

An Association of Serum Vitamin D3, ionized calcium with Depression among teenagers.

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Abstract

Background and Objectives: The association of Vitamin D with depression is suggested due to the pressure of vitamin D receptors in cingulate cortex, thalamus, cerebellum, substantia nigra, amygdala and hippocampus. Depression is a mood disorder affecting approximately 1-6% of teenagers. This study aims at evaluating the association of serum vitamin D3, ionised calcium and depression among teenagers.

Material and Methods: The study included 142 teenage children who visited the hospital for regular health checkup. They were evaluated by the questionnaire, "Depression scale for children", serum vitamin D3 and ionised calcium was estimated. A comparison of socioeconomic data, serum vitamin D3, and ionised calcium was done.

Observations: Out of 142 teenagers 36 children (25.6%) were diagnosed of suffering from depression. A significant negative correlation was observed between serum vit D3 and depression ($r = 0.868$, $p = 0.05$).

Conclusion: An association of decreased vit D3 with depression was found in depression among teenagers. Hence vit D3 supplementation is required during growth years is essential along with preventive measures of depression.

Keywords: Depression, Teenagers, Vitamin D3.

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I. Introduction:

Depression is a mood disorder demanding treatment affecting the teenagers. During teenage various biological, social and psychological changes occur and children attempt to create reorganization in the society. Recently an increased number of teenagers have reported of impaired mental health status (1). It has been observed that 1-6% of teenagers are affected by depression worldwide (2). The early manifestation suggests mental health problem in later years of life (2, 3). Depression is teenagers' warrants immediate measures as it increases the risks of suicide, homicidal ideas, smoking, substance abuse and drug addiction (4, 5). Teenage is also the period during which mental health is less frequently assessed. The evaluation of prevalence of mental health issues among teenagers and factors associated with it, is required and till date remains inadequate.

Estimation of serum vit D is a reliable marker of vit D status of the body (6). Serum vit D level maintain homeostasis of ionised calcium in the body (7). Studies have observed vit D receptor in various areas of the brain which are associated with development of depression (8). In adults an association of vit D has been observed in depression and various other psychiatric disease conditions (9). An increase number of vit D receptors are found in amygdala, the reason the brain responsible for emotion and behaviors. Vit D receptors are also found abundantly in the thalamus, hypothalamus, dorsal raphe nucleus, dorsal nucleus of vagus, in both spinal and cranial regions implicating, the existence of endocrine sensory autonomic system and molar system (8). The various signs and symptoms of depression like fatigue, mood alterations, pain and molar regulation may be associated with serum vit D.

Although various studies have reported the association of vit D with depression in adult population, similar studies in teenage population is limited. The deficiency of vit D is a treatable condition and evaluation of depression among teenage children is essential as they early treatment can be started.

Hence this study was taken in SCBMCH to evaluate the association of depression with Serum vit D and ionised calcium among teenage population.

II. Material and method

In this study 142 children were taken. The socio demographic data of the children was collected this included age, gender, level of education, birth order of the child, presence of chronic illness, history of trauma, school performance, physical activity, use of drugs, serum was used to estimated vit D and ionised calcium. Serum vit D was estimated by ECLIA Roche in the department of Biochemistry and ionised Ca^{2+} was estimated by ISE (Ion selective electrode) in the dept. of Biochemistry.

Assessment of depression among teenagers: We used the depression scale developed by Kovac's (12). We included the children in the age group of 13 to 19 years. The scale consists of 27 categoric items and each category has 3 options. The child choses the option which describes him / her the most. Each option carries points such as 0, 1, 2, 3 according severity. All the scores are added to get the total score. The highest score is 54 which depict the severity of depression. The minimum cut of score is 19 which depicts that depression is presence.

Statistical Analysis: Data is represented as mean \pm SD. The data was compare by chi-square test and compared standards t-test. Regression analysis was done to know the risk factors. A $P < 0.05$ was considered significant.

III. Results:

There was no significant difference in gender, age, birth order, presence of chronic disease school success or physical activity (Data depicted in table 1 & 2). The mean depression score of the teenagers with depression was 25.01 ± 4.89 .

Pearson's correlation was done to evaluate the correlation of serum vitamine D with depression score, Which revealed that a significant negative correlation existed between severity of depression and serum vitamin D level(table 2)

Table 3 shows the demographic and categoric data of the study population and those there was no significant difference but teenagers with depression were under activities in school performance and lack of physical activity,belongs to low socioeconomic status and had nutritional deficiency.

Though, the Sr. vit D and ionised calcium levels were not significantly different, but a significant negative correlation existed between serum vit D and the depression scores.

Table 1 Evaluation of depression among the teenagers with the demographic and biochemical data.

Parameters	Teenagers with depression	Teenagers without depression	P value
Age	13.68 \pm 6.88	13.66 \pm 6.9	NS
Average age of mothers	38.6 \pm 4.2	38.4 \pm 2.6	NS
Average age of fathers	41.6 \pm 7.4	42.2 \pm 8	NS
No .of siblings	1 \pm 1.0	2 \pm 1	NS
Serum vit D3(ng/ml)	13.62 \pm 0.8	14.4 \pm 0.72	NS
Serum ionized calcium	1.2 \pm 0.22	1.18 \pm 0.12	NS

Data is represented as Mean \pm SD. All data was compared by unpaired student t-test.A p-value of <0.05 was considered significant.

Table 2 Correlation of serum vitamin D3 levels with depression.

	Depression score
Serum vitamin D level	r = -0.842 p = <0.05

A significant negative correlation was observed between serum vitamin D3 level and depression among teenagers.

Table 3 shows the various demographic data and categoric data

Parameters	No. of teenagers with depression	No. of teenagers without depression
No. of participants'	36	106
Gender (male/female)	14/22	50/56
Any other disease or comorbid condition(present/absent)	18 present	53 present
History of trauma (present)	3	5
School performance		
Poor	3	6
Average	14	22
High achievers	19	78
Use of drugs (yes)	1	2
Regular physical activity or sports(yes)	24	79
Socioeconomic status(low)	22	58
Nutritional deficiency	30	92

IV. Discussion and conclusion:

Teenage is a period of turbulence and emotional fluctuations are usually present. Hence during this age children tend to feel depressed due to the change in social relations, thoughts and feelings. The signs of depression in a teenager include decreased interest and efficiency to do work, withdrawal from social performance, avoids friends, decrease in school performance, avoids parents and siblings and has an increase tendency to use drugs and alcohol. Depression in teenagers may also increase the tendency to suicide, homicide and drug and alcohol abuse (13,14). This also increases the changes addiction to smoking, alcohol and drugs (13,14). Recent studies have indicated that addiction begins on an average of 4-5 yrs after the commencement of depression (15).

Hence the first step in the management and treatment of depression in teenagers is identification of the causative factors and disease diagnosis at the earliest. The various causes of depression among teenagers include genetic, hereditary, biological, psychosocial and nutritional. In developing countries such as India, one of the major causes of depression is low socioeconomic status and nutritional deficiency (16). The observations of our study are also similar.

Various studies on animal suggest the role of vitamin D in the functioning of monoamines such as dopamine, norepinephrine, serotonin and depression (17,18). A study by Hoogendijk et al observed that in the elderly patients serum vitamin D level correlated negatively with the incidence of depression (19). A similar observation was found in our study, but our study population consisted of teenagers.

Vitamin D deficiency is a global problem affecting one third of the population (19). Recent studies have implicated that the dermal synthesis is inadequate to meet the daily requirement of vitamin D. Several factors such as latitude, insufficient exposure to sunlight, seasonal variations, rampant use of sunscreen lotions and clothes affect the dermal synthesis of vitamin D (20,21). A study by Erol M et al in Turkey observed a significant negative correlation between age and season (22). The vitamin D requirement of the body significantly increases in teenage period due to growth spurts and the incidence of mood changes such as depression is also high during that age (22).

Various research studies conducted on families with depression suggested that the incidence of depression increased in families having conflicts, negative and decrease communication. It was also observed the children of psychiatric parents especially when the mother is affected the incidence of depression is higher (15,23,24). In our study such observation were not found.

Another important finding in the incidence of depression is the influence of gender. Studies have shown that with increase in age the female gender is more vulnerable to depression (25,26). Similar observation were not found in our study on teenagers.

Various recent studies have observed an association between serum vitamin D levels and the incidence of depression. These studies have shown that the association of serum vitamin D levels with depression exists irrespective of lifestyle, socioeconomic status and other health problems (27,28). In our study we observed a negative correlation between depression and serum vitamin D and serum Ca^{++} levels among the teenagers.

In conclusion, we would like to suggest that since teenage years are crucial for a healthy adulthood, adequate attention should be given to the nutritional status and mood changes such as depression.

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