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Research Article

The relationship between Vitamin D and obesity

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Abstract:

Introduction:

Approximately 1 billion people worldwide suffer from vitamin D deficiency, which may result from limited exposure to sunlight, long-term wearing of covering clothes, use of sunscreen, age as well as low consumption of food containing ergocalciferol, and malabsorption syndrome, Low 25(OH)D levels correlated with high body fat, glucose levels and decreased insulin sensitivity.

Objective:

Study the relationship between vitamin D deficiency and Obesity

Material and Method:

A descriptive, cross-sectional, and correlational design was used in this study. A convenience sampling method of 59 participants aged between (20-74) years from 1st of July 2024 to 1st of September 2024 participated in the study.

Collection of basic Information of the subjects included the volunteers' basic information, past medical history, exercising activities.

Result:

The characteristics of the study population (n = 59) are shown in Table:1 The mean age of sample was between (20-74) years, vitamin D level was between (10-40) ng/ml, the average weight of the study group was between (50-125) Kg, height was between (151-194) cm, and BMI was between (19-37).

The P. Value was significant lower between (use sunblock, consumption of milk, bad mood, low immunity and good physical activity) (p. value <0.05). it was non-significant.

Conclusion:

In conclusion, there is no evidence of a relation between vitamin D level and the obesity; However, a statistically significant relationship was found between low immunity, bad mood, consumption of milk, use sunblock and vitamin D levels.

Keywords: vitamin d; obesity; body mass index

Introduction

Vitamin D3, or cholecalciferol, is essential for bone health, immune function, and overall well-being. A growing body of research shows a strong relationship between vitamin D3 levels and obesity. People with obesity often have lower levels of vitamin D3, which may be due to the vitamin being sequestered in fat tissue, reducing its availability in the bloodstream (1) This can lead to deficiency, even if vitamin D intake is sufficient. Obesity may also impair the conversion of vitamin D3 into its active form, further compounding deficiency. Low vitamin D3 levels in obese individuals have been linked to various metabolic disorders, such as insulin resistance and chronic inflammation, which are common in obesity (2) Although there is ongoing research into whether vitamin D3 supplementation can directly impact weight management, its importance in maintaining overall health in obese individuals is well recognized. Obesity and vitamin D deficiency are two major global health issues that significantly impact individual and public health. While obesity is considered a primary contributor to the rise of chronic diseases such as diabetes and cardiovascular conditions (3). vitamin D deficiency is a widespread concern, especially in regions with modern lifestyles. Studies suggest a complex relationship between obesity and vitamin D deficiency, with some proposing that obesity may lead to lower vitamin D levels,

while others argue that vitamin D deficiency could contribute to increased weight gain and obesity. This research aims to explore the bidirectional relationship between obesity and vitamin D deficiency, focusing on their health implications and potential preventive and therapeutic strategies (4).

Patients and Methods:

A descriptive, cross-sectional, and correlational design was used in this study. A convenience sampling method of 59 participants aged between (20-74) years from 1st of July 2024 to 1st of September 2024 participated in the study. Collection of basic Information of the subjects included the volunteers' basic information, past medical history, exercising activities and inquiries about symptoms.

Statistical Analysis:

Statistical analyses were performed using SPSS version 24. The results are expressed categorically in counts and percentages, and the differences between groups were tested using the $\chi 2$ test.

The p value of <0.05 is considered statistically significant.

Ethical approval

A local ethics committee examined and approved the study protocol, subject information, and consent form in accordance with 1/6/2024 and the date of 1/8/2024 to obtain this approval.

Results:

The characteristics of the study population (n = 59) 29was female and 30 males are shown in (Table 1. table2) the mean of age was (40.76) years, vitamin D3 level was (15.90), weight was (73.78) Kg, height was (170.14) cm, and BMI was (25.26). Regarding to the use of protective equipment 20 was not used protective equipment and 39 was used a protective equipment (Table3). 27 of the sample was having back pain, 22 having muscle weakness,19 have pain in legs pelvic,20 have bad mood,11with low immunity and 33 was suffering from obesity. (Table 4). Regarding to consumption of milk, egg and fish 50.85% was having milk and 49.15was not 22.3% having more than 7 egg in week and 3.39 was noting egg, 59% was having fish once weekly and 1.6 was having fish 4 days in week. As shown in table 5, the relation between vitamin D3 and use of protective equipment was non-significant P. value <0.05, but it was significant with the use of sunblock and milk consumption (p. value = 0.032 and 0.04) respectively. The relation of D3 level and other factor was only significant with physical activity (p. value<0.001).

	Range	Minimum	Maximum	Mean	Std. Deviation
Age	54	20	74	40.76	13.36
Vitamin D3	30.11	10	40.11	15.90	5.98
weight	75	50	125	73.78	15.15
Hight	43	151	194	170.14	10.65
BMI	18.6	19	37.6	25.26	4.18

Table1: Characteristics of the study population

		Frequency	Percent
Sex	Female	29	49.2
	male	30	50.8
Total		59	100

Table.2: Sex distribution of the study group

	No		Yes	
	Frequency	Percent	Frequency	Percent
use of protective equipment	20	33.9	39	66.1
use sunblock	38	64.4	21	35.6
consumption of milk	29	49.2	30	50.8

Table 3: frequency of the use of protective equipment

	No		Yes	
	Frequency	Percent	Frequency	Percent
back pain	27	45.8	32	54.2
muscle weakness	22	37.3	37	62.7
pain in legs pelvic	19	32.2	40	67.8
Bad mood	20	33.9	39	66.1
Low immunity	11	18.6	48	81.4
Good Physical activities	37	62.7	22	37.3
Obesity	33	55.9	26	44.1

Table 4: Symptoms of the study group

Vit D3 level

	No			Yes			p value
	Mean	Std. Deviation	Std. Error Mean	Mean	Std. Deviation	Std. Error Mean	
use of protective equipment	16.71	5.89	1.32	15.49	6.05	0.97	0.462 NS
use sunblock	14.67	5.93	0.96	18.13	5.53	1.21	0.032*
consumption of milk	14.43	4.73	0.88	17.32	6.75	1.23	0.046*

Table 5: The relation between Vitamin D3 and the use of protective equipment

	No			Yes			p value
	Mean	Std. Deviation	Std. Error Mean	Mean	Std. Deviation	Std. Error Mean	
back pain	17.14	4.67	0.90	14.86	6.79	1.20	0.146 NS
muscle weakness	16.70	4.27	0.91	15.43	6.81	1.12	0.436 NS
pain in legs pelvic	16.62	4.59	1.05	15.56	6.56	1.04	0.529 NS
Bad mood	20.41	6.39	1.43	13.59	4.24	0.68	<0.001**
Low immunity	15.67	7.06	2.13	15.95	5.79	0.84	0.889 NS
Good Physical activities	13.48	4.22	0.69	19.97	6.37	1.36	<0.001**
Obesity	15.96	4.68	0.82	15.82	7.40	1.45	0.930NS

Table 6: The relation between Vitamin D3 level and different factors

Discussion:

The World Health Organization defines overweight and obesity as abnormal or excessive accumulation of fat that may pose health risks. Overweight is classified as a body mass index (BMI) of 25 or higher, while obesity is defined as a BMI of 30 or higher. These two BMI thresholds are important references for assessing overweight and obesity in individuals (5). Obesity has numerous causes, and its development is influenced by a combination of biological and environmental factors. Maintaining a healthy body weight requires a balance between the energy consumed through food and the energy expended through physical activity (6). An increase in energy intake (food consumption) or a decrease in physical activity— or both—can lead to obesity. Additionally, a decline in physical activity results in reduced physical fitness. Conversely, decreased physical fitness can further contribute to obesity and decreased physical activity levels. Furthermore, weight gain and obesity can make individuals less active and more susceptible to physical inactivity (7). Obesity is caused by several factors, primarily an imbalance between the intake and expenditure of energy. Modern lifestyles contribute significantly to this issue, as many people spend long hours sitting in front of screens, whether for work, internet use, or video games (8). Although genetics can play a role in obesity, research has shown that diet and lifestyle choices are the main contributors to weight gain (9). Inactivity is often influenced by genetic factors, but it is crucial to recognise that obesity can lead to a variety of health problems, including type 2 diabetes, high blood pressure, increased body fat percentage, heart disease, early puberty, and psychological issues (10). Women between the ages of 18 and 50 need 1,000 milligrams of calcium a day. This daily amount increases to 1,200 milligrams when women turn 50 and men turn 70 (11). The increasing rate of obesity is contributing to the rising epidemic of vitamin D insufficiency. Obese individuals tend to have lower levels of serum 25-hydroxyvitamin D. Variations in vitamin D levels can be attributed to several factors, including age, gender, geographic location, skin colour, traditional clothing, and exposure to sunlight. Key dietary sources of vitamin D include fish, egg yolk, and fortified milk (12).

Research has indicated a relationship between obesity and vitamin D levels. This connection is attributed to the retention and storage of vitamin D within adipose (fat) tissue (13). Studies have shown a significant inverse relationship between obesity and vitamin D, meaning that lower levels of vitamin D are associated with higher fat mass (14). Findings reveal that the concentration of 25-hydroxy vitamin D is lower in obese individuals compared to those who are not obese (15). Several potential mechanisms may explain the decrease in 25-hydroxy vitamin D levels in obese individuals. These include lower dietary intake of vitamin D among obese individuals, as well as reduced synthesis of the vitamin by the skin (16). This reduction in synthesis is likely due to the fact that obese individuals often cover more of their skin, limiting their exposure to sunlight (17). Also, reduced sunlight exposure, environmental factors, dietary conditions as calcium deficiencies (low calcium intake), and a lifelong lack of calcium plays a role in the development of bones pain. Low calcium intake contributes to diminished bone density, early bone loss and an increased risk of fractures, poor living habits (18,19). Good nutrition and regular exercise are essential for keeping bones healthy throughout life. Vitamin D improves the body's ability to absorb calcium and improves bone health. Maintaining a healthy lifestyle can reduce the degree of bone loss (20).

Conclusion:

In conclusion, there is no evidence of a relation between vitamin D level and the obesity; However, a statistically significant relationship was found between low immunity, bad mood, consumption of milk, use sunblock and vitamin D levels.

References:

1. Palaniswamy, S., Gill, D., De Silva, N. M., Lowry, E., Jokelainen, J. et al., (2020), Could vitamin D reduce obesity-associated inflammation? Observational and Mendelian randomization study. *The American journal of clinical nutrition*, 111(5), 1036-1047.
2. Malden S., Gillespie J., Hughes A., Gibson A. M., Farooq A., et al., (2021), Obesity in young children and its relationship

with diagnosis of asthma, vitamin D deficiency, iron deficiency, specific allergies and flat-footedness: a systematic review and meta-analysis. *Obesity Reviews*, 22(3), e13129.

3. Duan L., Han L., Liu Q., Zhao Y., Wang L., et al., (2020), Effects of vitamin D supplementation on general and central obesity: results from 20 randomized controlled trials involving apparently healthy populations. *Annals of Nutrition and Metabolism*, 76(3), 153-164.
4. Szymczak-Pajor I., Miazek K., Selmi A., Balcerczyk A., Śliwińska A. (2022). The action of vitamin D in adipose tissue: is there the link between vitamin D deficiency and adipose tissue-related metabolic disorders? *International Journal of Molecular Sciences*, 23(2), 956.
5. Maghsoumi-Norouzabad L., Zare Javid A., Mansoori A., Dadfar M., Serajian A. (2021). The effects of Vitamin D3 supplementation on Spermatogram and endocrine factors in asthenozoospermia infertile men: a randomized, triple blind, placebo-controlled clinical trial. *Reproductive Biology and Endocrinology*, 19, 1-16.
6. Jafari M., Mirzaei K. H., Shojaei M., & Sabour M. (2024). A Systematic Review: The Relation between Vitamin D and Short Chain Fatty Acid in Serum Plasma with Protein Recombination in VDR in Multiple Sclerosis Patients (MS). *Eurasian Journal of Chemical, Medicinal and Petroleum Research*, 3(3), 819-840.
7. Filgueiras M. S., Rocha N. P., Novaes J. F., & Bressan J. (2020). Vitamin D status, oxidative stress, and inflammation in children and adolescents: a systematic review. *Critical Reviews in Food Science and Nutrition*, 60(4), 660-669.
8. Karampela I., Sakelliou A., Vallianou N., Christodoulatos G. S., Magkos F., et al., (2021), Vitamin D and obesity: current evidence and controversies. *Current obesity reports*, 10, 162-180
9. Fiamenghi V. I., Mello, E. D. D. (2021). Vitamin D deficiency in children and adolescents with obesity: a meta-analysis. *Jornal de pediatria*, 97, 273-279.
10. Kardum Pejić M., Cvijetić Avdagić S., Pejić J., Bituh, M. (2024). World Congress on Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (WCO-IOF-ESCEO 2024). *Aging clinical and experimental research*, 36(S1).
11. Dolati S., Mohammadi A., Onsoroudi A. B., Sadeghian S., Haghighi. et al., (2024), Relationship between serum 25-hydroxyvitamin D level and preeclampsia components and metabolic parameters among overweight and obese pregnant women. *Ethiopian Journal of Reproductive Health*, 16(1).
12. Kardum Pejić M., Cvijetić Avdagić S., Pejić, J., Bituh M. (2024). World Congress on Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (WCO-IOF-ESCEO 2024). *Aging clinical and experimental research*, 36(S1).
13. Rahman D. I., Salmeen, A., Akhter M. (2024). Nutritional status and vitamin D among adults.
14. Iftikhar M., Shah N., Khan I., Shah M. M., Saleem M. N. (2024). Association Between Body Mass Index (BMI), Vitamin D, and Testosterone Levels. *Cureus*, 16(1).
15. Barrea L., Frias-Toral E., Pugliese G., Garcia-Velasquez E., Savastano S. et al., (2020), Vitamin D in obesity and obesity-related diseases: an overview. *Minerva endocrinology*, 46(2), 177-192.
16. Hajhashemy Z., Foshati S., Saneei P. (2022). Relationship between abdominal obesity (based on waist circumference) and serum vitamin D levels: a systematic review and meta-analysis of epidemiologic studies. *Nutrition reviews*, 80(5), 1105-1117.
17. Al-Sumaih I., Johnston B., Donnelly M., O'Neill C. (2020). The relationship between obesity, diabetes, hypertension and vitamin D deficiency among Saudi Arabians aged 15 and over: results from the Saudi health interview survey. *BMC endocrine disorders*, 20, 1-9.
18. Bárbara S. E. Lígia A. M (2010), Nutritional aspects of the prevention and treatment of osteoporosis: A review., 54(2):179-85.
19. Kaptoge S., Welch A. McTaggart A. (2013). Effects of dietary nutrients and food groups on bone loss from the proximal femur in men and women in the 7th and 8th decades of age. *Osteoporos*. Int14:418-28.
20. Shivani S., Kelsey M. M., Douglas P. K., Katherine L. T., Marian T. H. (2017), Dairy Intake Is Protective against Bone Loss in Older Vitamin D Supplement Users: *The Framingham Study*. 147(4): 645–652.