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RESEARCH ARTICLE

PREVALENCE OF VITAMIN D DEFICIENCY IN CENTRAL REGION OF LIBYA

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Abstract

Introduction: Vitamin D deficiency becoming one of the most prelevant health problems worldwide. Sunny countries are not an exception.

Objective: To study the prevalence and epidemiological characters of Vitamin D (Vit D) deficiency in middle region of Libya in two selected cities.

Methods: Retrospective study of patients attended clinics in Benwalied and sirte cities and have been investigated for Vit D status, done by a questioner designed to reveal the possible underlying factors, along Measurements of total 25 hydroxycholecalceferol 25(OH)D3, by using Fluorescence immunoassay. Statistical analysis was reached by using SPSS.

Result Our result showed sub optimal Vit D level in 63 % (133/211) patients. Among 133 Patients with suboptimal vita D, 70.68 % have deficiency and 29.32 have insufficiency. Being a female, is a risk factor. Sun exposure in light cloths for more than 30 minutes along with consumption of Omega-3 could contribute to prevention from vit D deficiency. Multi-varient analysis showed that use of small quantity of sunscreen is not associated with Vit-D deficiency

Discussion and Conclusion: Consumption of Omega-3 is advisable as one of preventive measures of Vit D deficiency, however, a more focus and further studies are needed for elucidation of all participant positive and negative factors.

Introduction:-

The prevalence of low vitamin D status is increasing globally, and Libya is not spared. Vitamin D is a fat-soluble vitamin that plays an important role in every cell of the human body. Vitamin D deficiency is more common than thought and poor vitamin D status is a world health concern, affecting nearly fifty percent worldwide (1) and 42 percent of adults in the United States alone, with black and Hispanic people being most affected (2).

Vitamin D deficiency occurs due to low dietary consumption of vitamin D or when body cannot absorb enough vitamin D due to living at a high latitude, being indoors too much, living in a highly polluted area, using large

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quantities of sunscreen, having darker skin, being overweight, aging or when body cannot metabolize the vitamin D due to body systemdiseases.
Vitamin D adequacy is best determined by measurements of the 25-hydroxyvitamin D in the blood (3). In this paper we will study the prevalence and epidemiological factors of Vitamin D deficiency through assessment of social and dietary practice, and to define possible underlying causes in affected population in central region of Libya as Phase-I of study of Vitamin D status assessment in Libyans as a component of Project of Health, Nutritional and Environmental Status Assessment(PHNESA).

Materials and Methods:-

A retrospective study has been done for all patients with different age groups attending the clinic (Al Rahma clinical) in Benwailed city and (Noor yaqenclincal) in Sirte, for general health checkup or for complaint and have been investigated for Vitamin D status in the period (August 2018 Month to January Month 2019).

Our work concerned with measurement of total 25 hydroxycholecalciferol, 25(OH)D3 by using Fluorescence immunoassay (IFA) techniques using I Chroma, or Vidas or Tosho analyzers, along with data collection done through questioner designed to elucidate the epidemiological and possible underlying causes of Vitamin D deficiency. Vitamin D levels less than 50 nmol/L are suboptimal for skeletal health. Optimal, sufficient, deficiency (sever and moderate) and toxic level are summarized in agreement with toMayo medical laboratories ranges and following references (4), (5). SeeTable.1.

Table 1:- Reference ranges of optimal, insufficient, deficient and Toxic vitamin D level.

Vitamin D Toxic	> 200 nmol/L, >80 ng/mL
Vitamin D Sufficient	>50 nmol/L, (>20 ng/mL
Vitamin D Optimal	50-63 nmol/L, 20-25 ng/mL
Vitamin D Deficient	<50 nmol/L, < 20 ng/mL
Vitamin D mild to moderate Deficieny	25-48 nmol/L 10-19 ng/mL
Vitamin D Sever Deficieny	<25 nmol/L, <10 ng/mL

Data entry has been done by Excel. Statistical analysis of data has been done by using statistical Backage of Social Science (SPSS) version 10. Chi square and Odds Ratio (95%) confidence interval both had been used. Chi square is considered significant if P Value < 0.5. Logistic regression analysis was used to determine the predictors of potential riskfactors.

Evaluation of assessment accuracy:

All technicians are trained (100%), either by qualified trainer or by trained colleagues (52.1%). However quality of training could not be evaluated.

Vitamin D assays done by Fluorescence immunoassay (IFA) by using of automated machines Vidas, or i-CHROMA (Boditech Med Inc.'s) or Tosho (Bioscience, Inc). Despite use of quality control materials provided in kits from companies suppliers, there are no established quality control and quality assurance programs in national laboratories.

Results:-

Attributes and distribution of sample according to different factors associated with Vitamin D deficiency:

One hundred patients of the total 211 were from Benewalid and 110 from Sirt.
There was predominance of females either in Sirt or in Benewalid. Age categories for 211 patients were; Children (26/ 12.3%) , Adolescents (20/ 9.5 %), Young adults (24/ 11.4 %), adults (89/ 42.2 %), Late adults (52/ 24.6 %). Result of analysis of different factors associated with Vitamin D deficiency in total study population (TSP) are listed in Table-2

Table 2:- Result of study of different factors associated with Vitamin D deficiency in TPS. TPS: Total Study population.

Factor	Patients Number and Percentage.
Gender	Female: 133/211 (63.0 %), two were pregnant. Male: 78/211 (37%).
Ethnicity	Non Blacks: 206/211 (97.6 %). Blacks: 5 /211 (2.4%)
Sun Screen	No use of sunscreen: 156/211(64.5%). Use o sun screen: 75/211 (35.5%)
Exposure to sun light in Light Cloths	Exposure: 101/211 (47.9 %). No exposure: 110/211 (52.1 %).
Sun exposure > 30 Minutes Sun exposure < 5 Minutes	Exposed: 101/211(47.9%). Exposed: 110/211(52.1%).
Taining (UV rays Exposure)	Exposed: 55/211 (26.1%) Not exposed : 156/211 (73.9 %)
Extremities (warm or cold)	Warmextremities: 110/211(52.1%).
Multi-vitamins Intake	No Intake by all patients (0%)
Vitamin D Intake	No Intake by all patients (0%)
Omega-3 Intake	Intake : in 30/211 (14.2%). No Intake: 181/211 (85.8 %)
Butter Intake	Intake: No Intake by all patients (0%)
Presence of concomitants	• kidney disease 2/211 (0.9 %) ofpatients,
disease	• Liver disease 2/211 (0.9 %)have,
	• Ulcerative colitis 7/211 (3.3 %)
	• Celiac sprue 3/211(1.4%)
	• Diarrhea(0%).
Muscular pain	Muscular pain present in: 110/211(52.1%).
Consumption of dairy products	No consumption: 103 (48.8%). Consumption 2-3 times/ day: 101/211 (47.9%). Consumption >3 times/ day: 7/211 (3.3%).

Vitamin D deficiency percentage and category:

Vitamin D level was sub optimal in 63 % (133/211) patient, while 37.0 % (78 /211) of patients have optimal vitamin D level. Then we categorized pateints with sub optimal vitamin D (133/211) in to two categories. Patients with vitamin D deficiency (94/113) represent 70.68 % and patients with insufficiency (39/133) represent 29.32 %. see Figure-1. Considering TSP (211), patients with with vitamin D deficiency (94/211) represent 44.5 % and patients with insufficiency (39/211 as TSP) represent 18.5%.

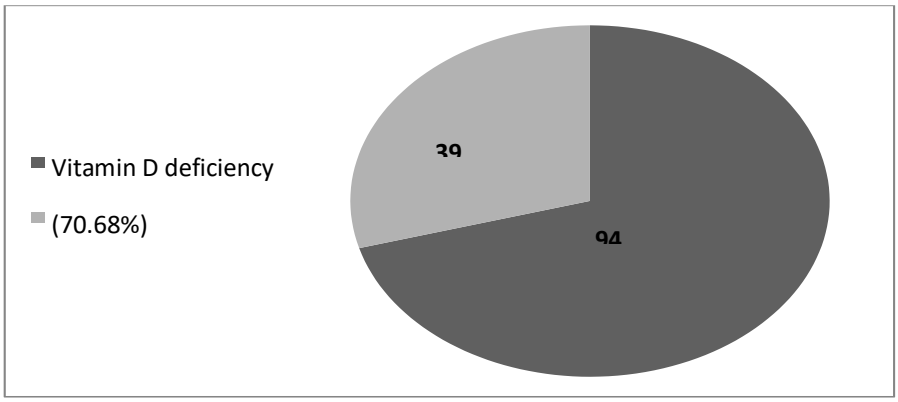

Figure 1:- Percentage of Vitamin D deficiency and Vitamin D insufficiency in patients with sub optimal vitamin D level.

Proportion of Vitamin D deficiency according to age and gender:
Table 3illustrated distribution of Vitamin D deficiency among different groups

Table 3:- The percentage of Vitamin D deficiency among different groups.

Age Group	Number (Percentage)	Group Total Number of Male - Female	Group Number of Normal Vitaim D Male - Female	Group Number of Vitaim D deficient Male - Female
Children	26 (12.3%)	9-17	2-1	7-16
Adolescents	20 (9.5 %)	7-13	1-2	6-11
Young adults	24 (11.4 %)	9-15	4-2	5-13
Adults	89 (42.2 %)	31-58	22-19	9-39
Late adults	2 (24.6 %)	22-30	16-9	6-21

Our results showed that overall proportion of vitamin D deficiency is higher in Younger age. There is a difference in proportion of vitamin D deficiency between male and female. Female are deficient in all age groups, but difference increase with increasing age, where females represent more than two thirds in adult and late adult groups. Distribution of proportion of Vitamin D deficient population according to age and gender.Are shown in Figure.2.

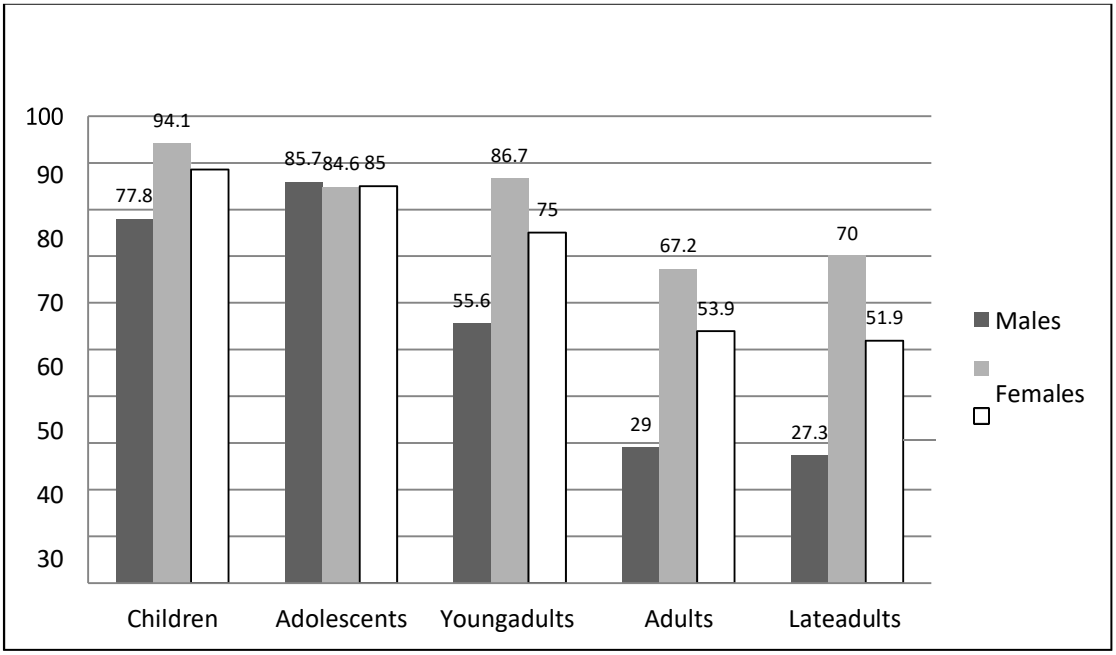

Figure 2:- Distribution of proportion of Vitamin D deficient population is according to age and gender.

Contribution of determent and related factors in Vitamin D deficiency:
Using of univariate analysis showed those females are more susceptible to Vitamin D deficiency. Muscular pain and warm extremities symptoms were statistically significant in Patients with Vitamin D deficiency.

Our study showed that use of sun screen was found in half of patients with Vitamin D deficiency. And about two third of Patients who did not consume dairy products have Vitamin D deficiency. However, consumption of Omega-3 could contribute to prevention from vitamin D deficiency, as 14.2 % of patients without Vitamin D deficiency consume it. Sun exposure in light cloths and for more than 30 minutes plays an preventive role for Vitamin D deficiency. See Table-4.

Using multivarint analysis to study association between risk factors and presence of vitamin D deficiency showed that being a female and lack of of sun exposure in light cloths are risk factors for Vitamin D difficiency. And consumption of Omeg-3/col oil is a preventative factor. See Table-5.

Table -4: Univariate determent and related factors:

Factors	Number among deficient/133	Number among non-deficient/78	Odds ratio (Confidence interval)	P Value
Gender/Being a Female	100	33	1.777 (1.347-0 2.344)	<0.001
Tainning	31	24	0.765 (0 .481 -1.192)	0.15
Sun Exposure Light Clothes	47	54	0.510 (0.388 -0.671)	<0.001
Sun Exposure > 30 Minutes in Last Week	47	54	0.510 (0.39 -0.67)	<0.001
Muscular Pain	86	24	2.102 (1.47-3.00)	<0.001
Sun Screen use	67	8	4.912 (2.494-9.674)	<0.001
Warm Extremities	86	24	2.102 (1.472-3.000)	<0.001
Dairy Products	47	54	0.510 (0.39 -0.67)	<0.001
Omeg3/CoL oil intake.	14	16	.513 (0.265-0.993)	0.037

Table -5: Multivariate determent and related factors:

Item	Odds Ratio (Confidence interval	P value
Gender	**0.366 0.161-0.833**	**0.017**
Sun Screen use	**2.762 0.625-12.197**	**0 .180**
Omeg3/CoL oil	**0.155 0. .045-0 .530**	**0.003**
Sun Exposure Light Cloths	**6.750 2.167-21.023**	**0 .001**

Discussion:-

Clinical or subclinical deficiency of Vitamin D plays a role in several clinical chronic problems such as cancer, cardiovascular disease and diabetes. Vitamin D deficiency associated with heart diseases, hypertension, obesity, cognitive impairments, Parkinson's diseases, fractures, autoimmune diseases, bacterial vaginosis, pelvic floor

disorders, and age related macular degeneration (6). This result in marked health burdens at financial, mental and physical aspects.

In ongoing project, we will try to identify the prevalence and change in the pattern of vitamin D deficiency in sub-population through different regions in Libya, in order to provide elementary data for future health guidelines and planning to overcome this medical problem. We started by a study of two samples from cities in central region of Libya. Sixty three 63 % of Libyans attending the clinics for regular checkup of for medical reasons were suffering of vitamin D deficiency. Libyans have more vitamin D deficiency than published data showing 50 % worldwide and 42 % in USA, (1), (2).

Dietary habits could contribute to that. Libyans did not eat fortified food, and no regulation for fortification of diets has been issued in Libya.

Pollution can absorb some of the sun's ultraviolet-B (UVB) rays, and affect vitamin D level. Vitamin D deficiency in these areas cannot be explained by pollution because they are non-industrial with relatively low population, nor by living at a high aititude which result in less access to the sun's (UVB) rays.

In current study, sample showed predominance of affected Female. This is could be explained by their life style where they spending little or no time outside and missing sun's rays as well as by regular use of Sunscreen. Our finding is consistent and confirms Office of Dietary Supplements (ODS) recommendation in people who use a lot of sunscreen or wear clothing that covers the body to include sources of vitamin D in their diet (7).

Underlying diseases such as gut, liver or renal diseases has outlined and it's not statistically significant. There is a difference in proportion of vitamin, D deficiency between male and female. Female are deficient in all age groups, but difference increase with increasing age, where females represent more than two thirds in adult and late adult groups. This finding is consistent with study conducted in Saudi Arabia 2017 (8).

Physiological factors such as age play a role. Vitamin D deficiency was highest in Adult, then late adult and children age group consequently. Recommended amount of Vitamin D for Children 1–13 years and adults 19–70 years is (600 IU) and for Late Adults is (800 IU) (9). Pattern of Vitamin Deficency in different age groupis different from a study performed in Qatar, where they found vitamin d deficiency is inversely related to age (10). This finding needs further study and explanation, because despite increase need for vitamin D in late adult, they are less deficient than adult group in our study.

Biological variability of being darker skin could play a role in vitamin D deficiency. Dark skin peoples need more sunlight exposure to absorb enough vitamin D. Libya is asunny country, and black patients were not deficient to Vitamin D in our study. This is contradictory to the published data, where blacks were having vitamin D deficiency with high bone density (11) (12). However, blacks represent only 2.4% of patients, so the result is not conclusive because of low number.

Excess body fat affects vitamin D absorption, and being overweight correlates with low vitamin D (13). In our study we could not have body weight measurements in all cases. However, obesity cases were few.

In multivarint analysis, being a female (14), and lack of of sun exposure in light cloths are risk factors for Vitamin D difficiency. This is consistent with report showed that sun exposure levels prevent winter vitamin D deficiency (15).

We found that omega3/col oil being a protective factors from vitamin D deficiency. This is consistent with data published by Lee SM et al (16) .

This study showed that Vitamin D deficiency is common in patients using sunscreen. However, our multivariant analysis done to study association between vitamin D deficiency and sunscreen uses, showed no association between sunscreen use as a cause of Vitamin D deficiency, in contradction to all published data. This is could be attributed to use of small amount of sun screen in our study population, while other publishd data showed that using of large quantity of sun screen is a risk factor of vitamin D deficiency (7).

Vitamin D deficiency is associated with iron deficiency and heart disease (14), (17). Fifty % of patients with female reproductive malignant tumors have vitamin D deficiency (18). This could emphasis the importance of prevention of vitamin D deficicncy.

Conduction of a study to assess vitamin D status at national level in other regions, could give more representative data for prevelance of vitamin D deficiency among Libyans. Mean while we could start by rising awarence and promotion of Omega3/Col oil consumption as a preventive measure against vitamin D deficiency.

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