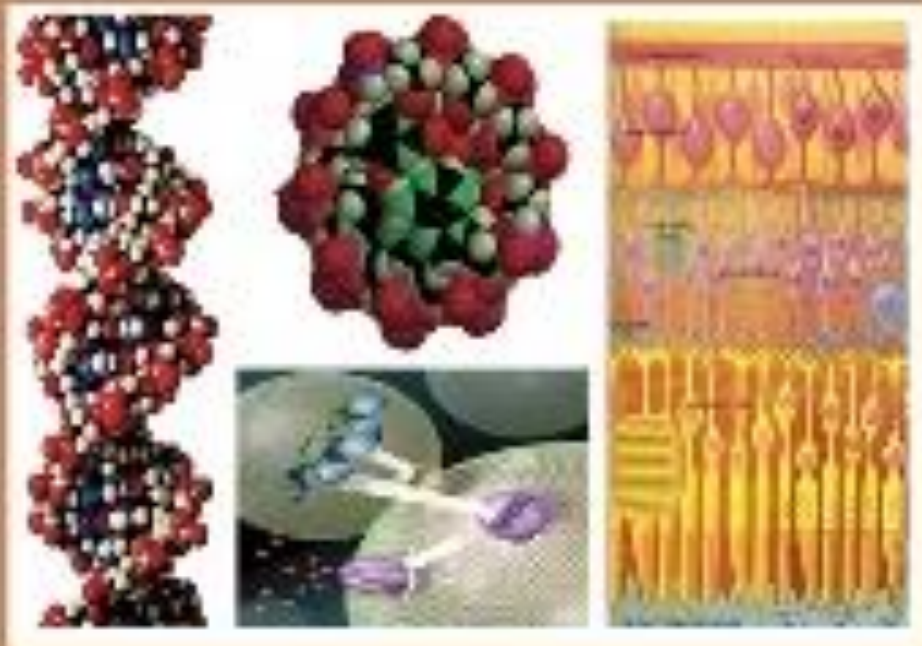




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## The relationship between Vitamin D3 deficiency and Hormones Imbalance

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### ABSTRACT

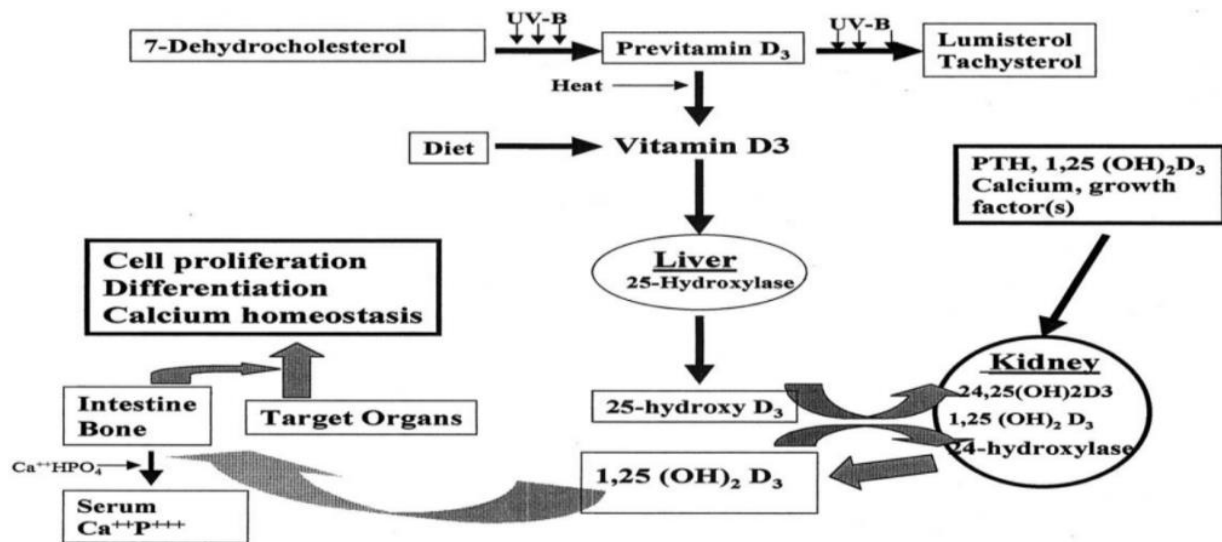
**Background:** Lack of vitamin D is a serious but little-known health issue. Issue: It's not just because youngsters get rickets, including an increased risk of high blood pressure, multiple sclerosis, colon, prostate, breast, and ovarian. cancer,.and.diabetes/type 1., as. well. as Osteomalacia and osteoporosis, in, adults may have a long-term effect. The aim of study-find the correlations between. Vit.D3 to levels of hormones, imbalances (prolactin and testosterone). **Subjects and methods:** One hundred females were randomly selected from Baquba City, Iraq to share in this study for determination of the level of D3, prolactin, testosterone and calcium. The fluorescent immunoassay was used to detect the level of hormones and the colorimetric assay for the detection of Calcium level. **Results:** The result demonstrated that the level of D3 ( $16.75 \pm 9.49$ ) ng/mL was deficiency and effect on the level of prolactin ( $10.76 \pm 9.49$ ) ng/mL with positive correlation and testosterone ( $1.17 \pm 0.37$ ) ng/mL, leading to decrease the level of calcium ( $8.0 \pm 2.2$ ) mg/dL. **Conclusions:** This study concluded there is a positive high correlation between the level of D3 and Prolactin] and the Testosterone hormone with age groups in females and the outcome gave evidence to the importance of the level D3 and its effect on the fertility hormones.

### INTRODUCTION

Vitamin.D was. discovered by. Edward Amelanby in.1919 during. clinical Experiments with Rickets patients (Mellanby, 1999). If it is considered/the oldest Hormone, was produced in early forms of, life and it is found that phytoplankton, zooplankton, plants and even animals possess this vitamin, those that, are exposed to sunlight, as they have the ability to synthesize it. This Vitamin was considered a hormone in the twentieth century since that time. It is worth noting that two types of. Vitamin.D, and D2, Ergocalciferol, Vitamin,D3.Cholecalciferol (Rizk M *et al.*, 2022) ..Vitamin,D3 is Synthesized in human skin in the summer under influences of Ultraviolet(UV) radiation when exposed to the shines, and from another source as a diet -especially fishes oils, While vitamin,D2 is derived, from another source as a plant source (Holick, 2003), from sea-foods too after the process (Hydroxylation).in the liver (25)2OH (dihydroxyvitamin,D), and. kidneys,.(1,25-Dihydroxyvitamin.D) (1,25(OH)2D), an. active metabolites will also be in].cell/the vitamin D receptors are linked to an effect genes such as a (Calcium-Binding. Protein). after transcriptions and translations.a.protein is formed,.eg.Osteocalcin or.Calcium-Binding-Protein. vitamin,D.is metabolized on liver-tissues and in.kidneys.to.(1,25-Dihydroxyvitamin D.(1,25(OH)2D).

1,25(OH)<sub>2</sub>D-Receptor (V.D. R) ; its found on intestine, bones, tissues as. brain, heart. stomach, pancreas, activated T.and.B lymphocyte, skins, gonad, (1,25(OH)<sub>2</sub>D is considered one of most effective. Substances in preventing the proliferates among normal and hyperproliferative cells.in stimulating their maturation. The enzymatic mechanism of.1,25 (OH)<sub>2</sub>D production.1,25(OH)<sub>2</sub>D, and its, analogues would develop in order to treat the. hyperproliferative psoriasis, also known to affect a variety of tissues, vitamin.D deficiency is considered a major, not

Just/does and causes rickets in kids, including an increased risk of high blood pressure, multiple sclerosis, Ovarian cancers, and diabetes(type1)as well as,Osteomalacia and Osteoporosis on olde ages, and it may be a long-term effect. Chronic vitamin,D um-inefficiency has consequences for the production of vitamin D,it be a, better appreciation for the importance of vitamin.D for a general healthy well-being and for a better life (Demer and Hsuand, 2018): shown in Figure(1).



**Fig.1.** Synthesis and metabolism-vitaminD..Conversion of 7.hydrocholesterol.to pre-vitamin D3 By UV-light.and its subsequent,s processing of vitamin D3.

## MATERIALS AND METHODS

One hundred female was randomly selected to share in this study. Five mL of blood was drawn from each participant and a serum sample was collected that was used to measure the level of VitD3, Prolactin, Testosterone and Calcium (14).

The level, of, Vit.D3. (AFIAS-1, REF: SMFP-108), Prolactin (AFIAS-1, REF: SMFP-8), and Testosterone (AFIAS-1, REF: SMFP-29) were detected by using the. fluorescence-immunoassay for the quantitative diagnosis of parameters. The reference range was for females D3 < 10 ng/ml was a deficiency, for prolactin 5-53 ng/ml, testosterone < 2 ng/ml.

For detection of (Ca)levels, the colorimetric chemical methods kits(spinreact-TK1001065) the normal value was (8.5-10.5) mg/dL.

**Ethical Approval:** Iraq ministries of higher education and scientific research as well as the Ministry of Health have accredited this study as ethical.

## Statistical. Analysis:

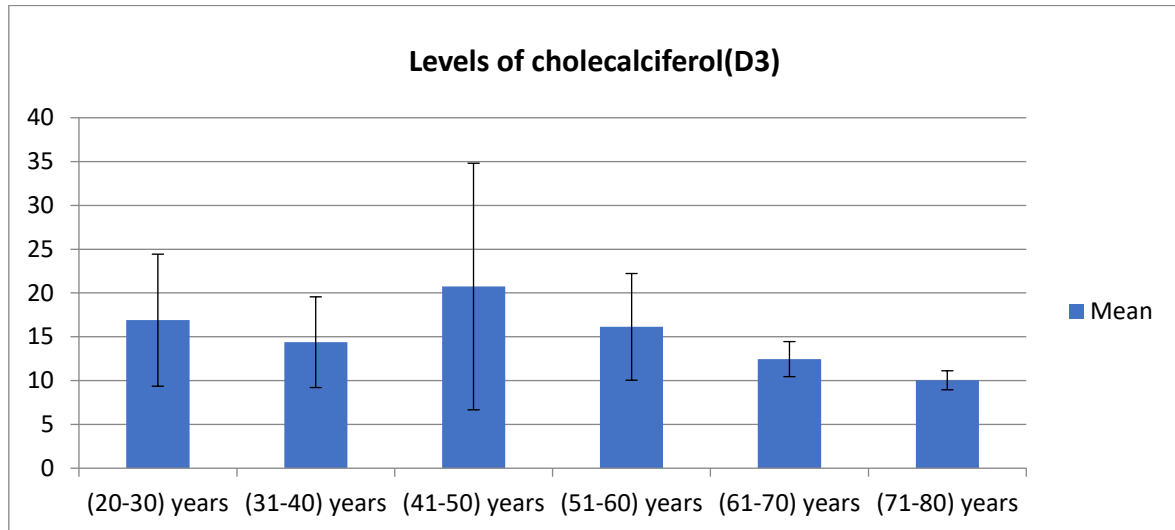
Dates were express mean.± SD. ANOVA test and correlation test were used for analysis and the significance of variance at P value < 0.05.

## RESULTS

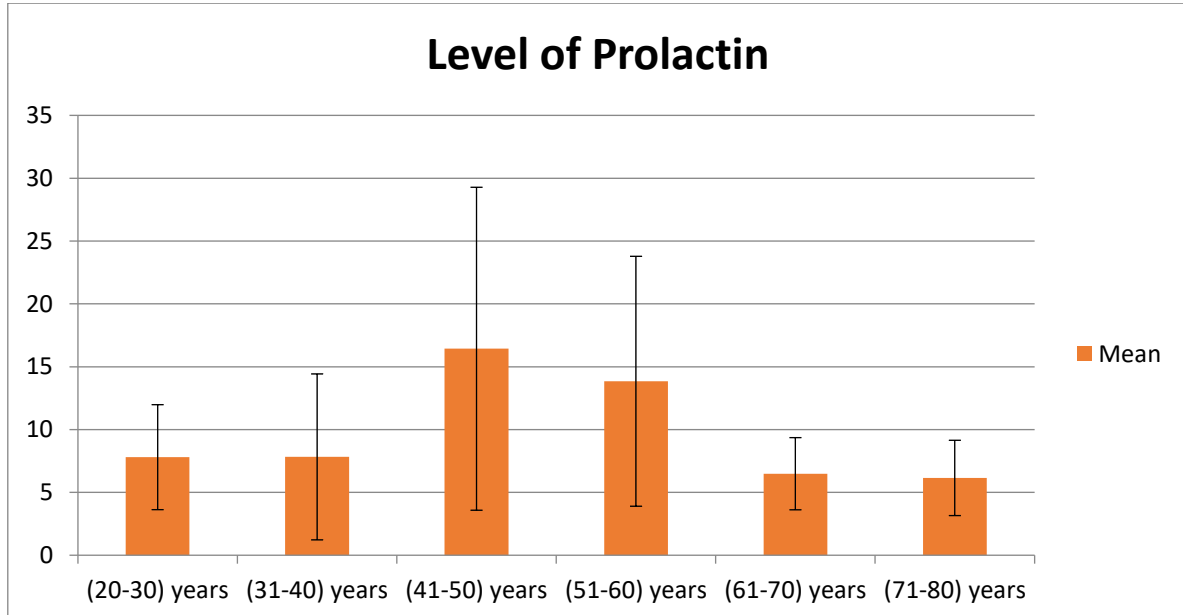
The results of one hundred females were randomly selected to evaluate the level

of cholecalciferol (Vit. D3) and the relation with levels of hormone Prolactin, testosterone and calcium. The results in (Figs. 2,3,4, and 5) showed the mean level of VitD3, Prolactin (PRL), Testosterone (TEST) and Calcium. among age groups respectively; The result showed Significant

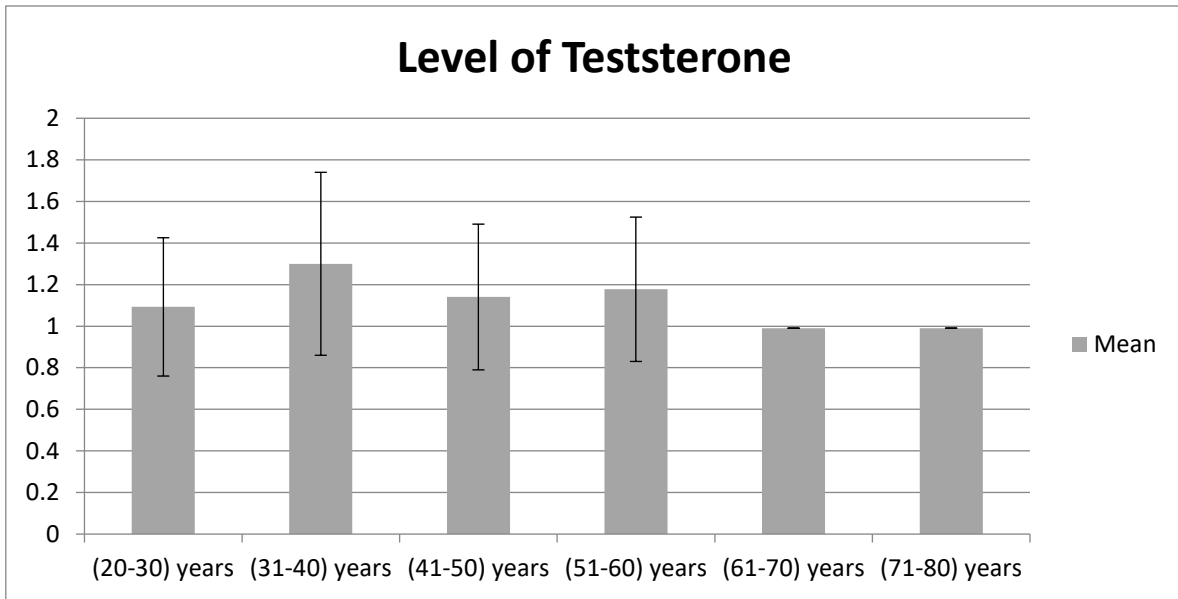
relation between the mean level of VitD3, Prolactin, Testosterone and Calcium among ages group at  $p.value < 0.001$ . The level of D3 was higher level at the medium age group while decreased in older ages this is associated with the level of PRL, TEST and calcium.



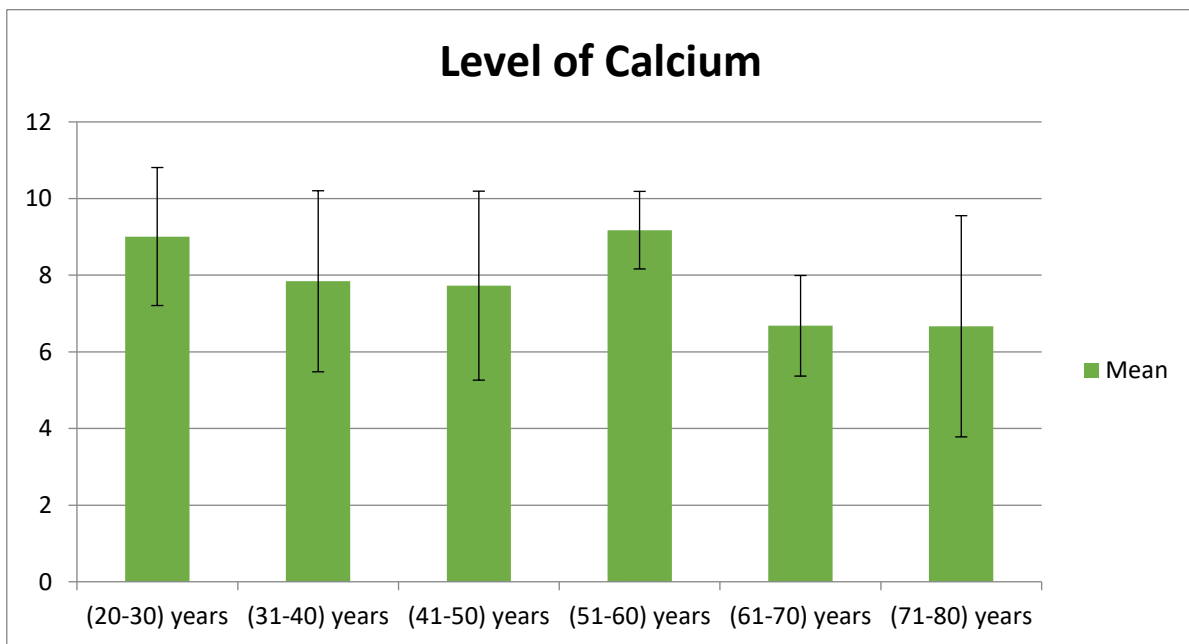
**Fig. 2:** showed the level of cholecalciferol (D3) among age groups. The data was presented as mean  $\pm$ SD at ng/ml unite.



**Fig. 3:** showed the level of Prolactin among age groups. The data was presented as mean  $\pm$ SD at ng/ml unite.



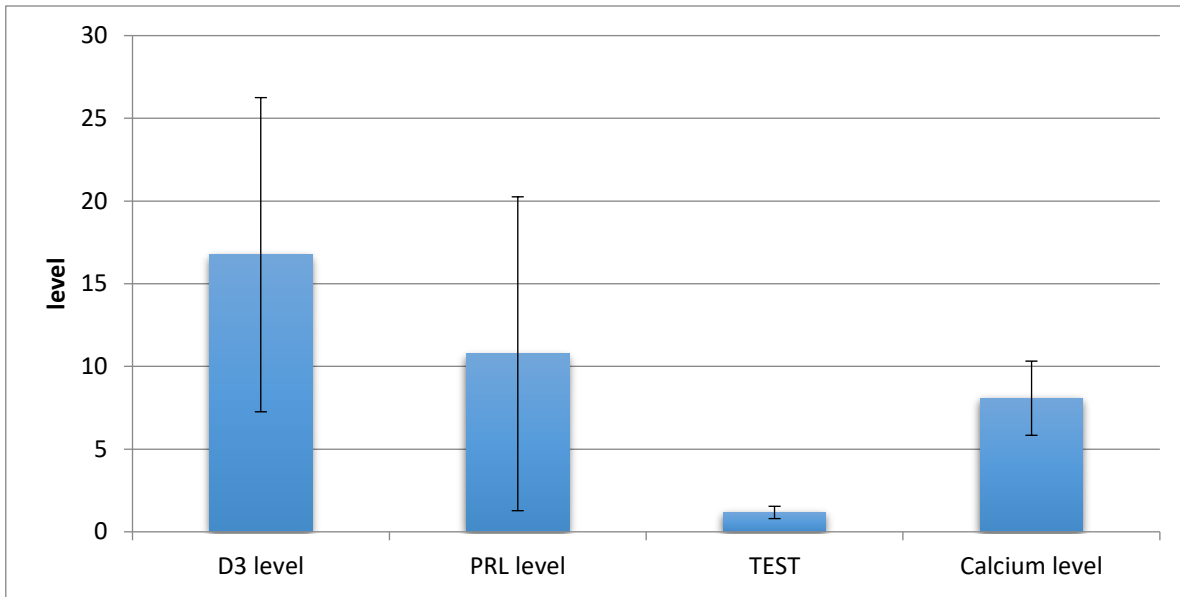
**Fig. 4:** showed the level of Testosterone among age groups. The data was presented as mean  $\pm$ SD at ng/ml unite.



**Fig. 5-** shows the level of calcium among age groups. The data was presented as mean  $\pm$  SD at mg/dL Unites.

The correlation between the level of D3 and PRL, TEST and calcium was presented in Figure 6 and Table 1 where the results appear there is an appositve high

significant ( $p=0.000$ ) correlation between D3 and PRL level and an appositve weak non-significant correlation with TEST and calcium.



**Fig. 6:** showed the level of cholecalciferol (D3), prolactin (PRL), testosterone (TEST) and calcium

**Table 1:** showed correlations between the level of cholecalciferol (D3) prolactin (PRL), testosterone (TEST) and Calcium.

Correlations					
		D3 level	PRL level.	TEST	Calcium level
D3 level	Pearson Correlation	1.0	.650**	.173	.192
	Sig. (2-tailed)		.000	.085	.056
	N	100	100	100	100
<b>**correlation.is Significant at the 0.01 level (2-tailed).</b>					

**DISCUSSION**

Vitamin D's relationship to the immunity- system (1,25 (OH) 2D3) has important relationships in modulating the immune system and function, ie acting to enhance the innate immunity system and inhibit adaptive and immune- response, related to increasing the synthesis of interleukin (IL4) via a T-helper (Th) pathway (Alobaidy and Hasan, 2013).2-Lymphocyte and up-regulation, Regulatory.(T.) lymphocyte (T.-Reg). indeed, there are different types of immune cells, such as DC dendritic cells, macrophages, T/and B Lymphocytes that are expressed. VDR and most of them able to synthesizes calcitriol in the pathways of regulation of the metabolite that responds to a number of pro-inflammatory factors such as bacteria lipopolysaccharides and tumor

necrosis factors such as (TNF-α). Cytokines derive from macrophages promoting differentiation (T.h) cells. Subsequently, and in association with some co-stimulatory Exogenous.Cytokines produced by a number from Antigen-Presenting. Cells (APC), that is, macrophages in.DCs, differentiating into Th1 or Th2 cells, whose role is to regulate immune responses to cells and antigens (Holick *et al.*, 2013). It is reported that the forms of vitamin D2 and vitamin D3 differ in the structures of the hydrocarbon side chain. The different unaffected metabolic activations are the forms of hormone-stimulating function (Holick *et al.*, 1989). The development of auto-immune disease will be influenced by hormonal pathways, immune activation, and metabolism. Prolactin (PRL), ferritin, vitamin D, and polypeptide antigen in

tumor tissues (Saki *et al.*, 2020). Hormones as chemical messengers excretion from special glands (Endocrine glands) such as Testosterone, and Prolactin hormone and other steroids hormones (Al-Obaidy, 2013), suggest the estradiol increasing  $1,25(\text{OH})_2\text{D}_3$  by raising. Thyroxine lowering serum FGF23. However, prolactin be to increasing  $1,25(\text{OH})_2\text{D}_3$  by decreasing serum FGF23. Also, Prolactin has been found to be more effective in increasing serum  $1,25(\text{OH})_2\text{D}_3$  than estrogen itself and is important in providing the mother and fetus with Calcium and during late pregnancy and lactation. The active vitamin D hormone,  $1,25$ -dihydroxyvitamin  $\text{D}_3$ , exerts many physiological actions. Its effects include effect on nervous systems (Saeed *et al.*, 2022). In the nervous systems and elsewhere, not only does ( $1,25$ -dihydroxyvitamin  $\text{D}_3$ ) influence steroid pathways, but it also indicates different responses in different cell types. Vitamin-D deficiency is defined as a  $25(\text{OH})\text{D}$  concentration. Under then  $20\text{ng/ml}$  ( $50\text{nmol/L}$ ). Vitamin D adequacy a  $25(\text{OH})\text{D} > 30\text{ng/mL}$  ( $75\text{nmol/L}$ ), insufficiency  $21.29\text{ng/mL}$ . That is, recommendations for pandemic vitamin D deficiency are needed for reasonable Sun-Exposures and vitamin D supplementation of  $800$ - $1000\text{IU/day}$  (10). Vitamin  $\text{D}_3$  deficiencies associated with female sexual dysfunctions in Postmenopausal women, there were many relationships. FSH (Bargiota *et al.*, 2011). Vitamin- $\text{D}_3$  deficiency. Also, increase depressive symptom has been associated with FSH (Al-Obaidy and Hasan, 2016). Vitamin D regulating hormones-production and receptors expressions on granulosa cells and granulosa cells of developing follicle cells, which in order influences Follicle-recruitment and maturation (Stankiewicz *et al.*, 2015). On the sperm's ability to undergo lysosomal interaction and thus for ability to fertilize the egg Vitamin D indicates increased expressions, productions or activity of ( $3,\beta$ -

Hydroxysteroid)Dehydrogenase,(AMH) anti, Mullerian. hormones, Mullerian hormone-receptors, Estrogen, follicle-stimulating. hormone receptors, hormone. Lutein LH, Progesterone., and elemental Vitamin D responses.

### Conclusions

This study concluded there is a positive high correlation between the level of  $\text{D}_3$  and prolactin, and testosterone hormone with age groups in females and the outcome gave evidence to the importance of the level  $\text{D}_3$  and its effect on the fertility hormone.

### Conflicts of interest:

The Author declared that there is no conflict of interest.

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