Original Research Paper

Volume-9 | Issue-10 | October - 2019 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Physiology

A CROSS-SECTIONAL STUDY TO EVALUATE THE INTERRELATIONSHIP BETWEEN VITAMIN D, LIPID PROFILE AND BMI IN YOUNG ADULTS OF BANGALORE CITY

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ABSTRACT In the present era, obesity is of global concern with serious public health consequences. In recent years, emerging evidence has linked Vitamin-D not only to its known effects on calcium and bone metabolism, but also to chronic diseases like cardiovascular disease and its risk factors. Hence there is need for a study to evaluate the interrelationship between Vitamin D levels, BMI and Lipid profile in young adults. The objective of this study is to assess Serum 25(OH) Vitamin-D, BMI and Serum Lipid levels in young adults of Bangalore city, and to evaluate the interrelationship of the above parameters in the same subjects. After obtaining Ethical Clearance, 180 eligible healthy young subjects were recruited for the study. Written informed consent was taken. For each subject, fasting blood sample of 4ml was collected for Serum 25(OH) Vitamin-D assessment and Serum Lipid profile. Height and weight were measured, and BMI was calculated. Results were compiled and statistically analyzed. In this case control Study, the cases whose BMI ≥ 25 had significantly decreased Mean Vitamin-D levels which was associated with higher mean lipid levels compared with those with Controls (BMI < 25). This study shows an association with Vitamin-D and obesity. Elevated Lipids and Dyslipidemic Triglyceride levels associated with Vitamin-D deficiency in overweight or obese young adults indicates a need for clinical monitoring and appropriate intervention.

KEYWORDS : Vitamin-D, Obesity, Cholesterol, Lipids

INTRODUCTION

Obesity is a global health concern with serious health consequences (Srivatsa N et al 2007). There are around 243 million adolescents in India and more than 14.4 million have BMI more than 25 (Central Statistics office, Govt of India 2017). The Primary role of Vitamin D is Mineralisation but many studies have also shown an association with Vitamin D deficiency & Dyslipidemia & Obesity (Holick, 2007) (Faridi KF et al 2017). Hence this study was undertaken to evaluate the interrelationship between Vitamin D, Lipid Profile and BMI in young adults of Bangalore city, the population which belong to Indian genetic stock & is genetically different from the stock of subjects mentioned in the reference.

OBJECTIVES

A. To assess Serum 25(OH) Vitamin-D, BMI and Serum Lipid levels in young adults of Bangalore city
B. To evaluate the interrelationship of the above parameters in the same subjects

MATERIALS & METHODS

After obtaining Ethical Clearance, 180 eligible healthy young subjects aged 18years to 25 years were recruited for the study. Among them 100 were male subjects and 80 were female subjects. The study was done across 3 months from June to August months which is neither winter nor summer in Bangalore. Written informed consent was taken. To be included in the study, the subjects were 1) to have no history of hepatic disorders, renal disorders, intake of Vitamin D supplements or Calcium supplements or drugs known to influence Vitamin Metabolism or with any systemic illness. Demographic characteristics, past medical history and use of medications were collected via structured questionnaires. Dietary intake was measured using 24-Hour Dietary Recall Questionnaire. For each subject, fasting blood sample of 4ml was collected by trained registered medical personnel for Serum 25(OH) Vitamin-D assessment and Serum Lipid profile. Height and weight were measured, and BMI was calculated using Quetlets Index. The subjects were divided into cases and controls based on BMI, 82 Subjects with BMI 25 were grouped as Cases & 98 subjects with BMI < 25 were grouped as Controls. Confounding factors were well adjusted. Results were compiled and statistically analysed using Chi-square test, Pearsons Correlation, ANOVA & Linear regression on SPSS 24 software. $P \leq 0.05$ was taken as significant.

RESULTS

In this study, the cases whose BMI ≥ 25 had statistically significant ($p < 0.05$) decreased Mean Vitamin-D levels(12.3 ± 6.1) when compared to controls who had Vitamin D levels (26.7 ± 7.0) which was significantly associated with higher mean lipid levels compared with those with controls (BMI < 25).

TABLE – 1

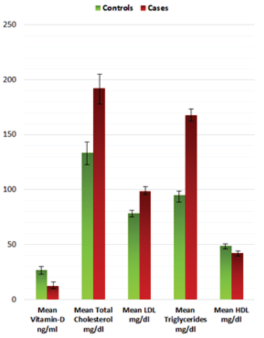
Comparison of Means of Vitamin D Status, Mean Total Cholesterol, Mean LDL, Mean Triglycerides and Mean HDL in Cases (BMI ≥ 25) & Controls (BMI < 25) in Young Adults of Bangalore City

Parameters		**Controls BMI < 25 (Count 98) Mean ±SD**	**Cases BMI ≥ 25 (Count 82) Mean ±SD**	**P Value**
Mean Vitamin D (ng/ml)	26.7 ± 7.0	12.3 ± 6.1	* 0.0024	
Lipid Profile (mg/dl)	Mean Total Cholesterol	133.3 ± 22.33	192 ± 28.66	* 0.0101
	Mean LDL	78.4 ± 6.25	98.23 ± 8.13	* 0.0002
	Mean Triglycerides	94.66 ± 11.01	167.66 ± 11.97	* 0.0470
	Mean HDL	48.83 ± 4.68	42.23 ± 5.12	* 0.0001

* P Value Significant

FIGURE– 1

Comparison of Means of Vitamin D Status, Mean Total Cholesterol, Mean LDL, Mean Triglycerides and Mean HDL in Cases (BMI ≥ 25) & Controls (BMI < 25) in Young Adults of Bangalore City



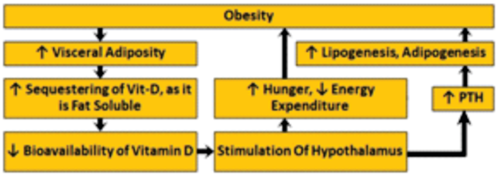
DISCUSSION

Obesity is considered a public health problem that has been increasingly reaching alarming proportions in all regions of the world. (Tremblay A, Arguin H, 2011). Table 1 & Figure 1 show Mean Vitamin D levels ng/ml (12.3 ± 6.1) decreased in Cases with BMI > 25 in comparison to Controls with BMI < 25 who had Mean serum Vitamin D levels (26.7 ± 7.0) ng/ml. These findings are in unison with Lee HA et al 2013 & Lee SH et al, 2013).

Table 1 & Figure 1 also show Mean Total Cholesterol levels (192 ± 28.66), Mean LDL Levels (98.23 ± 8.13) & Mean Triglyceride levels (167.66 ± 11.97) in Cases were significantly higher when compared with Controls whose Mean Total Cholesterol levels were (133.33 ± 22.33), Mean LDL levels (78.4 ± 6.25) and Mean Triglycerides level (94.66 ± 11.01) mg/dl respectively. Table 1 & Figure 1 also show Mean HDL levels mg/ml (42.23 ± 5.12) in Cases which were significantly lower than the Controls whose Mean HDL levels were (48.83 ± 4.68) mg/dl. This was in accordance with the study done by Mohan Kumarratne et al, 2017).

The probable explanation for this is as follows. The mechanism by which Vitamin D influences adiposity is not completely understood, but there are lines of research that try to explain this phenomenon. Vitamin D, being fat soluble, is stored in the body fat. Cholecalciferol that is produced in the skin or ingested from the diet is partially sequestered in the body fat. However, in obese, the cholecalciferol is sequestered deep in the body fat, making it more difficult for it to be bioavailable. Thus, obese individuals are only able to increase their blood levels of Vitamin D approximately 50% compared with normal weighted individuals (Worstman et al, 2000). That reduces its bioavailability and triggers the hypothalamus to generate a cascade of reactions that leads to increased feelings of hunger and decreased energy expenditure, to compensate for the lack of the Vitamin (Schuch NJ, 2009). Among these reactions is the increase in parathyroid hormone (PTH) levels, which promotes lipogenesis and can modulate adipogenesis by suppressing the Vitamin D receptor, which inhibits compounds involved in adipocyte differentiation and maturation. In general, it can be observed that the increase in Body Fat can aggravate Vitamin D deficiency which, in turn, can further increase the accumulation of fat, creating a cycle. (Wood RJ ,2008).

FIGURE– 2
Suggested mechanism to explain interrelationship between Vitamin D, Lipid profile in Obese Individuals



CONCLUSION

This study shows an association with Vitamin-D and obesity. Elevated Lipids and Dyslipidemic Triglyceride levels associated with Vitamin-D deficiency in overweight or obese young adults indicates a need for clinical monitoring and appropriate intervention. Thus, Public health Nutritional intervention should be directed towards the prevention of chronic diseases associated with obesity.

REFERENCES:

[1] Srivastava N, Lakhan R, Mittal B. (Nov 2007) Pathophysiology and genetics of obesity. Indian Journal of Experimental Biology, New Delhi; 45:929-936.
[2] Central Statistics Office Ministry of Statistics and Programme Implementation Government of India
[3] Holick MF. Vitamin D deficiency. N Engl J Med. 2007;357:266-281.
[4] Faridi KF, Zhao D, Martin SS, et al. Serum vitamin D and change in lipid levels over 5 y: the atherosclerosis risk in communities study. Nutrition. 2017;38:85-93.
[5] Wortsman J, Matsuoka LY, Chen TC, Lu Z, Holick MF. Decreased bioavailability of vitamin D in obesity. Am J Clin Nutr. 2000 Sep;72(3):690-3.
[6] Indian Council of medical Research..Nutrient Requirements and Recommended Dietary allowances for Indians.Hyderabad;2010
[7] Robert H Riffenburg. Statistics in Medicine. 2nd ed. Academic press; 2005.p. 85-125
[8] Tremblay A, Arguin H. Healthy eating at school to compensate for the activity-related obesigenic lifestyle in children and adolescents: the Quebec experience. Adv Nutr. 2011;2:167S-70S
[9] .Lee HA, Kim YJ, Lee H, Gwak HS, Park EA, Cho SJ, et al. Association of vitamin D concentrations with adiposity indices among preadolescent children in Korea. J Pediatr Endocrinol Metab. 2013;26:849-54.
[10] Lee SH, Kim SM, Park HS, Choi KM, Cho GJ, Ko BJ, et al. Serum 25-hydroxyvitamin D levels, obesity and the metabolic syndrome among Korean children. Nutr Metab Cardiovasc Dis. 2013;23:785-91.
[11] . Lourenço BH, Willett L, Cardoso WC. Action Study Team FTO genotype, vitamin D status, and weight gain during childhood. Diabetes. 2014;63:808-14.
[12] Kumaratne, M., Early, G., & Cisneros, J. (2017). Vitamin D Deficiency and Association With Body Mass Index and Lipid Levels in Hispanic American Adolescents. Global pediatric health, 4
[13] Schuch NJ, Garcia VC, Martini LA. Vitamin D and endocrine diseases. Arq Bras Endocrinol Metab. 2009;35:625-33.
[14] Cunha, Kelly Aparecida da, Magalhães, Elma Izze da Silva, Loureiro, Laís Monteiro Rodrigues, Sant'Ana, Luciana Ferreira da Rocha, Ribeiro, Andréia Queiroz, & Novaes, Juliana Farias de. (2015). Calcium intake, serum vitamin D and obesity in children: is there an association?. Revista Paulista de Pediatria, 33(2), 222-229.
[15] Wood RJ. Vitamin D and adipogenesis: new molecular insights. Nutr Rev. 2008;66:40-6.