Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.47750/jptcp.2022.969

Evaluation of vitamin D3 among overweight and obese school students in Samarra city

Shafaq Abbas Muhammad Al-Samarrai[1*], Abdul Monaim Hamad Majeed Al-Samarrai[2]
[1,2]University of Samarra , college of education ,Department of chemistry
***Corresponding author:** Shafaq Abbas Muhammad Al-Samarrai , University of Samarra , college of education ,Department of chemistry, Email: shafaq.abbas.iq@gmail.com

Submitted: 10 February 2022; Accepted: 12 April 2022; Published: 11 June 2022

ABSTRACT

The current research included evaluating the level of vitamin D3 in overweight and obese school students. The research included collecting 90 blood samples, between the ages of (12-18) years, 30 blood samples were from overweight people (G1), and 30 blood samples were from people with obesity. Obesity (G2) and 30 blood samples from healthy people (control group). The samples were collected from school students in the city of Samarra, for the period from 11/12/2022 - 12/20/2022.

The research included estimating the level of vitamin D3, in the blood serum of the samples under study. And Know the prevalence of Vitamin D3.

The results obtained from the current study:

Prevalence Study: The results showed that vitamin D3 deficiency was 100% in all study groups. As for the severity of the deficiency, it was found that the prevalence of vitamin D3 deficiency within the range (20-30)ng/ml was 40% and the range (10-20) was 60%. As for (5-10) ng/ml, it was 0% for the healthy group. As for the group G1 (overweight), the results showed that the prevalence of vitamin D3 deficiency within the range (20-30) ng /ml was 23.3%, and the range (10-20) ng /ml was 50%, while (5-10) ng/ml it was 27%, while the percentage of The prevalence of vitamin D3 deficiency for group G2 (obesity) within the range (20-30) was 10%, and the range (10-20) ng /ml was 53%, while (5-10) ng/ml it was 36%.

Biochemical study : The result showed a significant decrease in Vit D3 in blood serum G1,G2 groups Compered with control groups .

Keywords: *samples, vitamin, collected, blood*

INTRODUCTION

Obesity is defined as a measure of body mass and is considered one of the most common public health problems at the present time (1). It is also a common disorder associated with genetic makeup, behavioral, physiological and environmental factors (2، 3). The World Health Organization -WHO predicted that 30% of deaths in the world are due to obesity and its associated chronic diseases, which may increase by 2030 and can be stopped by addressing the associated risk factors (3).

Vitamin D3 is one of the important essential, fat-soluble vitamins, as it is found naturally in a number of foods and is available as a dietary supplement.

Therefore, it is a substance required by all vertebrates, including humans, to maintain blood calcium and phosphate levels within the normal limit, and thus support Normal skeletal structure, muscle contraction, and optimal cellular functions in many body sites (4). There are many rich sources of vitamin D3, both natural and industrial, as vitamin D3 can be obtained naturally from food (5), as fish liver oil, cod liver oil and egg yolk are among the best sources for it, and it is also found in a small amount in milk (6) It was found that exposure to sunlight is one of the basic natural sources for obtaining it (7), and that foods fortified and fortified with vitamin D2 and D3 such as milk, yogurt and vegetable ghee are important industrial sources for obtaining vitamin D3 (8). Some experimental data indicates that vitamin D induces obesity, resulting in increased parathyroid hormone, enhanced calcium influx into adipocytes, and enhanced lipogenesis (9). Fat cells express 1-hydroxylase and 24-hydroxylase enzymes responsible for activating and deactivating 25-hydroxyvitamin D (25 (OH) D. Obesity may alter the activity of these enzymes, leading to a decrease in the serum 25 (OH) level (10).

MATERIALS AND METHODS

Samples collection

90 blood samples were collected from school students in Samarra district, their ages ranged between (12-18) years, and they were divided into 45 males and 45 females in three groups, each group containing 15 males and 15 females, for the period from 11/12/2022 - 20/12/ 2022. The samples were divided into: Control group (healthy group):

It included 30 healthy samples. and The first group (G1) It included 30 samples of overweight school students and -The second group (G2) It included 30 samples of obese school students.

Body mass index calculator

Body mass index-BMI was calculated for the study samples to find out the degree of obesity based on the following equation: (11, 12).

$$\textbf{BMI}\ (\frac{\textbf{kg}}{\boldsymbol{m^2}}) = \frac{\textbf{wieght}\ (\textbf{kg})}{\textbf{length}\ \ (\boldsymbol{m^2})}$$

Estimation of vitamin D concentration in blood serumThe level of vitamin D3 was estimated according to the kit prepared by the American company Monobind and according to the researcher's method (13).

RESULT AND DISSECTION

Level of BMI

TABLE 1: Mean ± standard deviation of body mass index in the serum of the samples under study.

Groups Parameters	Mean ± S.D		
	Control(C)	Overweight(G1)	Obesity(G2)
BMI (kg/m^2)	20.320±1.613c	25.633±1.024b	31.650±3.388a

The results showed that there was an increase in the body mass index level in the serum of the obese G2 compared to the overweight group

The results of the current study agree with (Stefan Jijo) (14) and (Haitham M) (15) (Muna Hamza) (16), Mahmoud (17) who showed in their study a high level of body mass index among obese school students. compared with the control group. The reason for the increase in BMI is that being overweight is generally considered a major risk factor for obesity (18). Body mass index, which is defined as body weight in kilograms divided by the square of height in meters, is one of the most commonly used anthropometric measurements for obese patients (19). Primary care is a key setting for the prevention, screening, and management of obesity (20), with individual studies indicating that patients with obesity are more likely to lose weight when they receive recommendations for lifestyle changes from primary care physicians because it can be difficult for physicians to accurately define obesity Only by visually

examining their patients do they need a reliable and effective screening tool in order to ensure that those who need management and treatment receive it (21,22).

Obesity is conceived by the World Health Organization as an abnormal or excessive accumulation of fat that may be harmful to health. It is commonly assessed using the BMI, a simple, rapid, low-cost anthropometric tool that ranks adults with a BMI greater than or equal to 30. They are obese (23,24). The reason for these results may be attributed to the nature of the followed lifestyle in terms of unhealthy diet or lack of exercise and lack of physical activity due to the long periods of sitting to follow social networking sites.

The prevalence of vitamin D deficiency among the samples under study

The vitamin D level was measured for 90 samples, and the samples were divided into a healthy group, which included 30 samples, the first group G1, which included 30 overweight school students, and the second group, G2, which included 30 obese school students. The results showed that the number of samples in which the level of vitamin D was within the normal range (above or equal to 30 ng / cm3) was 0%, as it was shown through the results of the study that the prevalence of vitamin deficiency among healthy people and school students was 100%, as in Figure (2). The vitamin level was also studied depending on the severity of the deficiency in the level of vitamin D3, as the samples were divided according to the severity of the deficiency into three groups, which include the Insufficient group (20-30) ng/ml, the Mild conc group (10-20) ng/ml, and the Moderate group (5-10) ng/ml . In healthy and sick patients.

The results showed that for healthy subjects, the number of samples that had a vitamin D level within the range (20-30) ng/ml was 12 samples, or 40%, while the number of samples that had a vitamin D level within the range (10-20) ng/ml was 18 samples, or 60%. As for the number of samples that had a vitamin D level within the range (5-10) ng/ml 0%. As in Figure (3). While the results showed that for the group of overweight students (G1), the number of samples that had a level of vitamin D within the range (20-30) ng/ml was 7 samples, reached 23.3%, while the number of samples that had a level of vitamin D within the range (20-20) ng/ml reached 50%, while the number of samples that had a vitamin D level within the range (10-5) ng/ml was 8 samples, reached 27%. As in Figure (4). While the results showed that for the group of obese students (G2), the number of samples that had a vitamin D level within the range (20-30) ng/ml was 3 samples, or 10%, while the number of samples that had a vitamin D level was within the range (10-20) ng/ml 16 samples, or 53%, while the number of samples that had a level of vitamin D within the range (10-5) ng/ml reached 36%. As in Figure (5).

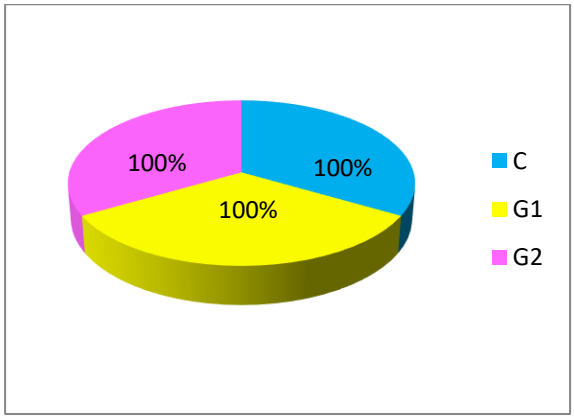

FIGURE 2: shows the prevalence of vitamin D deficiency among healthy and obese schoolchildren

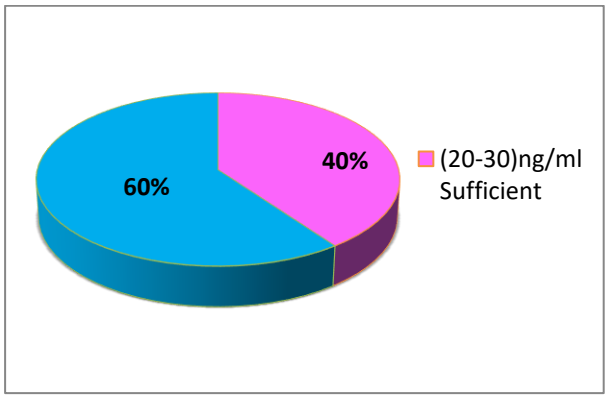

FIGURE 3: shows the prevalence of vitamin D deficiency within the normal levels of the healthy group

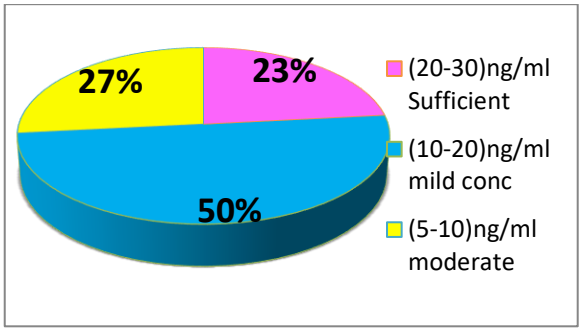

FIGURE 4: shows the prevalence of vitamin D deficiency within normal levels for the overweight group

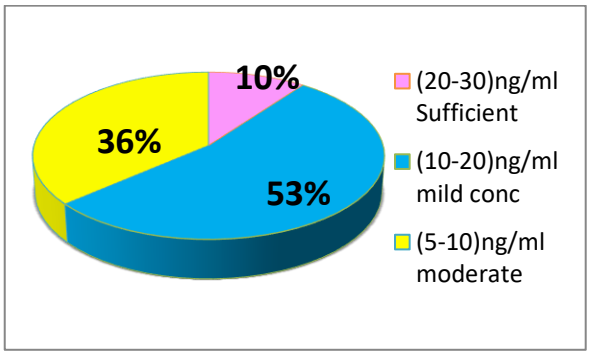

FIGURE 5: shows the prevalence of vitamin D deficiency within the normal levels of the obese group

Vitamin D3 deficiency has become a modern epidemic of epidemic disease. In the United States of America, it was found that at least one-third of the population suffers from vitamin D3 deficiency at a level less than 320 ng/cm3 (25), It also found a study on the prevalence of obesity and its association with the state of deficiency in the level of vitamin D3, as it included a study of 3613 students between the ages of 6-19 years in the western, central and eastern regions in the Kingdom of Saudi Arabia, and then data on age, gender and vitamin D deficiency were collected. Children who were obese by 64.2% had a deficiency in vitamin D compared to people who were obese by 33.7%, so it was found that children with a high body mass index had a deficiency in vitamin D3 (26).

It was also noted through the study of Issa and Ibrahim, who indicated that the deficiency rate was 33.91% among healthy people in Kufa (27). It is also higher than the results of Darwish, who indicated that the percentage of deficiency among females in Karbala was 15%, while its insufficiency was 56.25% (28), and came in agreement with the results of the current study, as vitamin D3 Deficiency was not limited to patients only, but it has become an epidemic of age. which affects healthy people as well. Studies were not limited to researching the prevalence of vitamin D3 deficiency among young age groups, but rather for all age groups. Gordon and his group (29) indicated that 24.1% of healthy adolescents in the United States of America suffer from vitamin deficiency. And 33.33% among school children aged 5-10 years in Rajasthan, India, who had a vitamin level of less than 25 ng/cm3 (30). While kaddam (31) found that the prevalence of deficiency among schoolgirls was 69.2% for females and 30.1% for males. Shin (32) indicated that 98.9% of adolescents in Korea suffer from vitamin D3 deficiency, compared to 100% of females who have a vitamin D3 level of less than 30 ng/cm3. While the results of Moussavi (33), who conducted their studies on students of a school in the city of Isfahan in Iran, at the age of (14-18) years, showed that the highest prevalence of vitamin D3 deficiency was in the low-deficiency Mild group, reaching 18.6% of the total 46.2% as a general percentage for the prevalence of deficiency.

The reason for the decrease in the level of vitamin in the current study may be attributed to malnutrition and dependence on fast food as well as the poverty of the Iraqi table with seafood and the lack of interest in health institutions in educating people about the importance of eating foods fortified with vitamin and the importance of dietary diversity and interest in eating foods rich in vitamin such as egg yolks, beef and liver Milk and cheese, and since the vitamin is a fat-soluble vitamin that an adult needs in the amount of 200 IU/day, any factor that affects the absorption of fat in the intestine can affect the absorption of the vitamin (34, 35).

Estimating the level of vitamin D3 among students of the current study sample

TABLE 2: The mean ± the standard deviation of the vitamin D3 level in the blood serums of the samples under study

Groups Parameters	Mean ± S.D		
	Control	Overweight G1	Obesity G2
Vit D(ng/ml)	20.814±4.379a	11.063±2.702b	11.523±2.167b

The results showed that there was a significant decrease in the level of vitamin D3 in the blood serum of the two groups G1 and G2 compared to healthy people at the level of probability ($P \leq 0.05$). The results also showed that there were no significant differences between the groups G1 and G2.

The results showed that the level of vitamin D3 showed a significant decrease in the students of the selected sample who were obese compared to the healthy subjects. Therefore, the results of the current study agree with the results of (M Pereira-Santos) (36), (Oliveira) (37) and (Fiamenghi) (38), who indicated in their study a decrease in vitamin levels in obese patients.

The reason for the decrease in the vitamin D3 level may be attributed to an increase in body fat, which has reciprocal negative effects resulting from metabolic processes that generate accumulation of inactive forms and reduce bioavailability of vitamin D3, as well as decreased tissue secretion and insulin sensitivity (39). Since overweight and obesity are associated with vitamin D3 deficiency, both of which are important health problems, obesity is known to be associated with vitamin D3 deficiency (40). Therefore, obesity is a very common problem all over the world, as it is one of the most important risk factors for death, which may be related to vitamin D3 deficiency in obese people (41). Vitamin D deficiency is a global health problem affecting nearly 1 billion individuals worldwide (42). Vitamin D is mainly required for the absorption of calcium, phosphate and magnesium in the gut and to prevent rickets. However, most of it is produced in the skin by ultraviolet radiation. The active form of vitamin D is essential for calcium homeostasis and metabolism as well as lipid formation, glucose and insulin balance, cell growth, non-alcoholic fatty liver disease, and diabetes. , insulin resistance, and metabolic syndrome (43,44). Also, vitamin D3 deficiency is more prevalent due to the lack of exposure to the sun or living in enclosed spaces and the use of radiation insulators, which reduces the formation of vitamin D in the skin (45). A study conducted by Carnevale V et al. (46;47) found that in their study, obese Norwegian women seeking weight loss treatment had significantly higher odds of vitamin D deficiency than males with similar BMI values. The cause of vitamin D deficiency as a result of volumetric dilution of ingested or transdermal vitamin D3 in female patients with obesity is significant

REFERENCES

1. Yahya Al - Tufaily 1, Rana Ibrahim 2, Fadhil Sahib Hassnawi. Assessment of Prevalence and Risk Factors of Obesity in Pediatric Age Group Between (5-15) years. J. Of university of Babylon for pure and applied sciences. 29(2).2021.
2. Kotsis V, Stabouli S, Bouldin M.,etal. Impact of obesity on 24-h ambulatory blood pressure and hypertension. Hypertension 2005;45: .607–602
3. Mahmood Safaei a, Elankovan A. Sundararajan a,*, Maha Driss b,c, Wadii Boulila b,c, Azrulhizam Shapi'i d A systematic literature review on obesity: Understanding the causes & consequences of obesity and reviewing various machine learning approaches used to predict obesity. Computers in Biology and Medicine 136 (2021) 104754.
4. Al–Mogadamy, O. A., Mohammed, B. O., Al-Saadi, A. F. and Al–Mogadamy, O. A. (2020). Association of Serum vitamin D levels, Psoriasis and the Effect of Oral D supplementation on Clinical improvement of Disease. Annals of Tropical Medicine and Public Health. 23, 232-233.
5. Paschou, S.A.; Anagnostis, P.; Karras, S.; Annweiler, C.; Vakalopoulou, S.;Garipidou, V. and Goulis, D.G. Bone mineral density in men and children with haemophilia A and B: a systematic review and meta-analysis. Osteo Inter. 2014;25(10):2399-407.

6. Jandal, Jassim Muhammad, Chemistry of Vitamins, first edition, College of Veterinary Medicine - University of Tikrit, 2007, p. 6, 132, 134, 131, 135.
7. Al-Samarraie, M. Q., Mohammed, H. E., Noori, D. S., & Hassan, Z. M. (2022, November). Prevalence of vitamin D3 deficiency in people according age, weight and gender in Samarra city. In AIP Conference Proceedings (Vol. 2394, No. 1, p. 080007). AIP Publishing LLC.
8. Nowson, C.A. and Margerison, C. Vitamin D intake and vitamin D status of Australians. Medical Journal of Australia. 2002;177(3):149-52.
9. M.F. McCarty, C.A. Thomas PTH excess may promote weight gain by impeding catecholamine-induced lipolysis-implications for the impact of calcium, vitamin D, and alcohol on body weight Med. Hypotheses, 61 (2003), pp. 535-542, 10.1016/s0306-9877(03)00227-5
10. L. Wamberg, U. Kampmann, H. Stødkilde-Jørgensen, L. Rejnmark, S.B. Pedersen, B. Richelsen Effects of vitamin D supplementation on body fat accumulation, inflammation, and metabolic risk factors in obese adults with low vitamin D levels - results from a randomized trial Eur. J. Intern. Med., 24 (2013), pp. 644-649, 10.1016/j.ejim.2013.03.005
11. National Institute of Health, National heart, Lung and Blood institute. Clinical Guidelines on the Identification Evaluation, and Treatment of overweight and obesity in adults : The Evidence report Bethesda , Md: National Institutes of Health obes. Res 1998; (2): .51-209.
12. Grummer, M.; lstrawn, A.; pietrio, B.; and Dietz, W,H. Am. j. clin Nutr. 2002; (752): 85-978.
13. Holick , MF. Vitamin D Status :Measurement , Interpretation and Clinical Application . Ann Epidemoil . 2009, 19 (2):73-78.
14. Stefan Jijo Marzina Karsh, Assistant Lect. Revan Said Ishua. BMI levels among Secondary school male and female students in Karakosh. Sciences Journal Of Physical Education, 2020, Volume 13, Issue 4, Pages 380-400.
15. Haitham M. Mikhlif, Randa Mohammed Dhahi . The relationship between body mass index (BMI (and lipid profile in Iraqi population. Journal of Education and Scientific Studies, 2018, Volume 1, Issue 12, Pages 127-142.
16. Muna Hamza Hanoun Alsultany, Shahrazad S. Al Jobori, Khalid K. Alaaraji. Prevalence and Behavioral Risk Factors of Overweight and Obesity amongst Fifth and Sixth Grade Primary Schools' Children in AL-Najaf. Karbala Journal of Medicine, 2019, Volume 12, Issue 2, Pages 2220-2233.
17. Mahmoud M.A . The relationship of chemrin with some biochemical variables for male secondary students in Kirkuk. Master Thesis . Faculty of Education . Samarra University. 2018.
18. Renehan AG, Tyson M, Egger M, Heller RF, Zwahlen M. Body-mass index and incidence of cancer: a systematic review and meta-analysis of prospective observational studies. Lancet. 2008;371(9612):569–578.
19. Aune D, Greenwood DC, Chan DSM, et al. Body mass index, abdominal fatness and pancreatic cancer risk: a systematic review and non-linear dose–response meta-analysis of prospective studies. Ann Oncol. 2012;23(4):843–852.
20. Campbell-Scherer D, Sharma AM. Improving obesity prevention and management in primary care in Canada. Curr. Obes. Rep. 2016;5:327–332. doi: 10.1007/s13679-016-0222-y.
21. Rodondi N, et al. Counselling overweight and obese patients in primary care: a prospective cohort study. Eur. J. Cardiovas. Prev. Rehabil. 2006;13:222–228.
22. Hite A, Victorson D, Elue R, Plunkett BA. An exploration of barriers facing physicians in diagnosing and treating obesity. Am. J. Health Promot. 2018 .
23. Hebert JR, Allison DB, Archer E, Lavie CJ, Blair SN. Scientific decision making, policy decisions, and the obesity pandemic. Mayo Clin. Proc. 2013;88:593–604.
24. Oliveros E, Somers VK, Sochor O, Goel K, Lopez-Jimenez F. The concept of normal weight obesity. Prog. Cardiovasc. Dis. 2014;56:426–433.
25. Daniel, Nicola. Seminar in Biology. Vitamins, National Center for Distinguished People, Syrian Arab Republic 2014, pp. 10-12.
26. 26-Adnan Al Shaikh1, Khaled Aseri1, Fayssal Farahat1, Bahaa A. Abaalkhail2, Ibrahim Kaddam1, Yousef Salih3, Ali Al Qarni4, Ahmed Al Shuaibi4, Waleed Tamimi3. Prevalence of obesity and overweight among school-aged children in saudi arabia and its association with vitamin D status. Acta Biomed 2020; Vol. 91, N.4: e20201333.
27. Issa, A.M. and Ibraheem, S.A. Alterations of vitamin" D" level in sera of Iraqi population. J kerbala Univ. 2007;5(1):58-64.
28. Darwish, L.A.A.I.Vitamin D status in healthy femal individuals .AL-KufaUnversityJ.Bio. 2018;10(1):11-9.
29. Gordon, C.M.; DePeter, K.C.; Feldman, H.A.; Grace, E. and Emans, S.J. Prevalence of vitamin D deficiency among healthy adolescents. Arch Pediat Adol Med. 2004;158(6):531-7.

30. Sharawat, I.; Sitaraman, S. and Dawman, L. Prevalence of Vitamin D Deficiency among Healthy School Children in Jaipur District, Rajasthan, India. Int J Pediat. 2015;3(4-2):801.
31. Kaddam, I.M.; Al-Shaikh, A.M.; Abaalkhail, B.A et al. Prevalence of vitamin D deficiency and its associated factors in three regions of Saudi Arabia: A cross-sectional study. Saudi Med J. 2017;38(4):381-90.
32. Shin, Y.H.; Kim, K.E.; Lee, C et al. High prevalence of vitamin D insufficiency or deficiency in young adolescents in Korea. Eur J Pediatr. 2012;171(10):1475-80.
33. Moussavi, M.; Heidarpour, R.; Aminorroaya, A.; Pournaghshband, Z. and Amini, M. Prevalence of vitamin D deficiency in Isfahani high school students in 2004. Horm Res Paediat. 2005;64(3):144-8.
34. Jhon, G.R. competitive protein binding redio assay for 25(OH) D3. J.Clin. Endocr.Metab.1971;33:992-5.
35. Holick H. L. Biochemistry and physiology-Aspect of Nutrition. 4th Ed. Mosbey 2004.
36. M Pereira-Santos, P R F Costa, A M O Assis, C A S T Santos, D B Santos. Obesity and vitamin D deficiency: a systematic review and meta-analysis. , Federal University of Bahia, Salvador, Bahia, Brazil;2015. Apr;16(4):341-9.
37. Lara Fonseca de Oliveira, Lucas Guimarães de Azevedo.et al. Obesity and overweight decreases the effect of vitamin D supplementation in adults: systematic review and meta-analysis of randomized controlled trials. Campus Universitário do Canela, Salvador, Bahia, 40110-040, Brazil. . 2020 Mar;21(1):67-76.
38. Fiamenghi, Elza Daniel de Mello. Vitamin D deficiency in children and adolescents with obesity: a meta-analysis. Jornal de Pediatria . Volume 97, Issue 3, May–June 2021, Pages 273-279.
39. Al-Samarraie, M. Q., Mokdadhatamabdulwahed, A., Mustafa, M. A., Alkanaani, M. I., Abdulateef, I. D., Hameed, R. S., & Ibrahim, Z. M. (2021). Vitamin D Deficiency and It Relation with Weight, Age and Gender in Number of Men and Women in Samarra City. Annals of the Romanian Society for Cell Biology, 257-263.
40. J. Wortsman, L.Y. Matsuoka, T.C. Chen, Z. Lu, M.F. Holick Decreased bioavailability of vitamin D in obesity Am J Clin Nutr, 72 (2000), pp. 690-693.
41. Sabrina Ait Gacem and Moyad Jamal Shahwan. Vitamin D and Obesity. All content following this page was uploaded by Sabrina Ait Gacem on 29 November 2019.
42. Lee K, Kim J: Serum vitamin D status and metabolic syndrome: a systematic review and dose-response meta-analysis (https://dx.doi.org/10.4162/nrp.2021.15.3.329). Nutr Res Pract. 2021, 15:329-45.
43. Kheiri B, Abdalla A, Osman M, Ahmed S, Hassan M, Bachuwa G: Vitamin D deficiency and risk of cardiovascular diseases: a narrative review (https://dx.doi.org/10.1186/s40885-018-0094-4). Clin Hypertens. 2018, 24:9. 10.1186/s40885-018-0094-4 (https://dx.doi.org/10.1186/s40885-018-0094-4).
44. Melguizo-Rodríguez L, Costela-Ruiz VJ, García-Recio E, De Luna-Bertos E, Ruiz C, Illescas-Montes R: Role of vitamin D in the metabolic syndrome (https://dx.doi.org/10.3390/nu13030830). Nutrients. 2021, 13:830. 10.3390/nu13030830 (https://dx.doi.org/10.3390/nu13030830).
45. Deeb, KK, Trump DL, Johnson CS. Vitamin D signalling pathways in cancer: potential for anticancer therapeutics. Nature reviews cancer. 2007 Sep;7(9):684.
46. Abdulwahed, A. M. H., Alkanaani, M. I., Alsamarrai, A. H., Hamad, M. A. M., Dakheel, A., & Al-Samarraie, M. Q. (2020). Determination of some visfatin hormone level and lipid profilein some breast cancer patients in Samarra city. Annals of Tropical Medicine and Health, 23, 265-267.
47. Carnevale V., Modoni S., Pileri M., Di Giorgio A., Chiodini I., Minisola S., Vieth R., Scillitani A. Longitudinal evaluation of vitamin D status in healthy subjects from southern Italy: Seasonal and gender differences. Osteoporos. Int. 2001;12:1026–1030.