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Comparison of Effects of Different Educational Programs on Vitamin D Levels of Middle-aged Women

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ABSTRACT

Aims Vitamin D is a fat-soluble vitamin and essential nutrient for metabolic and physiological processes in the human body. Vitamin D is a vitally important substance for the body due to its role as vitamin and hormone. The aim of the present study was to assess the effects of different educational programs on vitamin D level of middle-aged women.

Materials & Methods This cross-sectional experimental study was conducted during spring and summer seasons (Six months) in Karaj, Iran, in 2017. Sampling was performed randomly from middle-aged women (30-59 years old with vitamin D deficiency) that refer to comprehensive health centers. 240 middle-aged women were selected and randomly divided into 4 equal groups (n=60 in each group). Preventive behaviors education, supplemental usage education, combination of preventive behaviors and supplemental usage education and control were considered for first to forth groups respectively. After 6 months intervention, the vitamin D serum level in all subjects was measured. The data were analyzed by Independent t test, one way analysis of variance and post hoc test using SPSS 21 software.

Findings All of intervention groups had significant difference with control group ($p<0.05$). The level of vitamin D for group 3 was significantly higher than the other groups ($p<0.05$). There was no significant difference between groups 1 and 2 ($p>0.05$).

Conclusion The preventive behaviors and supplementation usage are effective to compensate vitamin D deficiency in middle-aged women, but the combination of preventive behaviors and supplemental usage is more effective.

Keywords Food Assistance; Vitamin D deficiency; Behavior; Drug supplement

CITATION LINKS

[1] Vitamin D nutritional policy needs a vision for the future Exp [2] Association of air pollution and vitamin D deficiency in pregnant mothers and newborns in a sunny region [3] Factors that influence the cutaneous synthesis and dietary sources of vitamin D [4] The impact of clothing style on bone mineral density among post-menopausal women in Morocco: A case-control study [5] Calcium plus vitamin D supplementation and the risk of breast cancer [6] Investigating the relationship between air pollution and vitamin D deficiency in 20-50 year old housewives living in contaminated areas of Eastern Tehran with low pollution in Qazvin [7] Section on Breastfeeding and Committee on Nutrition - American Academy of Pediatrics. Prevention of rickets and vitamin D deficiency: New guidelines for vitamin D intake [8] A critical review of vitamin D and cancer [9] Serum vitamin D concentration and prostate cancer risk: A nested case-control study [10] Vitamin D and calcium intakes and breast cancer risk in pre- and postmenopausal women [11] Vitamin D(3) in fat tissue [12] The effects of calcium and vitamin D supplementation on blood glucose and markers of inflammation in nondiabetic adults [13] Vitamin D and disease prevention with special reference to cardiovascular disease [14] Vitamin D deficiency [15] Prevalence of vitamin D inadequacy among postmenopausal North American women receiving osteoporosis therapy [16] Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease [17] Vitamin D status and ill health: A systematic review [18] A school-based randomized controlled trial to improve physical activity among Iranian high school girls [19] Efficacy and safety of vitamin D3 intake exceeding the lowest observed adverse effect level [20] Effects of a 12-month physical activity counselling intervention on glycaemic control and on the status of cardiovascular risk factors in people with type 2 diabetes [21] Musculoskeletal pain in female asylum seekers and hypovitaminosis D3 [22] Effect of four monthly oral vitamin D3 (cholecalciferol) supplementation on fractures and mortality in men and women living in the community: Randomised double blind controlled trial [23] Effects of exercise on glycemic control and body mass in type 2 diabetes mellitus: A meta-analysis of controlled clinical trials [24] Meta-analysis of the effect of structured exercise training on cardiorespiratory fitness in Type 2 diabetes mellitus [25] Vitamin D and prevention of breast cancer: Pooled analysis

Introduction

Vitamin D is a fat-soluble vitamin and essential nutrient for metabolic and physiological processes in the human body. Vitamin D is a vitally important substance for the body due to its role as vitamin and hormone [1-3]. Exposure of the sun UVB rays with skin supplies more than 90% of vitamin D of body's need [4-6]. Reducing cell proliferation, increasing cellular differentiation, stopping the growth of new blood vessels, and the prevention of anti-inflammatory are affected by vitamin D and prevent the formation of cancer cells [7-10].

Vitamin D deficiency closely related to age, sex, body weight, skin color, location and genetics [11]. Vitamin D deficiency is a major pathogen in type 1 diabetes. Giving the vitamin D supplements at the time of the diagnosis and even at diagnosis of type 1 diabetes, promotes the optimal response of the immune system T-cell Helper 2 (Th2) and TCD+4 (Cluster of Differentiation) cells (As a vitamin D receptor) by prevents further degeneration of beta cells. The type 2 diabetes is also affected by vitamin D deficiency.

Study on non-diabetic patients with more than 65 years old showed that receiving 700 units of vitamin D (Plus calcium) comparing to placebo for more than 3 years reduced fasting blood glucose [12, 13].

Study on the effect of vitamin D on non-vertebral and hip fractures showed that vitamin D (With or without calcium supplements) decreased the risk of non-vertebral (29%) and hip fractures (15%) in older adults [14-17]. There are few studies to assess the effects of different educational programs on vitamin D level.

The aim of the present study was to assess the effects of different educational programs on vitamin D levels of middle-aged women.

Materials and Methods

This cross-sectional experimental study was conducted during the spring and summer seasons (Six months) in Karaj, Iran, in 2017. Sampling was performed randomly from middle-aged women (30-59 years old) that refer to comprehensive health centers. 240 middle-aged women were selected and randomly divided into 4 equal groups (n=60 in each group). The pregnant women under the supervision of the physician and those with underlying illness such as kidney and liver disease, women who had normal values of vitamin D, endocrine disease, and women who had received corticosteroid and anticonvulsants therapy were excluded.

Demographic factors such as age, height and weight, veil type, direction and type of the home, habitat area, time of exposure to sunlight, and the amount of sunblock lotion usage were recorded by a questionnaire. The vitamin D serum level [25(OH)D] was determined by blood sample testing.

Intervention groups included as follow:

Group 1: Preventive behavior education includes 4 sessions (One session weekly): Presently education of the healthy nutrition method in middle age (Based on the Medline Integrated Care Guidelines of the Health and Medical Education Ministry); useful effects of physical activity on the body; beneficial effects of sunshine light, proper methods, right time usage of sunlight and barriers to use it; training about ten stretches and strengths exercise and beneficial effects of vitamin D in the body

In addition, three sessions were held to the remainder of previous meetings (One meeting per month). Poster, pamphlet, short messages, along training of sports movements with audio-visual equipment were considered as an educational instrument.

Review of previous information (15 minutes), education of new information (45 minutes), discussion and one-week performance and experience reports, and review of the performance of self-reporting charts for 30 minutes were considered for each session.

Group 2: For this group, one per of 50,000 units of vitamin D supplementation was used and SMS was sent to samples in order to use supplementation (Once a month).

Group 3: Preventive behavior education (Group 1) and supplementation usage (Group 2) were considered for this group.

Group 4: This group did not receive any education and supplementation (Control group).

Intervention time: Six months were considered as intervention time and, then, a blood test was repeated to collect data.

Laboratory test: In the spring, 2cc of blood in fasting form was obtained from samples in the local area close to the place of residence and were transferred to the Laboratory of Alborz Kahrizak institute at 4-8°C temperature. The vitamin D (25OH) serum levels were measured by Euro-immune kits (MSG; Germany) following to centrifugation.

The mean and standard deviations of variables were calculated and normality of variables was confirmed by Kolmogorov-Smirnov test. The data were analyzed by Independent t-test, one-way analysis of variance and post hoc test using SPSS 21 software.

Findings

Most of the participants were between 30-34 years old (Table 1).

The mean of vitamin D levels significantly increased after intervention in groups 1, 2 and, 3 ($p=0.0001$).

There was a significant difference among the groups in vitamin D levels after intervention ($F=38.531$; $p<0.05$; Table 2).

All of the intervention groups had a significant difference with the control group ($p<0.05$). The level of vitamin D for group 3 was significantly higher

than the other groups (p<0.05). There was no significant difference between groups 1 and 2 (p>0.05).

Table 1) Frequency distribution of demographic variables (n=60 in each group, the numbers in parentheses represent percentages)

Variables	Group 1	Group 2	Group 3	Group 4
Age (years old)				
30-34	22 (36.7)	28 (46.7)	25 (41.7)	24 (40.0)
35-39	17 (28.3)	9 (15.0)	18 (30.0)	11 (18.3)
40-44	10 (16.7)	12 (20.0)	8 (13.3)	10 (16.7)
45-49	3 (5.0)	6 (10.0)	3 (5.0)	8 (13.3)
50-54	6 (10.0)	3 (5.0)	4 (6.7)	3 (5.0)
55-59	2 (3.3)	2 (3.3)	2 (3.3)	4 (6.7)
Weight (Kg)				
40-49	1 (1.7)	0	1 (1.7)	1 (1.7)
50-59	5 (8.3)	9 (15.0)	8 (13.3)	8 (13.3)
60-69	26 (43.3)	32 (53.3)	23 (38.3)	26 (43.3)
70-79	21 (35.0)	15 (25.0)	21 (35.0)	19 (31.7)
80-89	6 (10.0)	4 (6.7)	5 (8.4)	5 (8.3)
<90	1 (1.7)	0	2 (3.3)	1 (1.7)
BMI (Kg/m2)				
>18.5	1 (1.7)	3 (5.0)	1 (1.7)	0
18.5-24.9	16 (26.7)	14 (23.3)	15 (25.0)	14 (23.3)
25-29.9	36 (60.0)	38 (63.4)	33 (55.00	35 (58.4)
<30	7 (11.7)	5 (8.3)	11 (18.3)	11 (18.3)
House Direction				
North	29 (48.3)	22 (36.7)	17 (28.3)	25 (41.7)
South	21 (35.0)	25 (41.6)	33 (55.0)	23 (38.3)
West-East	10 (16.7)	13 (21.7)	10 (16.7)	12 (20.0)
Type of Home				
House	30 (50.0)	25 (41.7)	33 (55.0)	32 (53.3)
Flat	30 (50.0)	35 (58.3)	27 (45.0)	28 (46.7)
Type of veil				
Chador	45 (75.0)	48 (80.0)	46 (76.7)	43 (71.7)
Mantou	15 (25.0)	12 (20.0)	14 (23.3)	17 (28.3)
Number of Pregnancy				
0	3 (5.0)	1 (1.7)	2 (3.3)	4 (6.7)
1	6 (10.0)	4 (6.6)	11 (18.4)	7 (11.7)
2	23 (38.3)	32 (53.3)	28 (46.7)	23 (38.3)
3	20 (33.3)	16 (26.7)	12 (20.0)	17 (28.3)
4	5 (8.3)	3 (5.0)	0	6 (10.0)
5	1 (1.7)	1 (1.7)	2 (3.3)	2 (3.3)
6	1 (1.7)	2 (3.3)	3 (5.0)	1 (1.7)
7	1 (1.7)	1 (1.7)	2 (3.3)	0
Number of Children				
0	3 (5.0)	2 (3.3)	2 (3.3)	4 (6.7)
1	6 (10.0)	3 (5.0)	11 (18.4)	7 (11.7)
2	23 (38.3)	32 (53.3)	28 (46.7)	24 (40.0)
3	21 (35.0)	16 (26.7)	12 (20.0)	17 (28.3)
4	4 (6.6)	3 (5.0)	0	5 (8.3)
5	1 (1.7)	1 (1.7)	2 (3.3)	2 (3.3)
6	1 (1.7)	2 (3.3)	3 (5.0)	1 (1.7)
7	1 (1.7)	1 (1.7)	2 (3.3)	0
Literacy				
Illiterate	4 (6.7)	5 (8.3)	6 (10.0)	4 (6.6)
Elementary	17 (28.3)	15 (25.0)	11 (18.3)	19 (31.7)
Secondary	27 (45.0)	26 (43.3)	24 (40.0)	19 (31.7)
Diploma	12 (20.0)	13 (21.7)	18 (30.0)	17 (28.3)
Upper Diploma	0	1 (1.7)	1 (1.7)	1 (1.7)
Height (cm)				
150-159	18 (30.0)	28 (46.7)	24 (40.0)	22 (36.7)
160-169	39 (65.0)	27 (45.0)	33 (55.0)	37 (61.6)
170<	3 (5.0)	5 (8.3)	3 (5.0)	1 (1.7)

Table 2) Statistical mean levels of vitamin D before and after intervention in studied groups

Groups	Before intervention	After intervention	p-value
Group 1	15.71±7.90	21.63±7.07	0.0001
Group 2	15.33±7.94	21.40±7.13	0.0001
Group 3	14.29±6.94	32.00±5.69	0.0001
Group 4	16.64±8.59	16.54±6.72	1.000

Group 1: Preventive behaviors education; **Group 2:** Supplemental usage education; **Group 3:** Combination of preventive behaviors and supplemental usage education; **Group 4:** Control

Discussion

The aim of the present study was to assess the effects of different educational programs on vitamin D level of middle-aged women.

The results of the present study showed that intervention was associated with changes in vitamin D serum levels. In the current study, the studied groups had behavioral changes as small groups and it increased the mean levels of vitamin D in the intervention groups. Presence in the small educational groups (The method used in this research) is very effective in replacing positive attitudes rather than negative attitudes in the short run and increasing public health due to the wider and more comprehensive discussion of knowledge and the quicker shift of believes. Furthermore, the increase of vitamin D causing by preventive behaviors was approximately equal to the supplemental intake.

An increase in the mean level of vitamin D was observed when supplementary completed by behavioral training compared to when each was independently used.

Although the participants in the current study were in the early stages of thinking or thinking and the tendency to change their behavior was not high, training programs implemented in small groups made a very good participation and created an appropriate behavior in the participants.

Studies confirmed the obtained results and declared that the presentation of the educational program based on the health promotion model, not only increased effectively the physical activity but also had a very favorable participation in the participant despite the difficulty of changing. The results of a study conducted by Taymori *et al.* showed that constancy of physical activity behavior increased by training based on the combination of fitness and health promotion [18]. Some studies stated that individual counseling in diabetic patients increased physical activity and improved cardiovascular fitness in these patients [19-21]. The results of the cross-analytical researches performed to evaluate the effect of structured training on increasing physical activity in diabetic patients showed that education was effective and increased physical activity and cardiopulmonary respiration [22-25].

Performing sports activities in the outdoor and proper usage of sunlight cause the synthesis of

vitamin D in the body and are effective in the general health of individuals. Although only vitamin D supplementation can compensate vitamin D deficiency, its effect on general health is lower than sports activities. To create a state of vitality, happiness, good feeling and subsequently improving the health of individuals in the community (Especially middle-aged people), it is advisable to do sports activities in the outdoors, proper usage of sunlight and not to use sunscreen when the sunlight is mild. As the simultaneous usage of supplementary and preventive behaviors was the most effective, in the time of vitamin D deficiency, simultaneous use of vitamins and preventive behaviors for a short period and the use of preventive behaviors in the form of stabilized behavioral changes are recommended.

The limitation of this research includes just uni-central sampling because the participants were recruited from a private clinic in Karaj city that might interfere the generalization of the study and the suggestion is to select the participants from several centers in different geographical points of Iran in future studies.

Conclusion

The preventive behaviors and supplementation usage are effective to compensate vitamin D deficiency in middle-aged women, but the combination of preventive behaviors and supplemental usage is more effective.

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