



Deficiency vitamin D in nanoscale and its incidence on obesity

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Being overweight is referred to as obesity, which is a global health concern. The well-established finding that vitamin D (VD) insufficiency is more prevalent in nano scale on obese individuals is most likely the result of volumetric dilution into higher volumes of muscle, liver, serum, and fat; however, other routes may also be at play and cannot be completely ruled out. Hence, this study aimed to investigate the role of vitamin D3 in nano scale for occurrence of obesity among Iraqi patients. This study was included 100 patients suffering from obesity with age ranged from 8 to 70 years and weight ranged from 20 to 95 kg. Among 100 patients diagnosed with obesity, the results in Figure 1 indicated that 34% of patients were diagnosed with deficiency (<10 ng/ml) and insufficiency (10-30 ng/ml) of vitamin D3, while 32% of these patients were not suffering from deficiency of this vitamin (30 – 100 ng/ml). The majority of patients were included in 70-79 kg age group by 53%.

Keywords: Vitamin D3 deficiency; Obesity; Body mass index; nano scale.

1. INTRODUCTION

Vitamin D (VD) is required for the homeostasis of phosphorus and calcium and bone tissue maintenance [1]. Its receptors have been discovered all over the body of human, showing a variety of roles. Because it is produced naturally within the body, vitamin D is now more commonly viewed as a hormone than a vitamin in the traditional sense. 1,25-dihydroxyvitamin D (1,25(OH)₂D), the VD active form, has extra-skeletal roles like enhancing immune system, insulin secretion, stimulating cell differentiation, muscular function, in addition to its effects on decreasing PTH (parathyroid hormone) secretion and osteoblast function, osteoclastic bone resorption, reducing collagen type 1 production, and calcium absorption [2]. Children's rickets and adults' osteomalacia are the results of a vitamin D shortage, whereas a mild

deficiency increases bone turnover and the likelihood of fractures. In recent years, deficiency of vitamin D, which is described as a concentration of 25-hydroxyvitamin D (25(OH)D) in serum below 20 ng mL^{-1} or 50 nmol^{-1} [3], has been related with many diseases and conditions, including dementia, depression, multiple sclerosis, cancer, type 2 diabetes, arterial hypertension, dyslipidemia, psychiatric disorders and cardiovascular disease [4]. Consequently, there is a current trend in scientific inquiry of VD due to the unknown role it plays in the etiology and progression of these disorders [2]. Obesity, often known as excessive body fat, is a worldwide epidemic [5], [6]. Despite the prevalence of studies demonstrating an association between VD insufficiency and obesity and related illnesses, the existence of a causal linkage between the two remains uncertain [2]. Therefore, this work aimed to estimate the relationship of obesity with decreasing level of serum Vitamin D3. One of the most frequently seen health problems is obesity, which is characterized as an abnormal or excessive buildup of body fat that can have an impact on a person's health. [13]. The body mass index (BMI), a technique that uses an individual's height and weight, is a measure of obesity and other body weight status [14]. A common way of calculating the BMI is dividing the weight by the square of the height. An individual is classified as obese if their BMI is 30 or higher [13]. For adult males and females of various ages, BMI offers a generic measure of obesity and overweight; however, for youngsters, age must be taken into account [15]. Because it may not always accurately represent or correlate with an individual's level of fat, it should only be used as a general reference [13]. In addition to being linked to the metabolic syndrome, common obesity can be differentiated from rare types of monogenic and polygenic obesity as well as secondary obesity [16].

Since phenomenological methods to understanding obesity have not produced any lasting effects on treatment or prevention, the prevalence of common obesity has become a public health concern in many nations [15]. It has been demonstrated that a central control system uses homeostatic pathways to manage energy intake and expenditure in order to maintain body weight at a fixed value [18]. According to this study, fat mass buildup leads to an increase in body size, and an increase in the set-point causes common obesity [17]. According to the World Health Organization (WHO), obesity is known to be especially prevalent in developed (high-income) countries, but it is alarming to learn that obesity rates are also growing in middle-class and low-income countries. Due to the fact that obesity is a substantial risk factor for several serious chronic diseases that are categorized as noncommunicable diseases (NCDs), such as diabetes, cancer, respiratory conditions, and cardiovascular diseases, which, according to WHO estimates, are predicted to cause 38 million deaths yearly [19]. The World Health Organization (WHO) revealed that the prevalence of obesity among individuals aged 18 and over (1975–2016) was 31.7% in the United Arab Emirates (UAE) and 27.8% in the United Kingdom (UK), according to the Global Health Observatory (GHO) [19]. In the United Arab Emirates, adult obesity rates are 27.8% in 2019, per the National Health Survey. One of the many factors that contribute to obesity is an imbalance between calories burned and calories ingested as a result of dietary and physical activity changes [20]. While there are many factors that affect body weight, including genetic, behavioral, metabolic, and hormonal factors, obesity is mostly brought on by consuming more calories than being burned during routine daily activity and exercise. The prevalence of obesity has been linked to a number of factors; most notably changes in lifestyle habits [20]. Your body stores these extra calories as fat, which suggests that particular actions and healthcare awareness campaigns can support and aid in resolving this problem [16,21].

2. MATERIALS AND METHOD

2.1. Subjects

This study was included 100 patients suffering from obesity with age ranged from 8 to 70 years and weight ranged from 20 to 95 kg. These patients were visited different private laboratories in Baghdad city and diagnosed by physician depending on their lipid profile examination and weights. All information of patients, name, weight and age, were recorded.

2.2 Collection of specimens

3 ml of blood was drawn from vein of patients using needle syringe (5 ml) and transferred immediately into gel tube. Each tube was left for minutes until blood coagulate then centrifugated at 6000 rpm for 5 minutes to obtain the sera.

2.3 Estimation of vitamin D3

Icroma Vitamin D3 kit (Boditech/Korea) was utilized to estimate VD3 levels in sera of patients. The cut-off (reference range): sufficiencies (30 – 100 ng/ml); insufficiencies (10-30 ng/ml); deficiencies (<10 ng/ml).

2.4 Statistical Analysis

Mean median and standard deviation of patient’s weight, age and vitamin D3 were statistically analyzed using statical analysis system (SDS) program [7].

3. RESULTS AND DISCUSSION

Among 100 patients diagnosed with obesity, the results in Figure 1 indicated that 34% of patients were diagnosed with insufficiency (10-30 ng/ml) and deficiency (<10 ng/ml) of vitamin D3, while 32% of these patients were not suffering from deficiency of this vitamin (30 – 100 ng/ml). light on the interconnectedness of the three main adipocytes (lepton, adiponectin, and resist in) [12].

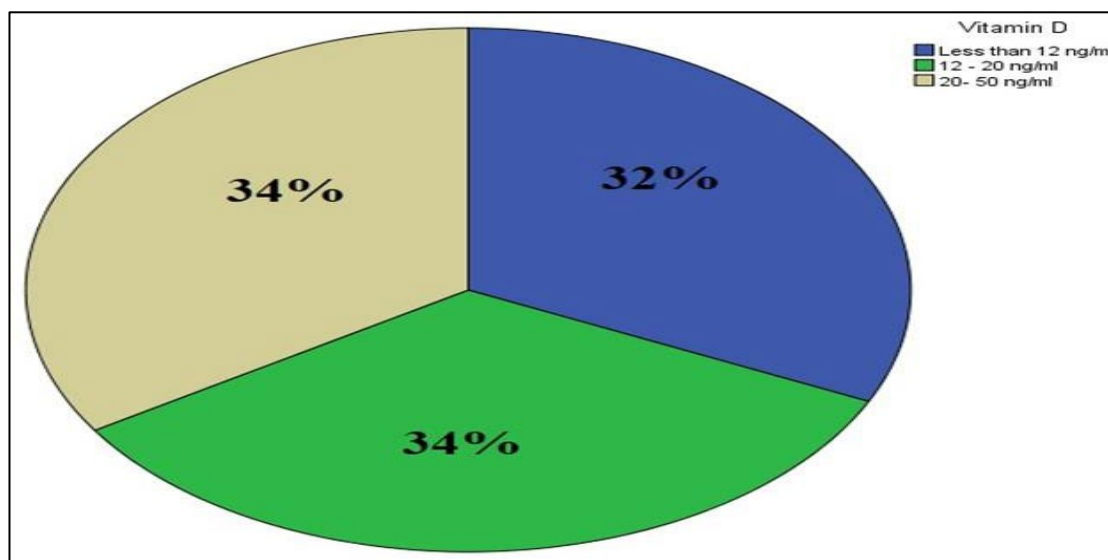


Figure 1 Vitamin D distribution of among patients' samples.

Table 1 Distribution of patient’s weight.

Case	Frequency	Percent
equal or less than 39 kg	2	2.0
50- 59 kg	1	1.0
70- 79 kg	53	53.0
80- 89 kg	28	28.0
90- 99 kg	12	12.0
Equal or more than 100 kg	4	4.0
Total	100	100.0

In Figure 2 and 3, the findings showed that majority of patients were included in 70-79 kg age group by 53%.

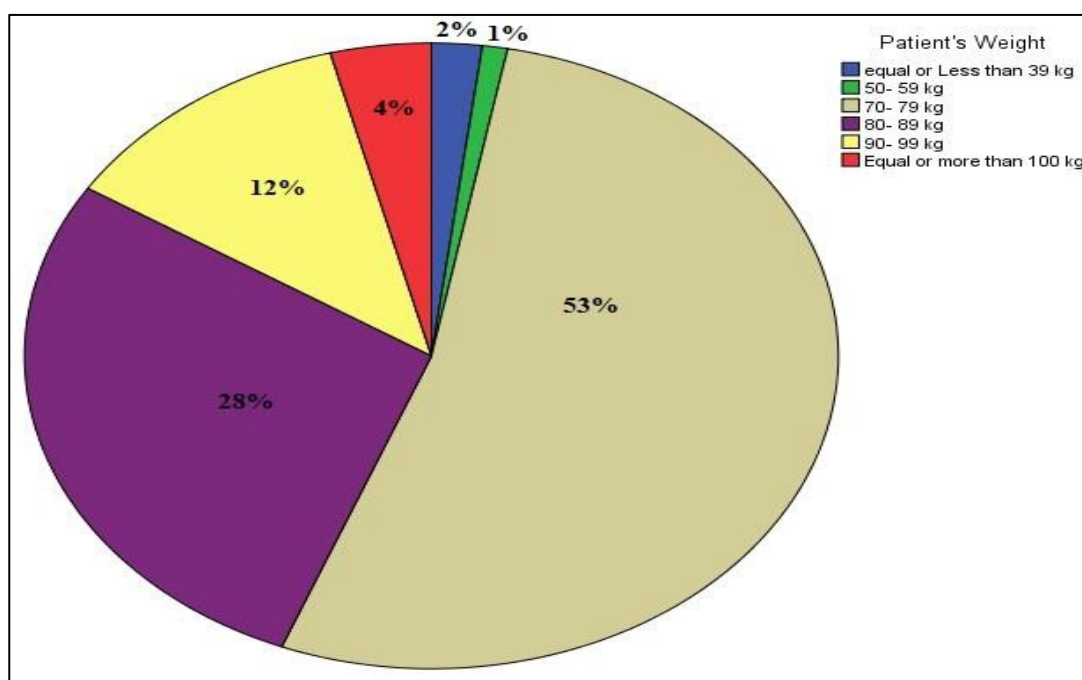


Figure 2 Distribution of weight groups among patients.

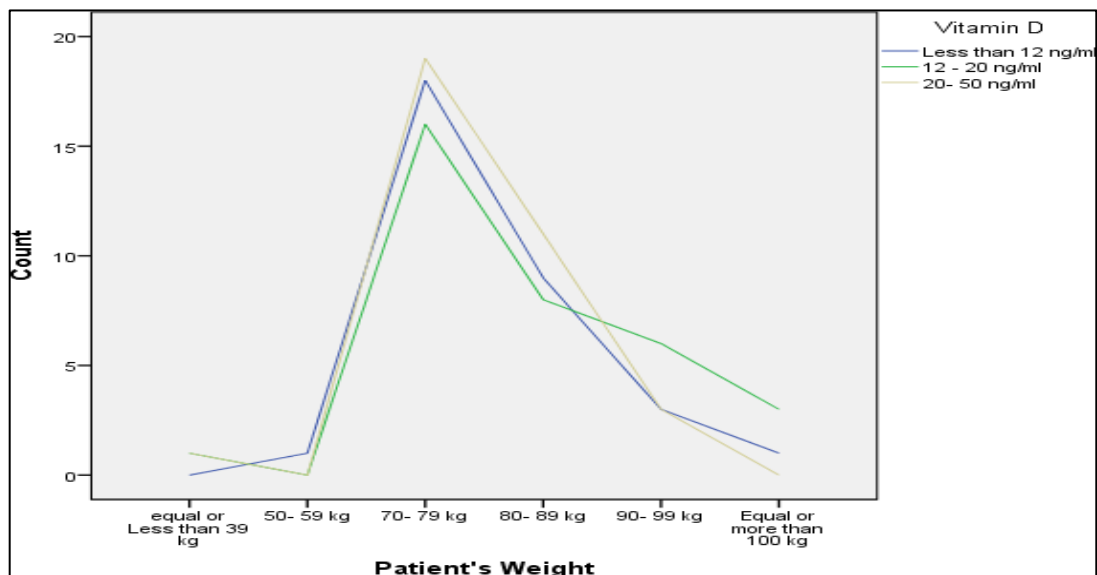


Figure 3 Correlation of vitamin D level and weight of patients.

In study conducted by [8], Levels of vitamin D3 ranged from deficient (52.94%) to high (20.16%) to excessively high (26.89%) among the subjects. The disease known as obesity is brought on by an abnormal accumulation of fat. Obesity goes well beyond just aesthetic concerns. The risk of getting additional diseases and cancers, as well as hypertension, diabetes, and cardiovascular disease, is increased by this medical condition [9] [22]. There is a growing recognition among doctors of many specialties that excessive weight in adolescents and adults is a major risk factor associated with severe consequences. Most countries also have a high rate of vitamin D insufficiency in children and adolescents, which goes hand in hand with the epidemic of childhood obesity and metabolic syndrome [10].

Tissue of fat packed with lymphocytes and macrophages shows evidence of subclinical inflammation, indicating a function for vitamin D deficiency in immunological processes that lead to inflammation. Vitamin D's significance as paracrine and endocrine regulators of inflammations in adipose tissues are demonstrated, as are the roles of adipokines, cells of immunity, and pro-inflammatory cytokines released by them in the obesity etiology [11]. Differences between when vitamin D levels are normal and when they are low shed light on the interconnectedness of the three main adipocytes (lepton, adiponectin, and resistin) [12][23].

4. CONCLUSIONS

In our study, we found that most population of Iraq are suffering from body weight associated with deficiency vitamin D, it has cleared a relationship between Obesity and Vitamin D3 serum level.

Ethical clearance

The experiments described in this study were approved by Nanotechnology and Advanced Materials Research Center. The research was conducted by a group from the University of Technology.

Conflict of interest

There are no competing interests that the authors need to disclose.

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