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Contents

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Effects of Knowledge of Vitamin D on Attitudes toward Sun Exposure among Middle-Aged and Elderly Indonesian Adults

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ABSTRACT

Introduction: Vitamin D deficiency may contribute to certain health problems among senior people. Excessive body weight lowers the vitamin D level. Hypovitaminosis D affects older adults, with a greater risk of infection, disease, type 2 diabetes, cardiovascular disease, stroke, and dementia. However, little is known as to what extent the knowledge of vitamin D's benefits contributes to the attitude toward sunlight exposure among people at risk of hypovitaminosis D.

Aim: The objective was to investigate the effect of knowledge of vitamin D on attitudes toward sunlight among 166 middle-aged and elderly people in East Java, Indonesia.

Method: We conducted an observational study using a case control design. The sample was purposively recruited among visitors consulting the geriatric clinic at a community health centre in Sidoarjo, East Java, Indonesia. Each case and control group consisted of 83 men and women aged 46 years old or older. The assignment of subjects to each group was determined based on their body mass index (BMI). A standardised questionnaire was delivered to the study subjects to obtain data on their knowledge and attitudes related to vitamin D. A Chi square test was performed to assess the difference between the obese group and the non-obese group.

Results: Our study found no significant difference in relation to the knowledge of vitamin D between the two groups (p=0.436). However, the two groups showed a significant difference in attitude toward sun exposure (p=0.030).

Conclusion: No significant effect was found between knowledge of vitamin D and attitude toward sun exposure among the adults.

Keywords: *knowledge, attitude, geriatric, vitamin D, obesity*

INTRODUCTION

Vitamin D deficiency has affected more than one-third of the population worldwide across all ethnic and age groups.[1] It is indicated by a lower 25(OH)D level, of less than 50 nmol/L in the body.[2,3] Lifestyle and environmental changes are considered to have a significant contribution toward lower vitamin D levels. Lack of vitamin D is an independent factor of the increased mortality caused by non-communicable diseases such as heart disease, osteoporosis, diabetes, autoimmune and cancer.[4] The high prevalence of vitamin D deficiency has become a public health concern as it relates to the increased risk of various chronic diseases

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and the high prevalence of osteoporotic hip fractures among older adults.[1] In addition, excessive body weight increases the risk of vitamin D deficiency which could also negatively affect bone.[5]

Having a vitamin D deficiency increases the risk of frailty among older adults.[6] Geriatric syndrome and impaired physical activity are usually considered to be multidimensional clinical conditions in the elderly. Geriatric syndrome is characterised by functional decline, low cognitive status, and increased exogenous and endogenous stress.[7] Functional decline, especially in relation to physical functions, may result in frailty, limited mobility, and death. Although vitamin D can be obtained from food and supplements, having sufficient sun exposure is beneficial in order to stimulate the skin to produce vitamin D.[4] On the other hand, as the human body ages, the skin's capacity to produce vitamin D3 decreases.[8] Therefore, the elderly have a higher risk of vitamin D deficiency than younger people.

Lack of knowledge on the importance of sun exposure for vitamin D synthesis in the body may induce an avoidance of sun exposure.[9,10] Most people prefer to stay, work, and exercise indoors or behind glass that is anti-ultraviolet (UVB) than be directly exposed to sunlight. Wearing closed-off clothing and using regular sunscreen may block the UVB transmission which is intended to prevent sun-related skin aging, reduce the risk of skin cancer, and avoid undue skin discoloration.[11] Our study aims to assess the difference between two groups on the knowledge of vitamin D and their attitude toward sunlight exposure.

METHOD

Research design: This study employed an observational research design using a case control method. A structured questionnaire was administered to the study subjects to understand their level of knowledge and attitude relevant to vitamin D.

Population and sample: The population of this study was the visitors of a geriatric consultation clinic at Taman community health centre in Sidoarjo district, in the East Java province of Indonesia. The age of the population was 45 years old or older. The inclusion criteria were no disability, that they were able to read and write, and had no co-morbidity such as cardiovascular disease, stroke, respiratory disease, or liver disease. The exclusion criteria were that they were unwilling to participate in the study. The participants were recruited using purposive sampling selection. The obese participants were assigned to the case group, while the non-obese participants were assigned to the control group. A threshold body mass index (BMI) level of 27 or higher was set up to classify participants in the obese group. Other male and female participants with lower BMI levels than the threshold were included in the normal weight group. To obtain the BMI level, body weight and height were measured for each participant. The BMI level was calculated through dividing the body weight (kilograms) by the square of the height (meters).

Sample size: To calculate the sample size, we adopted the following formula:

$$n = \frac{N}{1 + N(d^2)}$$

N in a capital letter is the size of the population, while n in a small letter represents the sample size. The confidence level was set at 0.1. The total population in this study was 500 people, based on the average number of monthly visits to the geriatric clinic of the study location in 2017. Therefore, the sample size calculation and the result has been presented in the following equation:

$$n = \frac{500}{1 + 500(0,1^2)} = 83 \text{ orang}$$

The minimum number of study participants for each case and control group was 83 people.

VARIABLES

The study variables were knowledge and attitude. Each variable had an assessment category of poor and good based on the scores obtained from the questionnaire answers. A participant was considered to have good knowledge if his/her total score of knowledge was 6 or higher. A total score below 6 was considered as having poor knowledge. The variable of attitude had 9 questions related to the participant's attitude toward sun exposure. Each item of questions was given a score of 2 for an answer related to a higher risk of vitamin D deficiency. A total score of 10 or higher was marked as having a good attitude, while a lower score than 10 represented a poor attitude.

DATA COLLECTION AND ANALYSIS

Prior to the data collection, the validity and reliability of the standardised questionnaire was tested, involving a convenience sample of 30 homogeneous respondents. To assess the validity of the questionnaire, the Pearson Product Moment Correlation was performed using SPSS software. The test was conducted by correlating the scores of each item of the questionnaire with the total score. Each question with a statistically significant value < 0.05, and count value r > r in the product moment table was concluded as a valid item. The questionnaire reliability was assessed using Cronbach's coefficient alpha to estimate the internal consistency of the questionnaire items. A minimum Cronbach's alpha value was determined to be 0.61 to be considered for inclusion in the questionnaire.

The measurement scale used in the present study was ordinal data presented in two categorical variables (poor and good). The data was analysed using the chi-square test to examine the difference between the obese group and the non-obese group on their knowledge of vitamin D deficiency and their attitude toward sun exposure. The difference between the obese and non-obese participants was concluded to be statistically significant when the p-value was 0.05 or less.

RESULTS

Table 1 displays the characteristics of the study participants. Females were the majority in both the obese group (84.3%) and the non-obese group (60.2%). Most of the participants were aged between 56 and 65 years old in both the obese group (45.8%) and the non-obese group (53.0%).

Table 1: The frequency distribution of the participant's characteristics

Characteristics		Groups	
		Obese n (%)	Non-Obese n (%)
Gender	Female	70 (84.3)	50 (60.2)
	Male	13 (15.7)	33 (39.8)
Age (years)	46-55	29 (34.9)	25 (30.1)
	56-65	38 (45.8)	44 (53.0)
	>65	16 (19.3)	14 (16.9

Table 2 presents the results of the chi-squared test when analysing the difference in the knowledge score between the obese group and the non-obese group. More than half of the obese group (57.8%) and the non-obese group (51.8%) have a good knowledge of vitamin D deficiency. The percentage of subjects with a good level of knowledge was slightly higher in the obese group than the non-obese group. The chi-square test generated a p-value of 0.436, indicating that no significant difference between the two groups was observed related to the knowledge of vitamin D deficiency.

Table 2: The chi-squared test results of the knowledge of vitamin D deficiency

Knowledge	Groups		P Value
	Obese n (%)	Non-Obese n (%)	
Good	48 (57.8)	43 (51.8)	0.436
Poor	35 (42.2)	40 (48.2)	
Total	83 (100.0)	88 (100.0)	

The chi-square test on the attitude toward sun exposure has been presented in Table 3. Most of the participants in the obese group showed a poor attitude toward sunlight (57.8%). In the non-obese group, most of the participants had a good attitude toward sun exposure (59.0%). The results of the chi-square test showed a p-value of 0.030, indicating that there is a significant difference between the two groups in relation to their attitude toward sun exposure.

Table 3: The chi-squared test results of the attitude toward sun exposure

Attitude	Groups		P Value
	Obese n (%)	Non-Obese n (%)	
Good	35 (42.2)	49 (59.0)	0.030
Poor	48 (57.8)	34 (41.0)	
Total	83 (100.0)	83 (100.0)	

DISCUSSION

The participants in our study were dominated by those of the female sex whose age was between 56 to 65 years old. The World Health Organisation (WHO) determined 60 years old to be the cut-off standard for the older population.[12] The proportion of middle-aged people in the present study was less than 30% in both groups.

Our study showed no significant difference between the obese group and the non-obese group on the knowledge of vitamin D deficiency. More than half of the study respondents had a good knowledge score. This result indicates that the importance of having sufficient vitamin D is well understood by both groups. A previous study reported that having a good level of knowledge on vitamin D significantly contributes to the positive behavior in maintaining the vitamin D sufficiency.[13]

Vitamin D has a pivotal role in regulating the absorption of calcium and phosphor in order to maintain optimum bone mineral density.[3] Vitamin D has two forms, namely vitamin D2 and vitamin D3. Vitamin D2 is a 28-carbon molecule derived from ergosterol, which is a component of fungal cell membranes. Vitamin D3 is a 27-carbon derived from cholesterol.[14] Vitamin D3 (cholecalciferol or D3) is synthesised in the skin in response to the effect of sunlight (eUVB) with a wavelength of 295-297 nm.[2] The UV-B skin irradiation triggers the photolysis of 7-dehydrocholesterol (pro-vitamin D3) to pre-vitamin D3, which is rapidly converted to vitamin D3 at skin temperature.

Vitamin D2 and vitamin D3 are produced from the skin undergo sequential hydroxylation. Hydroxylation firstly occurs in the liver (25 [OH] D) and secondly, takes place in the kidney which leads to the biological form of active 1,25-dihydroxyvitamin D (1.25 [OH] 2D).[15] Furthermore, the 1.25 [OH] 2D will bind to the vitamin D receptor (VDR), which can increase the absorption of calcium and intestinal phosphorus. Vitamin D is also actively involved in bone formation, resorption, mineralisation, and the maintenance of neuromuscular function. In addition, 1.25 [OH] 2D can also inhibit serum parathyroid hormone (PTH) levels through a negative feedback mechanism, by increasing serum calcium levels. This process leads to a regulation of bone metabolism through VDR activation in osteoblast and adult osteoclast formation.[16]

In a body with vitamin D deficiency, the small intestine can only absorb approximately 10% -15% of the calcium ingested. In a normal vitamin D level context, the body can absorb 30% - 40% of the calcium from food. Therefore, low levels of vitamin D (25 [OH] D) may hamper calcium absorption, which has some clinical implications, not only in relation to the bone but also some of the major metabolic functions.[15] Vitamin D also has an important function in minimising tissue damage by lowering oxidative stress. Muscles are one of the susceptible tissues easily exposed to free radicals. Muscle tissue is composed of approximately 40% of the total body mass. Various toxicities such as infection, ischemia, and inflammation may cause further damage to the muscle cells. The damaged muscle cell would release the myoglobin or protein in the muscle into the bloodstream, which is dangerous for the kidneys and may cause kidney failure.[17] A higher amount of free radicals from the muscle damage, more than the antioxidants of the body, would eventually aggravate the organ damage.

Although there was no significant difference regarding the knowledge of vitamin D deficiency, the two groups of this study presented a significant difference in the attitude toward sun exposure. The obese group had a higher proportion of poor attitude, which reflects having less sun exposure than the non-obese group. One possible explanation is that obesity contributes to a low level of participation in physical activity.[18] The elderly with obesity may have a fear of falls and may also have a certain degree of physical immobility that prevents them from taking part in recreational physical activity outdoors[18], thus they have less exposure to sunlight. A previous study reported that the prevalence of vitamin D deficiency is 35% higher among obese people.[19] Poor attitude toward sun exposure to increase the vitamin D sufficiency increases the risk of the elderly with obesity from contracting various non-communicable diseases.

CONCLUSION

Our study presented a non-significant difference in the knowledge of vitamin D deficiency. However, the two groups have a significant difference in their attitude toward sun exposure. Having good knowledge is importance to prevent the risk of vitamin D deficiency. However, it may not be sufficient to drive the expected attitude. Therefore, understanding people's constraints in relation to sun exposure is important, and in need of further investigation.

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REFERENCES

1. Hilger J, Friedel A, Herr R, Rausch T, Roos F, Wahl DA, et al. A systematic review of vitamin D status in populations worldwide. British Journal of Nutrition. 2014;111(1):23-45.

2. Holick MF. Photobiology of vitamin D. Vitamin D (Third Edition): Elsevier; 2011. p. 13-22.
3. Grant WB, Holick MF. Benefits and requirements of vitamin D for optimal health: a review. Altern Med Rev. 2005;10(2):94-111.
4. Nair R, Maseeh A. Vitamin D: The "sunshine" vitamin. Journal of pharmacology & pharmacotherapeutics. 2012;3(2):118.
5. Vimaleswaran KS, Berry DJ, Lu C, Tikkanen E, Pilz S, Hiraki LT, et al. Causal relationship between obesity and vitamin D status: bi-directional Mendelian randomization analysis of multiple cohorts. PLoS medicine. 2013;10(2):e1001383.
6. Shardell M, Hicks GE, Miller RR, Kritchevsky S, Andersen D, Bandinelli S, et al. Association of low vitamin D levels with the frailty syndrome in men and women. Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences. 2009;64(1):69-75.
7. Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J, et al. Frailty in older adults: evidence for a phenotype. The Journals of Gerontology Series A: Biological Sciences and Medical Sciences. 2001;56(3):M146-M57.
8. MacLaughlin J, Holick MF. Aging decreases the capacity of human skin to produce vitamin D3. J Clin Invest. 1985;76(4):1536-8.
9. Zhou M, Zhuang W, Yuan Y, Li Z, Cai Y. Investigation on vitamin D knowledge, attitude and practice of university students in Nanjing, China. Public health nutrition. 2016;19(1):78-82.
10. Alshamsan FM, Bin-Abbas BS. Knowledge, awareness, attitudes and sources of vitamin D deficiency and sufficiency in Saudi children. Saudi medical journal. 2016;37(5):579.
11. Boucher BJ. The problems of vitamin d insufficiency in older people. Aging and disease. 2012;3(4):313.
12. World Health Organization. Health Statistics and information systems. Proposed Working Definition of an Older Person in Africa for the MDS project Geneva: World Health Organization; 2002 [Available from: http://www.who.int/healthinfo/survey/ageingdefnolder/en/.
13. Aljefree NM, Lee P, Ahmed F. Knowledge and attitudes about vitamin D, and behaviors related to vitamin D in adults with and without coronary heart disease in Saudi Arabia. BMC public health. 2017;17(1):266.
14. Ahmed MS, Shoker A. Vitamin D metabolites; protective versus toxic properties: molecular and cellular perspectives. Nephrology Research & Reviews. 2010;2(1):19-26.
15. Alshahrani F, Aljohani N. Vitamin D: deficiency, sufficiency and toxicity. Nutrients. 2013;5(9):3605-16.
16. Suryadinata RV, Lorensia A, Aprilia AP. Profil Vitamin D Pada Pasien Asma Dan Non-Asma Dewasa Di Surabaya (Profile of Vitamin D among adults patients with and without asthma in Surabaya). The Indonesian Journal of Public Health. 2017;12(1):106-17.
17. Zutt R, Van Der Kooi A, Linthorst G, Wanders R, De Visser M. Rhabdomyolysis: review of the literature. Neuromuscular Disorders. 2014;24(8):651-9.
18. Bruce DG, Devine A, Prince RL. Recreational physical activity levels in healthy older women: the importance of fear of falling. Journal of the American Geriatrics Society. 2002;50(1):84-9.
19. Pereira-Santos M, Costa P, Assis A, Santos C, Santos D. Obesity and vitamin D deficiency: a systematic review and meta-analysis. Obesity reviews. 2015;16(4):341-9.

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