Assessment of vitamin D deficiency for those who visit some laboratories in Tarhuna

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تقييم نقص فيتامين د لدي الافراد المترددين علي المعامل الطبية بمنطقة ترهونة

المستخلص:

نقص فيتامين د يؤثر بشكل سلبي علي تكلس العظام مسببا مرض الكساح في صغار السن وهشاشة العظام لدى البالغين. الفيتامين يلعب دور هام في الاتزان الداخلي لعنصر الكالسيوم وترسب المعادن بالعظام. البيانات المتعلقة بمستويات الفيتامين لدى مجتمع الدراسة المتمثل في اولئك الافراد الذين ترددوا علي معامل التحليل بمدينة ترهونة لغرض اجراء تحليل الفيتامين، تم تفريغ البيانات في ثلاث فئات بناء علي تصنيف المعهد الطبي (IMO) حيث كانت الفئات كالتالي: أفراد لديهم مستويات كافية للفيتامين (أكثر من 30 نانوجرام/ ملليلتر) أفراد بمستويات غير كافية للفيتامين (30 إلى 20 نانوجرام/ ملليلتر) أفراد لديهم عوز الفيتامين (أقل من 20 نانوجرام/ ملليلتر)، الدراسة الحالية هنا أظهرت انتشار نقص الفيتامين فيما بين الاناث أكثر من الذكور حيث أن أعداد الإناث اللواتي لديهن مستويات طبيعية للفيتامين تمثل فقط 15% في حين أن أعداد الذكور الذين لديهم مستويات طبيعية من الفيتامين مثلت 40%، كما أوضح التحليل الإحصائي باستخدام مربع كاي انتشاراً ذو معنوية عالية (P= 0.01) لنقص الفيتامين فيما بين الاناث مقارنة بالذكور. بالنسبة لمستويات الفيتامين فيما بين الفئات العمرية في مجتمع الدراسة كانت كما يلي: أظهرت نتائج الدراسة أن الفئة العمرية من 17 سنة أو أقل 21.6 % من عدد أفرادها لديهم مستويات طبيعية أما الفئة العمرية من 18 إلى 35 سنة 13.8% فقط من عدد أفرادها لديهم مستويات طبيعية في حين الفئة العمرية من 36 إلى 55 سنة 19.3 % من عدد أفرادها لديهم مستويات طبيعية والفئة العمرية من 56 إلى 70 سنة 22.7% من عدد أفرادها لديهم مستويات طبيعية وأخيرا الفئة العمرية 71 سنة فما فوق 28.6 % من عدد أفرادها لديهم مستويات طبيعية. التحليل الإحصائي أظهر اختلافاً ذو معنوية لانتشار نقص الفيتامين فيما بين الفئات العمرية المختلفة حيث تبين أن الفئة العمرية من 18 إلى 35 سنة لديها أقل مستويات من الفيتامين وذلك من خلال استخدام اختبار LSD.

الكلمات المفتاحية: *فيتامين د، كافٍ، غير كافٍ، نقص حاد.*

Abstract:

vitamin D low levels negatively affect bone mineralization causing rickets in children and osteomalacia in adults it is involved calcium homeostasis and mineralization of bones. All data regarding levels of vitamin D have been classified as sufficient (>30 ng/mL),

insufficient (20–30 ng/mL) and deficient (<20 ng/mL) according to the classification of institute of medicine (IMO). Current study is reported here prevalence vitamin D deficiency in females more than males. The study is showed by the chi square test that the females exhibits highly significant prevalence vitamin D deficiency (P= 0.01). Males who having sufficient level of vitamin D represent 40% whereas females who having sufficient level of vitamin D represent 15%. According to the age group The finding in this research are as following, the age group (17 ≥ years old), recorded 21.6% as sufficient level of vitamin D. In the age group (18-35years old), recorded just 13.8% as sufficient which is the normal level that is the lowest found. The third age group (36-55 years old), recorded19.3% as sufficient. The fourth age group (56-70 years old), recorded 22.7% as sufficient level. Finally The fifth age group (71 ≤ years old), the sufficient recorded cases were 28.6. There are significant differences in the level of vitamin D between age groups, using Multiple comparison the study indicated that the group 18-35 years has the lowest level.
key words: *vitamin D, sufficient, insufficient, deficient.*

Introduction

Vitamin D considered as a hormone it has very important function in calcium balance in the body and bone calcification (Weaver, 2007). Vitamin D is unique, in terms of its metabolism and physiologic features. Human requirements of vitamin D are obtained from internal synthesis which is activated through exposure to sun light accounts for about 90% of vitamin D (vitamin D3) and external sources which is obtained from food rich in vitamin D. (Chakrabarty et al., 2005; Holick, 2007). Pathway of both Vitamins D3 (cholecalciferol) and D2 (ergocalciferol) are identical so they metabolize in the liver to 25-hydroxyvitamin D (Haddad and Hahn 1973), by the enzyme cytochrome P450 (vitamin D 25-hydroxylases) to 25-hydroxyvitamin D3, which is the common form of vitamin D in the circulation.Further hydroxylation of 25-hydroxyvitamin D to 1.25 (OH) 2D (active vitamin D) by the 1α-hydroxylase enzyme occurs in the kidney (Garg et al., 2012).A circulation of approximately 10–15 days half life of 25 (OH) D makes it the ideal measure for vitamin D, although the concentration of 25(OH)D in the serum was 8–60 ng/mL or 20–150 nmol/L (Jones, 2008). Vitamin D is an important nutrient for healthy bones, Many researchers have reported that vitamin D low levels negatively affect bone mineralization causing rickets in children and osteocalcin in adults (Holick, 2007; Holick and. Chen, 2008). 25(OH) D below 20 ng/ml is described as vitamin D deficiency, a 25(OH)D of 21–29 ng/ml is described as vitamin D insufficiency. The sufficient level is (>30 ng/mL); (Holick et al., 2011) and (Annweiler et al., 2009), level of vitamin is regulated through the interaction of various factors, including intestinal absorption, renal function, serum calcium level and parathyroid hormone (PTH) (Eastell et al., 2003). The 2 main sources for vitamin D are dietary intake and synthesis in the skin on exposure to ultraviolet-B (UVB) light from sunlight (Chan et al.. 2009). Skin pigmentation may play an important role in determining vitamin D levels as darker skin colour may limit the amount of UVB light that penetrates, thereby reducing the cutaneous synthesis of vitamin D (Aloia et al., 2008). Serum 25-hydroxyvitamin D [25(OH)D] level

is considered to be the best indicator of vitamin D status, with reference ranges from 15 or 16 ng/mL to more than 40 or 48 ng/mL (Heaney, 2004). A 25(OH)D level less than 8 ng/ mL is usually stated as vitamin D insufficiency (Vieth, 1999). Another important measure is the serum PTH level which increases in response to insufficient calcium in order to stimulate bone resorption and increase the serum calcium necessary for the different biological processes in the body, e.g. muscle contraction and nerve conduction (Lips et al., 2001). Many studies have reported an inverse association between serum PTH concentrations and serum 25 (OH) D concentrations (Lips et al., 2001; Nakamura et al., 2008).

Aim of this study

The aim of this study is to evaluate the conditions of vitamin D deficiency in Tarhuna city and to base on wide range of data has been collected from those who visit some laboratories in Tarhuna during period of year 2020.

Material and Methods

Study Population. This study was conducted in Tarhuna city with results of one thousand one hundred and ninety-three subjects those have been collected for the substantiate the study.

Sample: The sample was 1193subjects (males and females). All of them were Libyan nationals living in the Western region of Libya in Tarhuna city. The samples were collected during the year 2020.

Blood Sampling and Laboratory Analysis around 5 mL blood sample was taken from each participant under sterile conditions. Blood was centrifuged to separate the serum and then the serum was analyzed promptly to determine the levels of 25-hydroxyvitamin D. In this study Vitamin D levels are classified into 3 major groups according to the classification of the Institute of Medicine (IOM) (Holick et al., 2011; Annweiler et al., 2009)) sufficient (>30 ng/mL) ,insufficient (20–30 ng/mL) and deficient (<20 ng/mL)

Statistical analysis

Vitamin D levels are compared as per the mentioned categories (sufficient, insufficient and deficient) between gender and ages, the age have been divided into five groups Data presented in tables 1 and 2. Comparison between gender was conducted using chi-square test, whereas comparison between ages was compared using F test to determine whether differences. Data were then presented in tables and figures. The data presented in table 1 and table 2 are levels of vitamin D (sufficient, in sufficient and deficient) according to the gender and ages respectively.

Results and Discussion

The data presented in table 1 is re-represented in table 3 so the observed number of male and female who has sufficient level of vitamin D referred to them as normal and who has insufficient and deficient level incorporated in one category and referred to them as abnormal level of vitamin D. The data in table 3 is used to make comparison between gender regarding the level of vitamin D using chi square test, the chi square test has shown highly significant prevalence vitamin D deficiency in females than males (P= 0.01). This result appears to be in accordance with the high rates of vitamin D deficiency in female than male which has been reported in previous research 2011 in Saudi Arabia (Elsammak et al., 2011). Normal levels of vitamin D in males were significantly higher

than females Fig. 1 the number of males who having sufficient level of vitamin D represent 40% whereas in females were 15% ($P < 0.01$). Many epidemiology studies, men typically have higher serum 25(OH)D levels than women (Jacques et al. 1997), (Looker et al 2002) and (Zadshir et al., 2005). In current study significant differences ($P < 0.01$) in vitamin D levels were detected between total male and female, which might be explained by the outdoor activity of males, that is, the sun light exposure duration which is more than that of females, and also may be due to the use of sun block by females (Norman et al., 2006), and breast-feeding in nursing mothers (Holick, 2006).

Table 1: The number of male and female who has sufficient, insufficient and deficient level of vitamin D.

Gender	Sufficient (< 30 ng/ml)	Insufficient (20-30 ng/ml)	Deficient (< 20 ng/ml)	Total
Male	80	186	14	**280**
Female	140	629	147	**916**
Total	220	815	161	**1196**

Table 2: The number of each age group that has sufficient, insufficient and deficient level of vitamin

Age	Sufficient (25-100 ng/ml)	Insufficient (12-20 ng/ml)	Deficient (<12 ng/ml)	Total
17 ≥	21	57	19	**97**
18-35	54	272	65	**391**
36-55	98	367	44	**509**
56-70	34	90	26	**150**
71 ≤	14	29	6	**49**
Total	221	815	160	**1196**

Table 3: Observed number of male and female who has normal and abnormal level of vitamin D.

Gender	Normal (< 30 ng/ml)	Abnormal (less than 30	Total
Male	81	199	280
Female	140	776	916
Total	221	975	1196

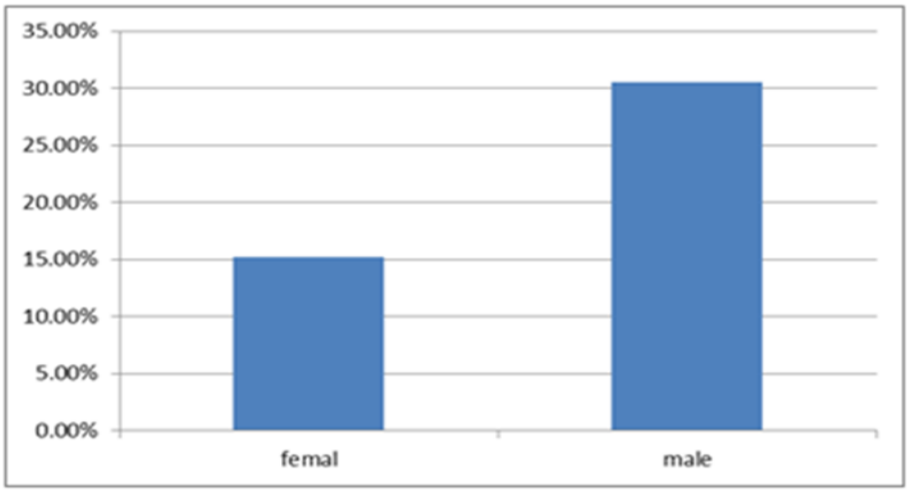

Fig 1: Number of male and female who having normal level of vitamin D as percentage. Females who have normal level of vitamin D represent 15% whereas male with normal level of vitamin D represent 40%.

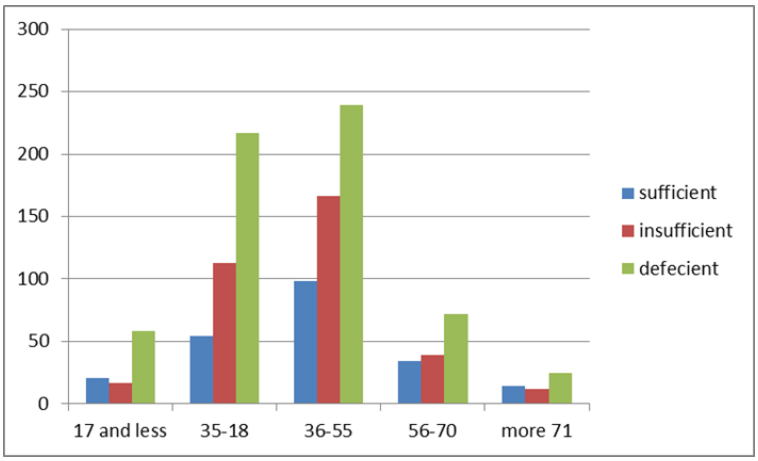

Fig 2 The total cases (normal, insufficient and deficient) according to age group

Fig 2 represents the total cases (normal, insufficient and deficient) depend on age. Normal level of vitamin D according to the age group can be seen from table 2. In the age group (17 ≥years old), there were 21 out of 97 cases recorded as sufficient represent 21.6% In the age group (18-35years old), there were 54 out of 391 cases recorded as sufficient represent 13.8%. The third age group (36-55 years old), the recorded cases as sufficient were 98 out of 509 that represent 19.3%. The fourth age group (56-70 years old), the sufficient recorded cases were 34 out of 150 represent 22.7%. The fifth age group (71 ≤ years old), vitamin normal level of vitamin D was 14 out of 49 represent 28.6% (Fig 3). Vitamin D level in the age group 18-35 has just 13.8 % which is the normal level that is the lowest found in Fig 3.

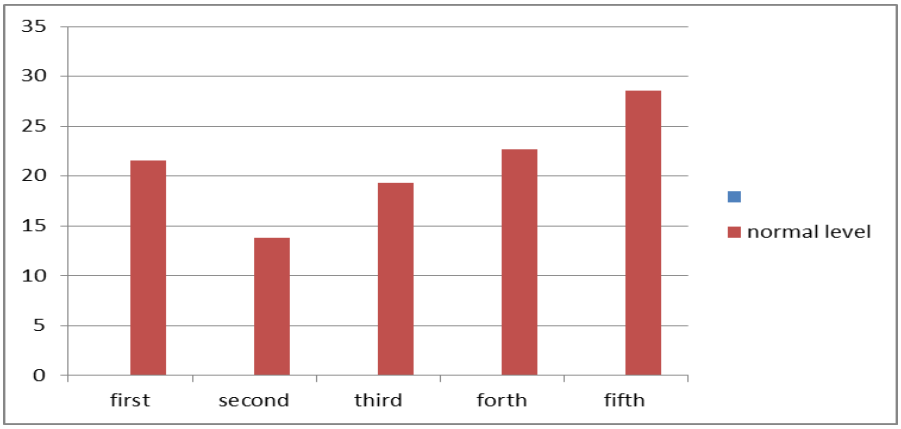

Fig 3 Normal level of vitamin D according to the age group

There was significant difference between ages in these results, F test has shown significant differences table 4. Multiple comparison between the five-age group is illustrated in Table 5 using Least Significant Differences Test (LSD), the test has shown that vitamin D level in the age group 18-35 years is lesser than vitamin D level in the age group 36-55 years and age group 71. In current study this result might be explained by the daily vitamin D intake of young adults is often below the recommended intake of 200 international units (IU) daily(Gartner and Greer 2003) and (Misra et al. 2006),We suggest that many individuals of the age group 18-35 drink carbonated beverages instead of milk, which lead to decreasing the intake of both calcium and vitamin D, these findings are similar to earlier discoveries (Tucker et al., 2006) at the vit D deficiency prevalent in the age group between 18-35.

Table 4 Analysis of variance between ages (Data of 1193 subjects have been used)

Source of variance	Df	Sum square	Means square	F value
Treatment	4	49026.12	12256.53	163.2*
Error	1188	89214.85	75.097	
Total	1192	138240.97		

Table 5: Least significant differences test

comparison	5	4	3	2
1	8.4	6.35	5.39	**5.5**
2	3.22*	4.7	0.108*	
3	7.12	4.5		
4	7.8			

The age group 1 (17 ≥years), 2, (18-35 years) 3, (36-55 yers) 4, (56-70years) 5 (71 ≤ years)

Conclusion:

Data of 1193 subjects (279 males and 916 females). All of them living in the Western region of Libya in Tarhuna city. The samples were collected during the year 2020. The current study showed that there was significant differences between male and female regarding levels of vitamin D, the prevalence of vitamin D deficiency in female is much more than male ((P= 0.01). In addition age categories showed significant difference between ages so the age group (18-35years old), recorded just 13.8% as sufficient which is the normal level that is the lowest found. Further studies are needed to elucidate the mechanism involved in the prevalence of vitamin D deficiency among ages.

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