Journal of Obesity & Weight Loss Therapy

Mohammed, J Obes Weight Loss Ther 2018, 8:5
DOI: 10.4172/2165-7904.1000377

Research Article Open Access

Association between Vitamin D and Body Weight in Iraqi Population: Case-Control Study

Mohammed SJ*

Department of Community and Family Medicine, Medical College, University of Kufa, Iraq

***Corresponding author:** Salam Jasim Mohammed, M.D, Department of Community and Family Medicine, Medical College, University of Kufa, Iraq, Tel: +009647812535432; E-mail: salam.alfatlawi@uokufa.edu.iq

Received date: October 23, 2018; **Accepted date:** October 31, 2018; **Published date:** November 5, 2018

Abstract

Background: Vitamin D is very important to maintain mineralization of bone and homeostasis, and prevents fractures in older adults. Obesity becoming an epidemic worldwide including Iraqi population. The study's aim was to determine the association of body weight with vitamin D concentration in Iraqi population.

Methods: Data from 273 Iraqi subjects came to private clinic for different clinical conditions, all of them were free from chronic diseases, age between 20-50 years, all of them were married, and their life style is sedentary, non-smokers. Body mass index measures were used to categorize subjects into under/normal weight (BMI<25), overweight, and obese groups (≥ 25).

VIDAS 25 OH Vitamin D TOTAL (VITD) is an automated quantitative test for use on the instruments of the VIDAS family for the determination of 25-Hydroxyvitamin D Total in human serum or plasma using the ELFA technique (Enzyme Linked Fluorescent Assay).

The VIDAS 25 OH Vitamin D TOTAL assay is to be used as an aid in the assessment of Vitamin D sufficiency.

Results: the distribution of patients according to gender shows approximately equal number of males and females (135 males and 138 females). There is no association between body mass index and Vitamin D concentration (odds ratio 0.66 95% CI (0.35-1.25)). Also there is no significant association between gender and vitamin D level (odds ratio 1.06 95% CI (0.62-1.82) also no significant association with age (p>0.05)

Conclusion: Our study shows no relationship between body mass index and vitamin D level.

Key words:

Vitamin D, Body mass index

Introduction

Vitamin D has showed great attention in the scientific and public health community, and about one billion individuals of different ages and races now being either insufficient or deficient all over the world [1-3]. The prevalence may be underestimated in elderly subjects, who may also have lower serum 25-Hydroxyvitamin D [25(OH)D] concentration [4]. Vitamin D is a fat-soluble vitamin, important to maintain extracellular calcium ion and phosphate levels that are very essential for mineral homeostasis of bone [5,6]. In addition to the role of vitamin D in skeletal health, many studies suggest that vitamin D plays important role in other health bad outcomes [2,7,8], the studies found low serum concentrations of vitamin D associated with cancer [9], diseases of immune system [10,11], diseases of cardiovascular system [12], diabetes mellitus [13-15], and weakness of muscle [16], depression [17], schizophrenia [18,19], cognitive deficits [20,21] and falls and fractures [22-25]. There is no consistent finding for vitamin D as causal in non-skeletal health [26], but it is important to maintain normal levels of vitamin D during the life of human. The production of vitamin D is from the skin through exposure to sun light. The wave length of Ultraviolet B radiation between 290 nm and 315 nm, in addition it can be taken from food and dietary supplement. By two hydroxylation, vitamin D derived from the diet or skin changes to 25-hydroxyvitamin D [25(OH)-D] in the liver, then to its active form 1,25-Dihydroxyvitamin D, in the kidney [2,27]. A lot of risk factors for low level of vitamin D in elderly have been identified, including sunscreen use, the season and time of the day, skin pigmentation, liver or kidney dysfunction, and dietary inadequacy or malabsorption, [2,27]. In addition to that, many researchers found a relationship between obesity and low vitamin D concentrations in the body [28-39], may be by the proposed action of excess body fat to sequester higher concentrations of serum 25(OH) D [31,40]. In addition to that, bioavailability of vitamin D impairment, in response to exposure to ultraviolet radiation, was observed in individuals with obesity, which is independent of the cutaneous precursor of vitamin D [31], may lead to low level of vitamin D in the serum.

Our aim in this study was to study the association between Vitamin D status and body weight (measured using Body Mass Index (BMI) in Iraqi adults.

Patients and Methods

Data from 273 Iraqi subjects came to private clinic for different clinical conditions during the period from 1st of January through June 2018, all of them were free from chronic diseases, age between 20-50 years, all of them were married, their life style is sedentary (by history), non-smokers. Body Mass Index (BMI) measures were used to categorize subjects into under/normal weight (BMI<25 Kg/m^2), overweight, and obese groups (BMI ≥ 25 Kg/m^2).

VIDAS 25 OH Vitamin D TOTAL (VITD) is an automated quantitative test for use on the instruments of the VIDAS family for the determination of 25-Hydroxyvitamin D Total in human serum or plasma using the ELFA technique (Enzyme Linked Fluorescent Assay).

The VIDAS 25 OH Vitamin D TOTAL assay is to be used as an aid in the assessment of Vitamin D sufficiency.

Result

Table 1 shows that approximately equal males and females, the age group 31-40 years is the highest number, and most of them 79.2% had body mass index more than or equal 25 and 73.3% show less than normal Vitamin D.

Variable		Number (%)
Gender	Male	135 (49.4%)
	Female	138 (50.6%)
Age (years)	20-30	76 (27.8%)
	31-40	136 (50%)
	41-50	61 (22.2%)
BMI (kg/m^2)	<25	57 (20.8%)
	≥ 25	216 (79.2%)
Vitamin D (IU)	<30	200 (73.3%)
	≥ 30	73 (16.7%)

Table 1: Socio-demographic characteristics of participants.

Variable		BMI Kg/m^2		Total	OR (95% CI)	P value
		≥ 25	<25			
Vitamin D IU	<30	162	38	200	0.66 (0.35-1.25)	0.273
	≥ 30	54	19	73		
Sum		216	57	273	--	--

Table 2: Association between vitamin D level and Body mass index.

Table 2 shows no significant association between vitamin D and body mass index.

Variable		Gender		Total	OR (95% CI)	P value
		Male	Female			
Vitamin D IU	<30	98	102	200	1.06 (0.62-1.82)	0.92
	≥ 30	37	36	73		
Total		135	138	273	--	--

Table 3: Association between Vitamin D level and gender.

Table 3 shows no significant association between gender and Vitamin D level.

Variable		Age/Years			Total	P value
		20-30	31-40	41-50		
Vitamin D IU	<30	56	107	37	200	0.03
	≥ 30	20	29	24	73	
Total		76	136	61	273	--

Table 4: Association between Vitamin D and age.

There is a significant association between Vitamin D and age as shown in Table 4.

Variable	B	S.E.	P value	Exp (B)	95% C.I. for EXP (B)	
					Lower	Upper
Gender (1)	-0.566-	0.446	0.204	0.568	0.237	1.36
Vitamin D IU	-0.013-	0.032	0.682	0.987	0.926	1.052
Age/years	-0.024-	0.024	0.314	0.976	0.931	1.023

Table 5: Multiple logistic Regressions for different variables associated with body weight.

There is no one significant factor in our study population as shown in Table 5.

Discussion

Approximately 73% of the participants in this study were identified as having low level of 25(OH)D concentrations in serum and this agree with a study done in Iran reported vitamin D. so it is important to supply Vitamin D to prevent the risk of falls and fractures, and late consequences of chronic comorbid conditions [41-43]. In our study there is no significant association between those who are overweight or obese (BMI ≥ 25 Kg/m^2) and those who are normal weight (BMI<25 Kg/m^2) and this may be attributed to the culture and religious causes which determine the type of clothes so most of the body covered and no sun exposure apart from face and hands. Many factors affect the Vitamin D level in the blood in humans. Vitamin D supplementation,

and gastrointestinal, hepatic and renal diseases, diet, exposure to sunlight are some of the known factors [44-50]. Additionally, older age, winter season, black race/ethnicity, and female gender have been associated with lower 25(OH)-D levels. Weight and BMI were not significantly associated with serum 25(OH)-D concentrations [51] and this agree with our finding in this study.

Determinants of vitamin D status in morbidly obese individuals were examined, and factors considered were dietary Vitamin D intake, BMI, skin color and sun exposure. The key findings were (i) Natural skin color accounted for 13.5% of the variation in serum 25(OH)D concentrations; (ii) Serum 25(OH)-D significantly associated with age; and (iii) Serum 25(OH)D had no significant association with weight and BMI [51] There are factors, such as skin pigmentation, style of clothing, insufficient Vitamin D intake, air pollution, and lack of routine enrichment of foods with Vitamin D could be responsible for the findings of our study [52].

Conclusion

The study shows no association between Body mass index and level of vitamin D concentration in Iraqi population.

Conflicts of Interest

The author declares no conflict of interest.

References

1. Palacios C, Gonzalez L (2014) Is vitamin D deficiency a major global public health problem? J Steroid Biochem. Mol Biol 144: 138-145.
2. Holick MF (2007) Vitamin D deficiency. N Engl J Med 357: 266-281.
3. Cashman KD, Dowling KG, Skrabakova Z, Gonzalez-Gross M, Valtuena J, et al. (2016) Vitamin D deficiency in europe: Pandemic? Am J Clin Nutr 103: 1033-1044.
4. Gloth FM, Gundberg CM, Hollis BW, Haddad JG, Tobin JD (1995) Vitamin D deficiency in homebound elderly persons. JAMA 274: 1683-1686.
5. DeLuca HF (2004) Overview of general physiologic features and functions of vitamin D. Am J Clin Nutr 80: 1689S-1696S.
6. Holick MF, Chen TC (2008) Vitamin D deficiency: A worldwide problem with health consequences. Am J Clin Nutr 87: 1080S-1086S.
7. Bouillon R, Carmeliet G, Verlinden L, van Etten E, Verstuyf A, et al. (2008) Vitamin D and human health: Lessons from Vitamin D receptor null mice. Endocr Rev 29: 726-776.
8. Wang Y, Zhu J, DeLuca HF (2012) Where is the vitamin D receptor? Arch Biochem Biophys 523: 123-133.
9. Deeb KK, Trump DL, Johnson CS (2007) Vitamin D signalling pathways in cancer: Potential for anticancer therapeutics. Nat Rev Cancer 7: 684-700.
10. Munger KL, Zhang SM, O'Reilly E, Hernan MA, Olek MJ, et al. (2004) Vitamin D intake and incidence of multiple sclerosis. Neurology 62: 60-65.
11. Merlino LA, Curtis J, Mikuls TR, Cerhan JR, Criswell LA, et al. (2004) Vitamin D intake is inversely associated with rheumatoid arthritis: Results from the Iowa Women's Health Study. Arthr Rheum 50: 72-77.
12. Norman PE, Powell JT (2014) Vitamin D and cardiovascular disease. Circul Res 114: 379-393.
13. Mauss D, Jarczok MN, Hoffmann K, Thomas GN, Fischer JE (2015) Association of vitamin D levels with type 2 diabetes in older working adults. Int J Med Sci 12: 362-368.
14. Hypponen E, Laara E, Reunanen A, Jarvelin MR, Virtanen SM (2001) Intake of vitamin D and risk of type 1 diabetes: A birth-cohort study. Lancet 358: 1500-1503.
15. Pittas AG, Dawson-Hughes B, Li T, Van Dam RM, Willett WC, et al. (2006) Vitamin D and calcium intake in relation to type 2 diabetes in women. Diabetes Care 29: 650-656.
16. Beaudart C, Buckinx F, Rabenda V, Gillain S, Cavalier E, et al. (2014) The effects of vitamin D on skeletal muscle strength, muscle mass, and muscle power: A systematic review and meta-analysis of randomized controlled trials. J Clin Endocrinol Metab 99: 4336-4345.
17. McGrath J, Selten JP, Chant D (2002) Long-term trends in sunshine duration and its association with schizophrenia birth rates and age at first registration-Data from Australia and the Netherlands. Schizophr Res 54: 199-212.
18. Brouwer-Brolsma EM, Dhonukshe-Rutten RA, Wijngaarden JP, Zwaluw NL, Sohl E, et al. (2016) Low vitamin D status is associated with more depressive symptoms in Dutch older adults. Eur J Nutr 55: 1525-1534.
19. Spedding S (2014) Vitamin D and depression: A systematic review and meta-analysis comparing studies with and without biological flaws. Nutrients 6: 1501-1518.
20. Manzo C, Castagna A, Palummeri E, Traini E, Cotroneo AM, et al. (2016) Relationship between 25-hydroxy vitamin D and cognitive status in older adults: The COGNIDAGE study. Recenti Prog Med 107: 75-83.
21. Brouwer-Brolsma EM, Groot LC (2015) Vitamin D and cognition in older adults: An update of recent findings. Curr Opin Clin Nutr Metab Care 18: 11-16.
22. Winzenberg T, Mei I, Mason RS, Nowson C, Jones G (2012) Vitamin D and the musculoskeletal health of older adults. Aust Fam Phys 41: 92-99.
23. Neelemaat F, Lips P, Bosmans JE, Thijs A, Seidell JC, et al. (2012) Short-term oral nutritional intervention with protein and vitamin D decreases falls in malnourished older adults. J Am Geriatr Soc 60: 691-699.
24. Kalyani RR, Stein B, Valiyil R, Manno R, Maynard JW, et al. (2010) Vitamin D treatment for the prevention of falls in older adults: Systematic review and meta-analysis. J Am Geriatr Soc 58: 1299-1310.
25. Janssen HC, Samson MM, Verhaar HJ (2002) Vitamin D deficiency, muscle function, and falls in elderly people. Am J Clin Nutr 75: 611-615.
26. Ross AC, Manson JE, Abrams SA, Aloia JF, Brannon PM, et al. (2011) The 2011 report on dietary reference intakes for calcium and vitamin D from the Institute of Medicine: What clinicians need to know. J Clin Endocrinol Metab 96: 53-58.
27. Dusso AS, Brown AJ, Slatopolsky E (2005) Vitamin D. Am J Physiol Renal Physiol 289: F8-F28.
28. Vimaleswaran KS, Berry DJ, Lu C, Tikkanen E, Pilz S, et al. (2013) Causal relationship between obesity and vitamin D status: Bi-directional Mendelian randomization analysis of multiple cohorts. PLoS Med 10: e1001383.
29. Pereira-Santos M, Costa PR, Assis AM, Santos CA, Santos DB (2015) Obesity and Vitamin D deficiency: A systematic review and meta-analysis. Obes Rev 16: 341-349.
30. Samuel L, Borrell LN (2014) The effect of body mass index on adequacy of serum 25-hydroxyvitamin D levels in US adults: The National Health and Nutrition Examination Survey 2001 to 2006. Ann Epidemiol 24: 781-784.
31. Wortsman J, Matsuoka LY, Chen TC, Lu Z, Holick MF (2000) Decreased bioavailability of vitamin D in obesity. Am J Clin Nutr 72: 690-693.
32. Damasiewicz MJ, Magliano DJ, Daly RM, Gagnon C, Lu ZX, et al. (2013) Serum 25-hydroxyvitamin D deficiency and the 5-year incidence of CKD. Am J Kidney Dis 62: 58-66.
33. Thuesen B, Husemoen L, Fenger M, Jakobsen J, Schwarz P, et al. (2012) Determinants of vitamin D status in a general population of Danish adults. Bone 50: 605-610.
34. Florez H, Martinez R, Chacra W, Strickman-Stein N, Levis S (2007) Outdoor exercise reduces the risk of hypovitaminosis D in the obese. J Steroid Biochem Mol Biol 103: 679-681.
35. Young KA, Engelman CD, Langefeld CD, Hairston KG, Haffner SM, et al. (2009) Association of plasma vitamin D levels with adiposity in Hispanic and African Americans. J Clin Endocrinol Metab 94: 3306-3313.

36. Young KA, Fingerlin TE, Langefeld CD, Lorenzo C, Haffner SM, et al. (2012) Exploring differences in adiposity in two US Hispanic populations of Mexican origin using social, behavioral, physiologic and genetic markers: The IRAS Family Study. Ethn Dis 22: 65-71.
37. Gonzalez L, Ramos-Trautmann G, Diaz-Luquis GM, Perez CM, Palacios C (2015) Vitamin D status is inversely associated with Obesity in a clinic-based sample in Puerto Rico. Nutr Res 35: 287-293.
38. Palacios C, Gil K, Perez CM, Joshipura K (2012) Determinants of vitamin D status among overweight and obese Puerto Rican adults. Ann Nutr Metab 60: 35-43.
39. Elizondo-Montemayor L, Ugalde-Casas PA, Serrano-Gonzalez M, Cuello-Garcia CA, Borbolla-Escoboza JR (2010) Serum 25-hydroxyvitamin D concentration, life factors and obesity in Mexican children. Obesity 18: 1805-1811.
40. Cheng S, Massaro JM, Fox CS, Larson MG, Keyes MJ, et al. (2010) Adiposity, cardiometabolic risk, and vitamin D status: The Framingham Heart Study. Diabetes 59: 242-248.
41. Johnson KA, Bernard MA, Funderburg K (2002) Vitamin nutrition in older adults. Clin Geriatr Med 18: 773-799.
42. Peacock M, Liu G, Carey M, McClintock R, Ambrosius W, et al. (2002) Effect of calcium or 25OH vitamin D3 dietary supplementation on bone loss at the hip in men and women over the age of 60. J Clin Endocrinol Metab 85: 3011-3019.
43. Pirotta S, Kidgell DJ, Daly RM (2015) Effects of vitamin D supplementation on neuroplasticity in older adults: A double-blinded, placebo-controlled randomised trial. Osteoporos Int 26: 131-140.
44. Looker AC, Johnson CL, Lacher DA, Pfeiffer CM, Schleicher RL, et al. (2011) Vitamin D status: United States, 2001-2006. NCHS Data Brief 59: 1-8.
45. Tolppanen AM, Fraser A, Fraser WD, Lawlor DA (2012) Risk factors for variation in 25-hydroxyvitamin D3 and D2 concentrations and vitamin D deficiency in children. J Clin Endocrinol Metab 97: 1202-1210.
46. Das G, Crocombe S, McGrath M, Berry JL, Mughal MZ (2006) Hypovitaminosis D among healthy adolescent girls attending an inner city school. Arch Dis Child 91: 569-572.
47. Lozano P, Henrikson NB, Morrison CC, Dunn J, Nguyen M, et al. (2016) Lipid screening in childhood for detection of multifactorial dyslipidemia: A systematic evidence review for the US Preventative Service Task. JAMA 316: 645-655.
48. Pereira-Santos M, Costa PR, Assis AM, Santos CA, Santos DB (2015) Obesity and vitamin D deficiency: A systematic review and meta-analysis. Obes Rev 16: 341-349.
49. Yao Y, Zhu L, He L, Duan Y, Liang W, et al. (2015) A meta-analysis of the relationship between vitamin D deficiency and obesity. Int J Clin Exp Med 8: 14977-14984.
50. Saneei P, Salehi-Abargouei A, Esmaillzadeh A (2013) Serum 25-hydroxy vitamin D levels in relation to body mass index: A systematic review and meta-analysis. Obes Rev 14: 393-404.
51. Dix CF, Bauer JD, Martin I, Rochester S, Duarte Romero B, et al. (2017) Association of sun exposure, skin colour and body mass index with vitamin D status in individuals who are morbidly obese. Nutrients 9: 1094.
52. Hovsepian S, Amini M, Aminorroaya A, Amini P, Iraj B (2011) Prevalence of Vitamin D Deficiency among Adult Population of Isfahan City, Iran. J Health Popul Nutr 29: 149-155.