kermanshah Elderly Care Center participated in this randomized trial. The samples were first selected using the convenience sampling and then were randomly assigned into intervention and control groups. The intervention group received one multivitamin mineral (MVM) supplement capsule every day for 3 months with no intervention for the control group. Standard quality of life questionnaire was used to collect the data. Data were analyzed using the SPSS software version 22.

RESULTS: The mean age of the participants was 70.77 ± 8.29 years. The results of intra-group evaluation of the aspects of quality of life of the elderly show the lack of significant changes in the mean scores of physical health and environmental health of the elderly in the intervention group ($P > 0.05$) and the significant reduction of these aspects in the control group ($P < 0.05$) after intervention. The mean score of mental health scores in the intervention group significantly increased ($P = 0.01$), but there are no significant changes in the control group ($P = 0.273$). The mean scores of social relationships as well as the overall score of quality of life in the intervention and control groups showed no significant changes ($P > 0.05$).

CONCLUSION: The present study showed that the consumption of MVM supplements can have a positive effect on increasing the quality of life of the elderly, but it is recommended to be done in the long term along diet. Moreover, considering the fact that no change was observed in the other aspects of the quality of life, attentions should be paid to the environmental and social factors such as social supports and empowerment of the old people in the future studies.

Keywords:

Multivitamin, quality of life, randomized control trial, the elderly

Introduction

Elderly is a sensitive period of human life and the focus on the issues and needs of this stage is a social necessity. The world sees the increase in the aging population. The estimates show that by 2020, the world's elderly population will increase from 9% to 16% and in Iran from 5.6% to 17.5%.[1]

With increase in the elderly populations, the focus on their issues gains more significance.[2] The changes in the pattern of disease reduces the rate of infectious diseases, chronic diseases, and increased life span, and this has led to an increase in

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attention to the concept of health and quality of life over the past decades. Quality of life is a multi-dimensional concept, including aspects such as physical, mental, economic, personal beliefs, and interactions with the environment.[3] It seems that the entry to aging affects quality of life.[4,5]

The lacks of the old age, emergence of the diseases with the increase in age, inability in the preservation of independence and physiological problems all cause reductions in the quality of the old people's lives.[6,7] In between, directing of the attentions to the quality of the old people's lives in the nursing homes is of a greater importance because they are among the most vulnerable classes of the society.[8] The results of the studies confirm the idea that the old people residing the nursing homes enjoy physical and psychological situations worse than the old people residing their homes; they have also been found with more psychological disorders and depressions; hence, their quality of life is also resultantly weaker.[9,10] This set of the old people usually have a lot of sanitary problems, and they may need higher care.[11] For example, these individuals are usually inflicted with physiological decline and co-morbidities, and they should accordingly take several medications. Therefore, they will encounter malnutrition and need energy, protein, and more vitamins.[9,11]

Thus, vitamins are among the factors influencing the old people's quality of life.[11] Lack of some vitamins is one of the problems of the 21st century community, but some people are at a higher risk of reducing vitamins.[12] According to the results of studies, new epidemics of vitamin deficiency have emerged worldwide.[13] This is not only related to developing countries, so that, even up to 100% of the American and European elders who live in the community suffer from a shortage of vitamins.[14] Lack of the essential vitamins can affect the physical, social, and mental health of individuals. Lack of vitamins can have a significant role in creating physical and mental disorders and exacerbating symptoms and improving the ability to improve mental illness.[9,10] The results of the studies by De Oliveira *et al*. 2018 and Okereke and Singh 2016 indicated that Vitamin D deficiency can be a risk factor for the low psychological health, including depression, among the old people. [15,16] Therefore, these individuals can use the supplements and vitamins for overcoming their problems and diseases and improving their quality of life.[11]

Nowadays, we are bearing witness to a considerable increase in the use of the multivitamin supplements and minerals for preserving health and preventing various diseases among the old people, particularly those residing the nursing houses.[11,17,18] The effects of these minerals and multivitamins on the quality of life have been well justified.[19,20] Derakhshani and Zijoud in 2017 showed that the supplementation with B-complex or multi-vitamin can improve physical health, mood, or reduce the symptoms of depression.[13] Kennedy *et al*. in 2010 showed the positive effects of high-dose of B-complex in the creation and health and well-being of men aged 30–55 years.[20] The results of the study by Sinnott *et al*. 2013 regarding the effect of the nutritional supplements on the quality of life among the retired professional football players showed that the use of fish oil, antioxidants, vitamins, and natural minerals on a daily basis can bring about improvements in the physical and psychological dimensions of the quality of the individuals' lives upon the completion of the intervention.[21] However, the results and effects of using supplements are different on the quality of the old people's lives. In some of the studies, the effect of supplements and vitamins' use on the strengthening of the old people's physiques has been shown.[18,22] Van de Rest *et al*. 2008 showed in a study about the effect of using fish supplements on the old people with an average age of 70 in Germany that the quality of the individuals' lives has been enhanced after the intervention.[23] However, the results are different in some of the studies and the interventions based on the supplements and vitamins have not demonstrated the positive effects on the quality of the old people's lives.[24,25] Based thereon, further studies are needed to specify the effects of dietary supplements on sub-groups of high-risk populations in the elderly living in aged nursing homes.[26] Improvement of the quality of life and paying attention thereto can largely cause enhancement of efficiency and independence in the old people and assist them in various treatments and controlling the numerous symptoms of senescence. Considering the results of the above-mentioned studies regarding the necessity and importance of performing supplementary interventions on the old people as well as about the effect of the multivitamin supplements on their physical, psychological, and social life aspects, the present study necessity becomes clear. On the other hand, the studies have less frequently dealt with studying and taking interventions regarding the both genders, and the present study is going to investigate the supplements' effects on both of the genders. Therefore, the aim of the study was to examine the effect of supplementary multivitamin minerals (MVMs) on the quality of life of the elderly living in Kermanshah nursing home.

Materials and Methods

The present study was a double-blind randomized controlled trial with 64 elderly people aged 65 and over residing in Kermanshah nursing home in 2017. The participation in the study was voluntary, and the written consent was obtained at the beginning of the study.

In addition, the university's ethics committee license and entry permit was obtained from the Kermanshah University of Medical Sciences.

Then, random allocation method was used using a random number table in intervention and control groups to control the interventions and the variables of age and gender. Thus, each selected number was assigned to the intervention group in the case of being in pairs and in case of being in the control group, and the sample size was considered as 32 in each group. Blinding was used to prevent information bias, and the participants were unaware of which group they were located in Figure 1. The inclusion criteria were age over 55, not having dementia, not having disability, and staying at the elderly boarding center, and the exclusion criteria were the reluctance to continue the study and the diseases that need special treatments. The following questionnaires were completed at the beginning and end of the study:

Demographic information and World Health Organization quality of life standard questionnaire included 26 items examining the quality of overall and general life of a person. This questionnaire has the four areas of physical health, mental health, social relationships, and environmental health and a general score. First, a raw score is obtained between 4–20 for each domain, with 4 showing of the worst and 20 showing the best condition of the desired field. The score of these domains must be converted to a standard formula between 0 and 100, with the higher scores showing higher quality of life. The validity and reliability of this questionnaire have been confirmed in Iran.[27] The intervention group received a multivitamin tablet with or immediately after taking for 3 months. The multivitamin pill contained the following vitamins:

Two milligrams of Vitamin B1, 2 mg of Vitamin B2, 1 mg of Vitamin B6, 1 mg of Vitamin B12, 60 mg of Vitamin C, 400 mg of Vitamin D, 10 mg of Vitamin E, 4000 units of Vitamin A, 15 mg of nicotine amide, 40 mg of concentrated ginseng extract, 90.3 mg calcium, 10 mg iron, 70 mg phosphorus, 1 mg copper, 8 mg potassium, 1 mg zinc, 16 mg magnesium, 60 mg choline, Inositol, linoleic acid, and linolenic acid. Regarding this, there was no intervention for the control group during the intervention period.

In addition, the height of the people was measured using studiometer and in a standard position (without shoes, while the shoulders, hips, and heels were in contact with the wall) with accuracy of 0.1 cm. Weights were measured using a digital scale (CAMRY, model: EB9171 max) with a precision of 0.1 kg. Body mass index (BMI) was calculated by dividing the weight in kg/m^2 by height/m^2.

After completing the intervention, the samples completed the quality of life questionnaires again. The SPSS software version 22 (International Business Machines Corporation (IBM), New York, United States) was used to analyze the data. The quantitative variables were stated as mean ± standard deviation, and the qualitative variables as frequency (number and percent). Initially, the Kolmogorov-Smirnov test was used to evaluate the normal distribution of quantitative data. *t*-test was used to compare the normal quantitative variables and Mann-Whitney U-test to compare non-normal quantitative variables. Paired *t*-test was used to compare intragroup changes of normal variables and Mann–Whitney U was used for the nonnormal ones. The Chi-square test was used to compare the qualitative variables in the two groups.

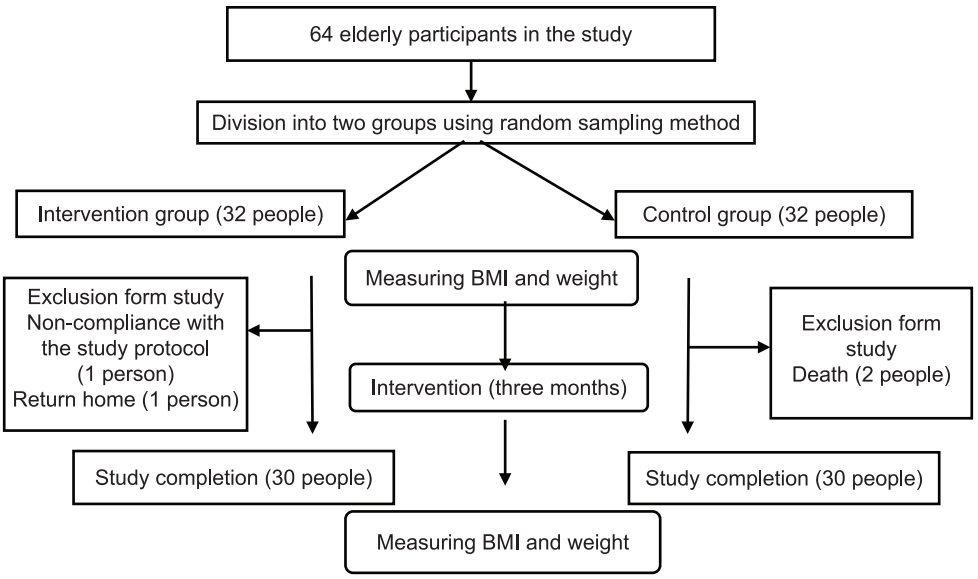

Figure 1: Steps of the study

Results

Sixty-four eligible elderly were enrolled in the study, of whom 4 were excluded during the intervention (2 were due to death, 1 due to noncompliance with the correct daily intake of multivitamin-mineral, and 1 because of discharging from the nursing home). Finally,`pants (31 women and 29 men) with a mean age of 70 ± 8 entered the final study [Figure 1]. There were no significant differences between the two groups in terms of the basic characteristics, including gender (P = 0.79), age (P = 0.37), weight (P = 0.30), and BMI (P = 0.6) distribution [Table 1].

The mean weight of the participants before the study was 52.61 ± 12.63 kg in the intervention group and 56 ± 12.83 kg in the control group. The mean weight of the participants after the study was 51.18 ± 13.40 kg in the intervention group and 55.69 ± 13.39 in the control group. The mean of BMI of the participants was 20.62 ± 4.20 in the intervention group and 23.13 ± 5.74 in the control group before the intervention and in the posttest phase 20.15 ± 4.67 in the intervention group and 22.98 ± 5.90 in the control group as shown in Table 2. The compliance rate of these 60 participants was 100%, and it was found that the patients have studied and complied to the protocol well.

Intervention (P = 0.032) and control (P = 0.88) groups were the same in terms of weight and BMI [Table 2]. Individuals were classified according to the elderly's BMI (thin 22 > BMI > 24.9 > BMI > 22 normal, BMI >25, overweight, and BMI >30 obese).

Intragroup comparison of elderly's quality of Life aspects showed no significant differences in the mean scores of physical and health aspects of the elderly in the intervention group (P = 0.716), (P = 0.11) and the significant reduction of these aspects in the control group (P = 0.008), (P = 0.007) after the intervention. The mean of mental health score in the control group showed a significant increase (P = 0.01), but there was no significant change in the intervention group (P = 0.273). Mean scores of social relationships as well as the overall quality of life score in intervention (P = 0.891, P = 0.458) and in the control (P = 0.536) (P = 0.870) groups did not change significantly. The results also showed no significant differences between the groups in mean of changes in all the aspects of quality of life as well as the overall score of elderly quality of life in the intervention and control groups [Table 3].

Table 1: General specifications of the participants in basic mode

Variables/groups	Intervention group	Control group	Significant*
Gender (male/female)	15.15	14.16	0.79
Age (years)	71±9	70±7	0.37
Weight (kg)	12.63±52.61	56±12.83	0.30
BMI (kg/m^2)	20.62±4.20	23.13±5.74	0.06

All data have been expressed as mean±SD. *Significance level of inter-group differences (Chi-square test), (Mann–Whitney U), (*t*-test). SD=Standard deviation, BMI=Body mass index

Discussion

The present study has been conducted with the objective of investigating the effect of using nutritional supplements on the quality of the old people's life. In the investigations, the most important intervening factors influencing the quality of the old people's lives were extracted, and the two groups were subsequently compared in terms of the intervening factors before the initiation of the study, but no significant difference was evidenced. It is worth mentioning that there are a limited number of studies performed regarding the effect of MVM aids on the quality of life, and most of the studies have been undertaken in separate for a given vitamin, mineral, or antioxidant.

The results of the present study indicated that the use of multivitamin can statistically exert significant effects on the quality of life from psychological perspectives, and they are consistent with the findings of the studies by Tabei *et al*., 2015 and Naseh *et al*., 2014 who showed that the nutritional supplements can significantly influence the psychological health of the old people.[28,29] In the other studies, as well, the effect of consuming supplements on the old people's quality of life has been investigated.[30,31]

In a study by Kennedy *et al*., 2010, the effects of high dosage of B. Complex and C vitamins were investigated on the middle-aged men, and it was found out that the speed of the psychological health improvement and the individuals' average dispositions undergo increases after 33 days in the intervention group in contrast to

Table 2: Mean±standard deviation of variables in the groups

Variables	Intervention group			Control group			P_2
	Before	After	P_1	Before	After	P_1	
Anthropometric indices							
Weight (kg)	52.61±12.63	51.18±13.40	0.032	56±12.83	55.69±13.39	0.675	0.636
BMI (kg/m^2)	20.62±4.20	20.15±4.67	0.088	23.13±5.74	22.98±5.90	0.635	0.912

P_1=*P* values denote significance of within-group changes (paired *t*-test) and (Wilcox on), P_2=P values denote significance of between-group difference after intervention (Mann–Whitney U) and (*t*-test). BMI=Body mass index

Table 3: Scale score and the total score of quality of life in intervention and control groups before and after intervention (standard deviation±mean)

Variables	Groups	Before intervention	After intervention	*P**
Physical health	Intervention group	21.74±49.64	17.15±48.69	0.716
Control group	10.29±57.02	50.95±10.05	0.008	
*P***	0.1	0.536	-	
Mental health	Intervention group	56.67±15.57	61.53±13.29	0.01
control group	57.08±13.76	59.72±11.44	0.273	
*P***	0.913	0.575	-	
Environmental health	Intervention group	15.84±60.21	11.77±57.71	0.11
control group	17.37±61.98	11.48±56.04	0.007	
*P***	0.682	0.581	-	
Social relationships	Intervention group	55±13.59	55.28±11.26	0.891
control group	52.50±14.03	51.67±12.64	0.536	
*P***	0.434	0.316	-	
Overall score	Intervention group	67.08±18.70	64.14±16.97	0.458
control group	62.92±14.80	63.75±14.08	0.870	
*P***	0.301	0.793	-	

*Significance level of intra-group changes (paired *t*-test) (Wilcoxon test), **Significance level of inter-group differences before and after the intervention (independent *t*-test) (Mann–Whitney U-test). $P<0.05$ was considered as the significance level

the test group. The same results can be also seen in the old people following the use of multivitamins.[20] In the study by Harris *et al*., 2011 one sort of multivitamin was administered for 8 weeks, and the result was the enhancement of the physical and psychological health indices that could have been due to the numerous compounds like Q10 and plant extracts that can strongly influence the psychological health and dispositions.[32] In the investigations by Dumville *et al*., 2006 as well, the use of vitamin D was found having positive effects on the studied individuals' psychological factors.[33] Considering the fact that the old people, especially those residing the nursing houses, are in an inappropriate situation in terms of the psychological health due to being away from their families and having no interaction with their family members and relatives, the effect of mineral supplements on this aspect of their quality of life can be considerable. If the old people take the required supplements properly, they can more favorably balance the factors causing reductions in the psychological aspect of their quality of life. It seems that having regular nutritional plan that also contains the necessary nutrients can improve the psychological quality of the old people's lives. Thus, considering the increase in the population of our country's old people during the upcoming years, it is necessary for the corresponding officials to make the suitable plans in this regard.

The results of the present study did not indicate the effect of the intervention based on the mineral supplements on the physical and social and general aspects of the quality of life. This finding is in accordance with the results of the numerous studies that have shown that the interventions based on the nutritional supplements do not bring about improvements in the status of the quality of life. As an example, in the studies by Avenell *et al*. 2005 regarding the effect of multivitamin supplements on the symptoms stemming from infections in the old people, the results indicated that the use of supplements does not have any effect on the quality of the old people's lives.[25] In a review research that investigated the effect of dietary regime and supplement-based interventions on the quality of life, the results signified no effect of the supplementation with micronutrients such as Vitamin C and chrome on the improvement of the quality of life[29] In the study by Maric *et al*., 2014 as well, the use of mineral multivitamin supplements was found having no effect on the quality of life (physical and psychological) aspects in the women with chronic fatigue syndrome.[34] In the study by Barringer *et al*., (2003) as well, the effect of a multivitamin- and mineral-based supplement was evaluated on the infection and quality of life in the diabetic patients above 45 years of age, but no relationship was documented between the consumption of the supplements and the physical and psychological aspects of the quality of life.[35] Many reasons can be posited for the lack of the supplements' effect on the physical and social aspects of the old people's quality of life; the old people need affective and social supports more than nutritional supports and distantness from the family and residence in nursing houses intensively influences their social relations and interactions and supplements' use cannot improve this situation. On the other hand, the old age and infliction with numerous physical diseases prevent the improvement of the physical aspect of their quality of life (reference). This is while, the use of supplements has been found causing improvement in the individuals' quality of life in various aspects thereof in some of the studies. In a study by Nozari *et al*. 2019 regarding the effect of the supplementation with vitamin and folic acid on the quality of life in patients with MS, the results indicated that the use of supplements can bring

about improvement in the physical, psychological, and social aspects as well as the quality of life in general.[31] Pietro *et al*., 2014 as well, showed in a study about the effect of B12 Vitamin's use on the patients with MS that the aspect of quality of life (physical and psychological) have been more improved in the individuals who took this vitamin for 2.4 mg everyday.[36] Ryan-Harshman and Aldoori, 2008showed that the use of B12 vitamin leads to an increase in the quality of life in the individuals with nervous problems.[37] In the study by Moghadam *et al*. 2014 about the effect of fish oil supplements on the quality of life in the menopaused middle-aged women, the results indicated that fish oil supplement causes an improvement in the quality of the women's life.[30]

As for the weight and BMI, the results of the present study indicated the reduction in these variables in both of the intervention and control groups; however, significant differences were observed only between the intervention group's body weights before and after the intervention. Tabei *et al*. 2015 showed in a study about the effect of multivitamin supplements on the psychological health that the participants weights and BMIs have not undergone any changes in both the control and intervention groups, and no significant differences were also evidenced therein.[28] which is not consistent with what has been found in this study. In the study by Grieger *et al*. 2009, as well, no significant differences were documented between the weights and BMIs of the participants before and after the intervention.[18] The reason for this difference in the results could have stemmed from the participants' age differences in various studies.

Amongst the reasons for the differences between the present study's findings and the foresaid results, the difference in the study sample volumes can be pointed out; the study participants of the present research paper were old people, whereas they were adolescents, youngsters, and middle-aged individuals in the other studies. There are differences between the foresaid groups in terms of the metabolic status, residence place as well as the sample volume. Furthermore, the short duration of the intervention span in the present study and the longer duration of this period in the other studies as well as the nonidenticalness of the vitamins, minerals, and antioxidants' dosages and components applied in the supplements are among the other causes of the differences in the results. Anyway, the paradoxical results about the effect of the supplements on the quality of life need to be investigated in further studies among the older age groups.

Limitations

The present study investigated the effect of multivitamin use on the quality of the old people's lives, and the results cannot be definitely generalized to the middle-aged groups and adolescents. Among the other limitations of the present study, the small volume of the participants, noninvestigation of the macro-nutrients and micronutrients taken along with meals, impossibility of evaluating the serum level of the blood indices in the beginning of the study and allowing the individuals with disordered serum levels of these indices to enter the study and impossibility of investigating the serum level of vitamins and minerals before and after taking the multivitamin and mineral supplements can be pointed out. It seems that in case of increasing the intervention length and changing the dosages of the taken multivitamins (single-dosage administering of the supplements) and investigation of the effect of each of them in separate, better results can be obtained. However, the foresaid constraints could not be resolved for the tiredness of most of the study participants due to their old age, various diseases and lengthening of the intervention. This is while designing a random clinical trial along with the administering of multivitamin and investigation of its effect on the quality of life can be introduced as the present study's strong point considering the inherent limitations of such studies.

Conclusion

Since the quality of life is readily threatened during the old age, administering of multivitamin supplements for the old people, particularly those who are exposed more than the other groups to higher risks like the individuals living in the nursing houses, is of great importance in line with the supplying of them with their nutritional and environmental needs and improvement of their quality of life; hence, it has to be revised and embedded in these individuals' method of life. The results indicated that the use of mineral supplements causes an improvement in the quality of the old people's lives in psychological aspect; however, it does not have a significant effect on the other aspects (physical, social, and others) as well as the general quality of life. This issue shows that attentions should be paid meanwhile corroborating the interventions based on the use of these supplements for enhancing the old people's psychological health to other influential environmental and social factors for the improvement of the other aspects of quality of life such as the social supports, networking, reduction of the social problems, and empowerment of the old people. Thus, considering the results of the present study, it is recommended that plans should be made in long-term format and along with the dietary regimes and long-term and constant follow-up of the old people for reaching a favorable quality of life.

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Conflicts of interest

There are no conflicts of interest.

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