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vitamin D (41.1%).

In studying some infantile characteristics there were no significant differences between the mean of fetal age, birth weight and weaning age with positive correlation only with birth weight.

Regarding the family size, vitamin D deficiency showed significant statistical differences as regards number of siblings. Girls had 1- 3 siblings were more in the normal vitamin D group, while girls with more than three siblings had lower vitamin D levels. Also, vitamin D deficiency is more in girls of 4th child order but with no significant statistical differences.

In agreement with our study, another study in Saudi Arabia examined 378 children with 9.5± 3 age range, noted that the mean vitamin D level was higher in families with less than 3 members than in families with (3- 6) members and more than 6 members (Al- Agha et.al., 2016).

This can be attributed to the fact that increase family size will proportionate with incapability of parents to provide concern about balanced nutrition, performance of outdoors physical activities as well as sufficient sun exposure for their children.

Quite the opposite, a study conducted in Finnish on 175 children aged 3 months to 3 years had reported that the intake of vitamin D through foods and supplements was more sufficient in families with more than three children than in families with only one child (Frei et.al., 2014).

As previously talked about, our sample falls nearly under the same socioeconomic status as well as almost the same middle level parental educational levels with no significant statistical differences between normal vitamin D and deficient girls.

Al- Agha et.al., 2016showed no significant difference in vitamin D levels according to the parents' education levels. However, the mean vitamin D levels were lower in families with uneducated mothers than in families with low and highly educated mothers. This can be explained by their insufficient knowledge about the importance of vitamin D supplementation due to their poor educational level.

As regard to sports practice, our sample revealed that both groups have significant lower sports practicing habit. However, the percentage of girls practicing sports is higher in the vitamin D deficient group. This observation may be explained by nearly higher parental educational levels that made them to some extent more aware about the importance of physical activities.

Quite the reverse, a study established in Egypt on 200 boys and girls aged from 9 to 11 years conducted a significantly lower mean serum 25 (OH) D in those with low physical activity (Abu Shady et.al., 2015).

The current study bearing some strength represented in that it was conducted on girls only that exclude effect of sex, in prepubescent period to exclude hormonal effects of puberty and completed in short period to avoid seasonal variations effect on vitamin D status.

On the other side, small sample size, limited social class attending the clinic and none studying of vitamin D deficiency effect on bone health was some limitations faced the study.

Conclusion:

From the previous interpretation of our results, we concluded that vitamin D deficiency is a crucial health problem that has a high prevalence rate among prepubescent girls. The main contributing socio- demographic factor that affects vitamin D status in the current study was the family size and the child order, as increasing family size inversely proportionate to vitamin D status that may be due to financial and social troubles.

Recommendations:

From our findings we recommend increase the awareness about the importance of family planning as well as complications of vitamin D deficiency among school aged children. Further researches on larger scale to study other socio- demographic factors affecting vitamin D deficiency in children may be recommended. A large scaled research is advisable to examine the relation of socio- demographic factors affecting vitamin D and COVID- 19 prognosis and outcome.

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sports practice, the percentage of girls practicing sports was low in both groups, but lower in normal vitamin D group with a significant statistical difference. While there are no significant statistical differences between the two groups as regards Father's and Mother's education in spite that both groups has higher percentages of parents with middle certificate as shown in table (2), figures (1- 2).

No correlation found between Vitamin D and siblings number, siblings order, fetal age and weaning age. While, there is a significant positive correlation between Vitamin D and the Birth weight r= 0.22 and P= 0.042, as shown in table (3).

Table (1) Comparison of the Age, Vitamin D level and Some infantile characteristics between normal and vitamin D deficient girls

Variables	Normal Vitamin D N= 37		Vitamin D Deficiency N= 53		(Z)	P	Sig.
	Mean	SD	Mean	SD			
Age(Years)	9.24	1.09	9.09	1.33	0.06	0.956	NS
Vitamin D (ng/ml)	56.53	21.07	17.20	5.19	8.04	0.000	HS
Fetal Age (Wks)	37.62	1.14	37.75	0.10	0.31	0.757	NS
Birth Weight (Kg)	3.23	0.60	3.00	0.50	1.72	0.085	NS
Weaning Age (Months)	5.92	1.21	6.08	0.94	1.00	0.316	NS

Mann- Whitney Test, HS= Highly significant S= Significant NS= Non significant.
Vitamin D deficiency: (25(OH) D ≤ 30 ng/ml).

Table (2) Distribution of the Socio- demographic characteristics according to Vitamin D status

Variables		Normal Vitamin D N= 37		Vitamin D Deficiency N= 53		Chi- Square	Sig
		N	%	N	%		
Siblings Number	1	3	8.1	3	5.7	0.028	S
	2	12	32.4	16	30.2		
	3	16	43.2	19	35.8		
	4	3	8.1	15	28.3		
	5- 6	3	8.1	-	-		
Child Order	1	9	24.3	17	32.1	0.245	NS
	2	16	43.2	25	47.2		
	3	12	32.4	9	17.0		
	4	-	-	2	3.8		
Father's Education	High Degree	8	21.6	15	28.3	0.475	NS
	Middle Certificate	29	78.4	38	71.7		
Mother's Education	High Degree	6	16.2	9	17	0.924	NS
	Middle Certificate	31	83.8	44	83		
Sports Practice	Yes	5	13.5	18	34	0.029	S
	No	32	85.5	35	66		

Chi- Square Test HS= Highly significant S= Significant NS= Non significant.

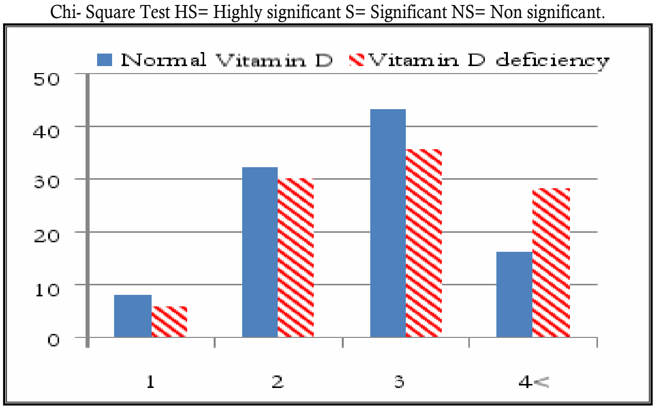

Figure (1) Siblings number

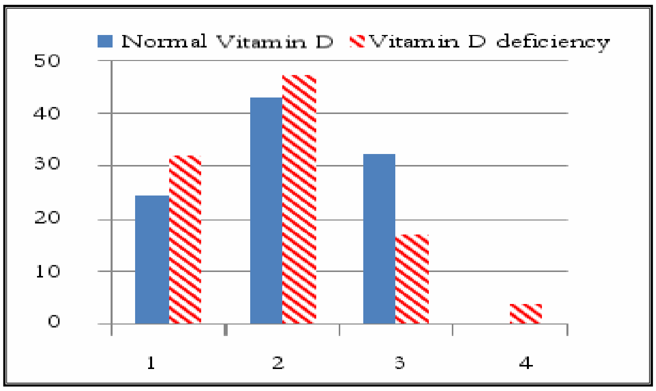

Figure (2) Child order

Table (3) Correlation between Vitamin D status and some socio- demographic characteristics

Variable	Vitamin D	
	R	P
Siblings Number	0.02	0.836
Child Order	0.04	0.731
Fetal Age (Wks)	- 0.06	0.555
Birth Weight (Kg)	0.22	0.042*
Weaning Age (Months)	- 0.08	0.473

Spearman's Correlation * Significant

Discussion:

In spite that vitamin D was discovered hundred years ago for its role in maintain healthy bones. Recently, it found to play important functions in many extra- skeletal organs. Nowadays, after emerge of COVID- 19 virus; vitamin D attracted the attention about its role in protection of acute lung energy by decreasing its mortality rates (Giustina et.al., 2020).

This cross- sectional study was conducted to evaluate the modifiable factors affecting vitamin D status of ninety prepubertal girls (6- 10 years) recruited during the period from March to May 2019. The study was ended before the beginning of COVID- 19 pandemic that's why our results didn't include information related to it.

The prepubescent period has been chosen to focus on vitamin D status that is mostly influenced by socio- demographic factors away from the effect of hormonal changes in puberty and other factors that may affect vitamin D levels in older ages. As well, they were selected in this short period of time to avoid the seasonal variations that may affect vitamin D status (Rosecrans and Dohnal, 2020).

Current sample was taken from girls attending the clinic of Management of visceral obesity and growth disturbance in the Medical Research Centre of Excellence (MRCE) of almost the same social class in the urban area around the National Research Centre (NRC). It was difficult to take accurate values of their family income, which make it difficult to examine vitamin D status among different socioeconomic levels. While, Manios et.al., 2017 observed that populations living in urban areas had lower 25(OH) D concentrations than rural populations, perhaps due to lifestyles that limit the duration of sunlight exposure or reduce the dietary intake of vitamin D.

According to global estimates, more than one billion people suffer from vitamin D deficiency (Tabrizi etal., 2018). In our study, vitamin D deficiency appeared to be higher with (58.9%) in comparison to normal

Introduction:

Vitamin D is both a vitamin and a steroid hormone that elicits vital roles extend beyond calcium and phosphate homeostasis, regulation of parathyroid hormone and prevention of rickets, osteomalacia and fractures. It acts as a hormone on many extra- skeletal targets (Bouillon et.al., 2019). Recently, it has been calculated that approximately 30% and 60% of children and adults have vitamin D deficiency or insufficiency (Peroni et.al., 2020).

It was proved that vitamin D has a potential protective role in extra-skeletal disorders as vitamin D receptors (VDRs) are expressed in almost every tissue and cell in the body (Keane et.al., 2018). These disorders include cardiovascular (hypertension, heart failure, ischemic heart), autoimmune (rheumatoid arthritis, systemic lupus erythematosus), neurological diseases, neurodevelopment disorders like autism, as well as increased infections rate (Autier et.al., 2017; Swart et.al., 2018; Elpatrik et.al., 2020).

Most recently, it has evolved as a burning topic due to the COVID- 19 pandemic, because of the alleged correlation between decreased level of vitamin D and increased risk of chronic pulmonary morbidity and mortality (Giustina et.al., 2020).

Serum 25(OH) D is regarded the best criterion to indicate vitamin D level in the blood (Bikle et.al., 2017). A cut- off of ≤ 30 ng/ml vitamin D status was specified to be deficient with increased threat of osteomalacia and nutritional rickets dramatically (Martineau et.al., 2017; Peroni et.al., 2020). Maintaining its level between 30 and 60 ng/mL would dramatically decrease the intensity of the associated diseases and prevent complications of vitamin D deficiency (Wimalawansa, 2019).

A Vitamin D level in the body is monitored by multiple factors such as age, race and skin pigmentation (Espinoza et.al., 2020). Decreased vitamin D level is common during winter and spring and more likely to occur in persons who have less exposure to sunlight (Kohlmeier, 2020). It is also suggested that vitamin D level may be affected by the socioeconomic factors such as family income, parental educational level and family size (Al- Agha et.al., 2016),.

Aims:

The aim of this study was to assess the impact of some socio-demographic characteristics that may have a great influence on vitamin D level in a sample of prepubescent Egyptian girls.

Subjects& Methods:

This comparative cross- sectional study was conducted on 90 prepubertal girls aged (6- 10) years were recruited from the clinic of Management of visceral obesity and growth disturbance in the Medical Research Centre of Excellence (MRCE) in the National Research Centre (NRC) during the period from March to May 2019.

The study's protocol was approved according to the instruction of the research ethics committee in the Faculty of postgraduate Childhood studies, Ain Shams University as well as by the Biological Anthropology Department, Medical Division and the Ethical Committee of the National Research Centre, Number (16/ 448).

Full description and discussion of the aim of the study and the suspected risk factors were done with the parents of the subjects and then they signed an informed consent. An oral consent was obtained from each girl before their evaluation.

The enrolled participants were subjected to:

- A simple questionnaire aiming to reveal the socio- demographic conditions associated with vitamin D deficiency. The questionnaire included age (at the time of examination), address, fetal age, weaning age, number of siblings, child order, father and mothers' qualifications and sports practice.
- Complete clinical and physical examination assessing all body systems to exclude any medical or genetic illness.
- Assessment of vitamin D status: A venous blood sample of 5 ml was taken from non- fasting girls and immediately processed and separated then stored at−70°C until the time of analysis. Serum 25(OH)D was measured using a commercially available ELISA kit. Vitamin D status was defined to be deficient when 25(OH) D levels ≤ 30 ng/ml (Saggese et.al., 2018; Peroni et.al., 2020).

Collected data were complied; coded and verified. Analysis was performed using the computer program Statistical package for social science (SPSS) version 16. Normality of data was tested using the Kolmogorov- Smirnov test. The figures were drawn using Microsoft Excel program (SPSS, version 12, 2004), According to serum vitamin D level, girls were classified into:

- 37 girls with normal vitamin D level (>30).
- 53 girls with vitamin D level deficiency (≤ 30).

Frequency distribution of the girls according to different socio-demographic characteristics was presented as number and percentage. In order to find out whether there are group differences, Chi- square test was used to compare between 2 groups for the non- parametric (qualitative) data. Spearman´s correlation was used to assess the association between the vitamin D levels with the studied variables.

Standards of probability were s`et to $P < 0.01$; which considered highly significant; and $P < 0.05$; which considered statistically significant; in all analyses.

Results:

The mean age was (9.24± 1.09 and 9.09± 1.33) with no significant differences between normal vitamin D and vitamin D deficient groups respectively. Regarding vitamin D, there was high significant difference between normal and vitamin D deficient girls with mean (56.53± 21.07 and 17.20± 5.19) respectively. There were no significant differences between the two groups as regard the mean of fetal age, birth weight and the weaning age. Table (1).

There was a high significant statistical difference between the two groups as regards number of siblings. Girls who have more than 3 siblings have lower vitamin D levels. Also, vitamin D deficiency is more in girls of 4th child order but with no significant statistical differences. As regards

Association of vitamin D status with socio-demographic characteristics among a sample of prepubescent Egyptian girls

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Summary

Background: In addition to its crucial role in maintaining bone and calcium homeostasis, vitamin D is both a vitamin and a steroid hormone that plays vital extra- skeletal functions. Nowadays vitamin (D) became an imperative issue due to its relation to COVID- 19 virus.

Objective: To define the effect of some socio- demographic characteristics on Vitamin D status among a sample of prepubescent girls.

Methodology: Ninety prepubertal girls (6- 10) years recruited from the clinic of Management of visceral obesity and growth disturbance in the Medical Research Centre of Excellence (MRCE) in the National Research Centre (NRC) during the period from March to May/2019. A questionnaire was taken to obtain informations about age, residence, family size, child order, paternal education and sports practice as well as infantile history (fetal age, birth weight and age of weaning). Thorough clinical examination to exclude chronic diseases was done. Serum samples were collected for 25- hydroxy vitamin D (25- OHD) assessment; participants were then subdivided according to vitamin D level into normal vitamin D and vitamin D deficient groups.

Results: The mean age was (9.24± 1.09 and 9.09± 1.33) with vitamin D mean levels (56.53± 21.07 and 17.20± 5.19) in normal vitamin D and vitamin D deficient groups respectively with high significant differences (p 0.000). As regards number of siblings, there was a significant statistical difference as girls having more than 3 siblings have higher percentages of vitamin D deficiency (28.3%) in comparison to (8.1%) with normal vitamin D level (p 0.028). Also, vitamin D deficiency is more in girls of 4th child order but with no significant statistical differences. As regards sports practice, both groups have significant lower percentages of practicing sports (13.5% and 34% respectively) in normal and vitamin D deficient groups respectively (p 0.029).

Conclusion: Increasing family size and child order inversely proportionate to vitamin D status in prepubescent girls.

دراسة ارتباط معدل فيتامين (د) بالخصائص الإجتماعية والديموغرافية لدى عينة من الفتيات المصريات فى مرحلة البلوغ

الخلفية: بالإضافة إلى دوره الحاسم فى الحفاظ على توازن العظام والكالسيوم، فإن فيتامين (د) يعد فيتامين وستيرويد هرمون له وظائف حيوية خارج الهيكل العظمي. كما أنه أصبح فى الوقت الحاضر قضية حتمية بسبب علاقته بفيروس كورونا المستجد.

الهدف: تحديد تأثير بعض الخصائص الاجتماعية والديموغرافية على معدل فيتامين (د) بين عينة من الفتيات فى مرحلة ما قبل البلوغ.

المنهجية: تم تجميع تسعين فتاة (٦- ١٠) سنوات من عيادة إدارة سمنة الأحشاء واضطرابات النمو فى مركز التميز للبحوث الطبية (MRCE) بالمركز القومى للبحوث NRC خلال الفترة من مارس إلى مايو ٢٠١٩. تم أخذ استبيان للحصول على معلومات مناسبة حول العمر، والإقامة، وحجم الأسرة، وترتيب الأطفال، ومستوى تعليم الأبوين، وممارسة الرياضية وكذلك تاريخ الطفولة (عمر الجنين، ووزن الولادة، وسن الفطام)، تم إجراء فحص سريرى شامل لاستبعاد الأمراض المزمنة. ثم جمع عينات المصل لتقييم ٢٥- هيدروكسى فيتامين د (25- OHD)؛ ثم تقسيم المشاركين وفقا لمستوى فيتامين (د) إلى مجموعة طبيعية وأخرى تعانى من نقص فيتامين (د).

النتائج: كان متوسط عمر الفتيات (٩,٢٤ ±١,٠٩ و٩,٠٩ ±١,٣٣) بمتوسط مستويات فيتامين (د) (٥٦,٥٣± ٢١,٠٧ و١٧,٢٠ ±٥,١٩) فى مجموعات فيتامين (د) الطبيعى وفيتامين (د) على التوالى مع وجود دلالة إحصائية عالية P 0.000. فيما يتعلق بعدد الأشقاء، كان هناك فروق ذات دلالة إحصائية حيث أن الفتيات اللائى لديهن أكثر من ٣ أشقاء لديهن نسب أعلى من نقص فيتامين (د) ٢٨,٣% مقارنة بـ٨,١% بمستوى فيتامين (د) الطبيعي P 0.028. أيضا، نقص فيتامين (د) يكون أكثر عند الفتيات من المرتبة الرابعة ولكن دون وجود فروق ذات دلالة إحصائية. فيما يتعلق بممارسة الرياضة، فإن كلتا المجموعتين لديهما نسب منخفضة من ممارسة الرياضة (١٣,٥% و٣٤%) فى المجموعتين العاديتين التى تعانى من نقص فيتامين (د) على التوالى P 0.029.

الخلاصة: زيادة حجم الأسرة، الترتيب بين الأطفال يتناسبا عكسيا مع حالة فيتامين (د) فى الفتيات قبل سن البلوغ.