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ESTIMATION OF LEVELS OF SERUM VITAMIN D3 IN VITILIGO

Dermatology

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ABSTRACT

Background: Vitiligo is an acquired or hereditary, usually progressive disorder of pigmentation which occurs due to loss of epidermal melanocytes. The mean value of serum vitamin D3 was significantly lower in vitiligo cases than controls.

Aims and Objectives: We carried out this controlled cross- sectional study to evaluate serum vitamin D3 levels in cases of vitiligo and to find the correlation between serum vitamin D3 levels with duration and severity of vitiligo.

Materials and Methods: For this study, 75 clinically and histopathologically diagnosed patients of vitiligo of either sex with age group between 12-60 years were enrolled and 75 patients with minor ailments like superficial bacterial, fungal or viral infections and not suffering from vitiligo were taken as controls. Salient presentations were recorded in a pre-set proforma. Serum 25-hydroxyvitamin D levels were determined through Sandwich-ELISA technique.

Observations: The mean value of serum vitamin D3 in cases and controls was 24.0748±3.795 ng/ml and 38.170±9.541ng/ml respectively. The p value was <.001, therefore highly significant. Serum vitamin D3 level had no significant relation with BSA involved in vitiligo (p value 0.942), VASI score in vitiligo (p value 0.738),VIDA score of vitiligo (p value 0.518),duration of vitiligo (p value 0.942).

Conclusion: The data suggests the mean value of serum vitamin D3 was significantly lower in cases as compared to controls. Serum vitamin D3 level had no significant relation with BSA involved in vitiligo ,VASI score, VIDA score ,duration of vitiligo.

KEYWORDS

Autoimmune diseases, depigmentation, melanocytes, vitamin D, vitamin D receptor, vitiligo

INTRODUCTION

Vitiligo is an autoimmune disorder caused by the destruction of functional melanocytes in the involved epidermis[1]. Vitamin D deficiency is the pandemic and most under-diagnosed and under-treated nutritional deficiency in the world[2]. Vitamin D3 protects the epidermal melanin unit by modulating T cell activation, and coordinating melanogenic cytokines [endothelin-3 (ET-3)] and SCF/c-Kit system.8 and by its antioxidant properties[3]. It exerts immunomodulatory effects by inhibiting the expression of IL-6, IL-8, TNF-a, and TNF- c.[4] So it inhibits the autoimmune pathway involved in the pathogenesis of vitiligo. Parameters to access the severity/activity of vitiligo are : Vitiligo area severity index (VASI) and Vitiligo disease activity score (VIDA)[5] .Taking the International Osteoporosis Foundation's (IOF),various levels of vitamin D have been suggested as : Deficient <20 , Insufficient 21-29, Sufficient >30 (To convert to nmol/L, multiply results by 2.5)[6].

In agreement with our study, Beheshti et al. and Saleh et al. in their study found significantly lower serum 25(OH) D levels in patients compared to controls[7]. In disagreement with our results, Xu et al, found that there was a non-significant difference between vitiligo patients and controls in serum 1,25(OH)D[8].

MATERIALS AND METHODS

It was a controlled cross-sectional study conducted in the Department of Dermatology after taking approval from ethical committee. One hundered fifty patients of either sex between age group of 12 to 60 years attending the outpatient department of Dermatology were enrolled. These patients were divided into 2 groups, where, in group A, 75 patients of clinically and histopathologically diagnosed patients of vitiligo were taken and in group B, 75 patients of same age group and sex matched were taken attending Skin and STD department with minor ailments like superficial bacterial, fungal or viral infections and not suffering from vitiligo. Patients with chronic medical illness like diabetes mellitus, hypertension and tuberculosis, patients with current consumption of vitamin D (within two months), patients receiving concomitant treatment with the ability to influence vitamin D3 and patients suffering from bowel disease with malabsorption of vitamin D3 were not included in the study groups.

Physical and dermatological examination was done for every patient. The detailed history (e.g. age, sex, residence, total duration of disease, and family history of vitiligo etc.) was recorded in a proforma. After routine investigations, Serum 25-hydroxyvitamin D levels were estimated using Sandwich-ELISA technique.

The Vitiligo Area Scoring Index (VASI)

In this assessment, the patient's body is separated into five regions: the hands, upper extremities (including axilliary regions), trunk, lower extremities (including inguinal regions and buttocks), and the feet. Subsequent studies have added a sixth site: the head/neck area. The percentage of vitiligo involvement for each body region is calculated by using the palmar method. The palmar method uses the palmar surface area of the patient's hand as an estimation guide and defines the surface of the patient's hand including fingers to be 1.0% of the total body surface area. The extent of residual depigmentation is expressed by the following percentages: 0, 10%, 5%, 50%, 75%, 90%, or 100%. At 100% depigmentation, no pigment is present; at 90%, specks of pigment are present; at 75%, the depigmented area exceeds the pigmented area; at 50%, the depigmented and pigmented areas are equal; at 25%, the pigmented area exceeds the depigmented area; at 10%, only specks of depigmentation are present. The VASI is then derived by multiplying the values assessed for the vitiligo involvement by the percentage of affected skin for each body site and summing the values of all body sites together.

VASI= Σ [HAND UNITS] × [RESIDUAL DEPIGMENTATION]
VIDA score

Grading is as follows; VIDA score + 4: -activity lasting 6 weeks or less; score +3: activity lasting 6 weeks to 3 months; score 2: activity lasting 3-6 months; score1: activity lasting 6-12 months; score 0: stable for 1 year or more; score -1: stable with spontaneous repigmentation for 1 year ormore. A low Vitiligo disease activity score indicate less vitiligo activity.

StatisticalAnalysis

The findings thus obtained were analysed to study the correlation between severity of vitiligo and serum vitamin D3 levels. The observations were tabulated in the form of mean±SD and analysed

using Chi-square test, t-test for intergroup comparison. Comparison and level of significance was determined as its p-value with p>0.05 as not significant, p<0.05 as significant and <0.001 as highly significant.

RESULTS

Demographics

The median age in the cases was 32.07±14.863 years. There were 42(56%) males and 33(44%) females in vitiligo cases.

Family History of vitiligo

Out of 75 patients diagnosed with vitiligo, 12 (16%) had family history of vitiligo.

Diseases in Controls

In our study, out of 75 control patients with minor superficial infections, 16 (21.33 %) each were suffering from scabies and tinea. 7 (9.33%) patients in each group were suffering from corn, molluscum contagiosum and warts. 4 (5.33%) patients in each group had callus and PIH (post inflammatory hyperpigmentation) 8,6 patients had milia and pityriasis versicolor respectively.

Mean Value of Vitamin D in Cases and Controls

The mean value of serum vitamin D3 in cases and controls was 24.0748±3.795 ng/ml and 38.170±9.541 ng/ml respectively. The p value was <.001, therefore highly significant.

Level of vitamin D3 and age

In age group between 10-19 years 17 (89.5%) had insufficient vitamin D3 levels, , in age group between 19-30 years 19(86.4%) had insufficient vitamin D3 levels, in age group between 31-40 years 12(85.7%), in age group between 41-50 years 9(90%) , in age group between 51-60 years 4(66.7%) and in age group between 61-70 years 1 (25%) respectively had insufficient vitamin D3 levels. Statistically ,the level of vitamin D3 did not vary significantly with the age group (p value .567).

Level of vitamin D3 and sex distribution

Out of 33 females in vitiligo cases, 32(97%) had insufficient vitamin D3 levels and out of 42 males in vitiligo cases, 30 (71.4%) had insufficient vitamin D3 levels.. Statistically ,the data was significant (p value .004) i.e. females had more vitamin D3 deficiency than males .

Level of vitamin D3 and family history of vitiligo in cases

Family history of vitiligo was present in 12 and all (100%) of them had insufficient vitamin D3 level and in which family history of vitiligo was not present was 63 and out of these 50 (79.4%) had insufficient vitamin D3 levels. Statistically ,there was no significant relationship between level of vitamin D3 and family history of vitiligo in cases . p value= .084

Level of vitamin D3 and rural/urban distribution of subjects

Out of 75 cases of vitiligo ,36 cases belong to rural areas and out of these 26(72.2%) had insufficient vitamin D3 level and 39 cases belong to urban areas and out of these 35(89.7%) had insufficient vitamin D3 level .Statistically the data was significant (p value .048) i.e. cases of vitiligo in urban population had more vitamin D3 deficiency than rural.

Correlation of Serum Vitamin D_3 levels with severity and duration of vitiligo

The p-value of Correlation of Serum Vitamin D_3 levels with severity and duration of vitiligo evaluated through post-hoc test was statistically non significant as shown in Table-1.

Level of vitamin D3 and duration of vitiligo

Out of 75cases of vitiligo, 23 cases had duration 0-<6 month and out of these 15(65.2%) cases had insufficient vitamin D3 levels, 5 (100%) cases had duration 6month-<12month and all of them had insufficient vitamin D3 levels,9 cases had duration 12-<18 month and out of these 7 (77.8%) cases had insufficient vitamin D3 levels, 10 cases had duration 24month-<30 month and out of these 9 (90%) cases had insufficient vitamin D3 levels,3 cases had duration 36-< 42 month and out of these 2(66.7%) cases had insufficient vitamin D3 levels,25 cases had duration >48month and out of these 24(95.8%) cases had insufficient vitamin D3 levels,the correlation between duration of vitiligo and Vitamin D3 level was not significant (p value .081) as shown in Table-2.

Level of vitamin D3 and BSA (body surface area) involved

Out of 75 cases, 61 had BSA involvement of 1-10%, out of these 49(80.3%) had insufficient vitamin D3 levels. 7 had BSA involvement of 11-20%, out of these 6(85.7%) had insufficient vitamin D3 levels. 3(100%)cases had BSA involvement of 31-40%, had insufficient vitamin D3 levels. Rest with BSA involvement >41% had insufficient vitamin D3 levels. As per this table the correlation between BSA and vitamin D3 levels was not significant (p value .942) as shown in Table3.

Level of vitamin D3 and Vitiligo Area Severity Index(VASI) SCORE

Baseline mean vitiligo area severity index (VASI) score was 5.17 ± 11.15. The relation between VASI and vitamin D3 level was statistically not significant (p value=.738) as shown in Table-4.

Level of vitamin D3 and vitiligo disease activity score (VIDA)

Out of 75cases, 10 cases had VIDA score 0,out of these 9 (90%) had insufficient vitamin D3 levels; 22 cases had VIDA score 1,out of these 20 (90.9%) had insufficient vitamin D3 levels, 11 cases had VIDA score 2 ,out of these 9 (81.8%) had insufficient vitamin D3 levels, 13 cases had VIDA score 3,out of these 9 (69.2%) had insufficient vitamin D3 levels, 19 cases had VIDA score 4,out of these 15 (78.9%) had insufficient vitamin D3 levels, As per this table the correlation between VIDA SCORE and vitamin D3 levels was not significant (p value .518) as shown in Table-5.

DISCUSSION

In our study there were 42(56%) males and 33(44%) females; 97 % females as compared to 71.4% males had insufficient vitamin D3 levels, results were similar to studies conducted by Arguelles *et al*, who showed that female gender and low physical activity were predictors of lower levels of vitamin D3[9] .

The mean age in study cases and controls was 32.07±14.863, serum vitamin D3 level had no significant relation with age group (p value .567),which was in consistence with studies conducted by Jonathan I. Silverberg [10],Ustun I et al[11] and Mamoun El Sayed Shalaby et al.[12]

Our study showed urban predominance of vitiligo cases which could be due to more environmental pollution or less sun exposure, which acts as trigger factor for development of vitiligo, this was in consistence with a study conducted by Mehta NR [13].

Our study showed that, 45(60%) cases were vegetarian i.e. their diet was low in proteins, this was in consistence with study conducted by BehlPN, which showed that prolonged consumption of diet poor in protein could be contributory factor for the development of vitiligo [14] .

Serum vitamin D3 level had no significant relation with family history of vitiligo in cases (p value 0.084), similar to study conducted by Jonathan I. Silverberg and Ustun I et al.[11]

Serum vitamin D3 level had no significant relation with BSA involved in vitiligo (p value 0.942) ,VASI (p value=.738) and duration of vitiligo (p value=.081), results were similar to study conducted by Jonathan I. Silverberg [10],Ustun I et al [11]and Saleh et al [15].

Out of 61 (81.33%) cases of non segmental vitiligo , 53 cases had insufficient vitamin D3 level, the results were similar to study conducted by Mamoun El Sayed Shalaby et al., suggesting that vitamin D3 deficiency may play a role in the pathogenesis of vitiligo[12].

In our study the mean value of serum vitamin D3 in cases and controls was 24.0748±6.795 and 38.170±9.541 respectively. In a prospective cohort study conducted by Silverberg JI et al on 45 patients with vitiligo vulgaris 31.1% had normal (Sufficient >30 ng/mL), 55.6% had insufficient (<30 ng/mL) and 13.3% had very low (<15 ng/mL) 25-hydroxyvitamin D3 levels[10].

LIMITATION

Sample size was small. Sun exposure and body mass index in cases and controls was not assessed. Therefore, more studies are needed with larger sample size.

CONCLUSION

We observed that serum vitamin D_3 levels were lower in patients with vitiligo as compared to controls. This is suggestive of role of vitamin D3 in the aetiopathogenesis of vitiligo, based on which newer

therapeutic modalities can be developed.

Table 1: showing correlation of Serum Vitamin D3 levels with severity and duration of vitiligo

Vitamin D^3	Duration	BSA	VASI	VIDA
	0.942 ;NS	0.942; NS	0.738;NS	0.518;NS

Correlation/comparison between serum vitamin D3 levels and severity and duration of vitiligo in study cases**p>.05 ; Not significant

Table 2: Level of vitamin D3 and duration of vitiligo

	CASES		
DURATION OF VITILIGO(month)	**Insufficient (VITAMIN D3)**	**Sufficient (VITAMIN D3)**	**TOTAL**
0-<6	15 (65.2%)	8 (34.8%)	23(100%)
6-<12	5(100%)	0	0(100%)
12 -<18	7 (77.8%)	2 (22.2%)	9(100%)
18- <24	0	0	0(100%)
24-<30	9 (90%)	1 (10%)	10(100%)
30 -< 36	0	0	0(100%)
36-< 42	2(66.7%)	1 (33.3%)	3(100%)
42 -<48	0	0	0(100%)
>48	24(95.8%)	1(4.2%)	25(100%)
TOTAL	62(82.4%)	13(17.6%)	75(100%)
x^2 =9.794 df=5 p value= .081 ; not significant			

Table 3 : Level of vitamin D3 and BSA (body surface area) involved

	CASES		
BSA INVOLVED	**Insufficient (VITAMIN D3)**	**Sufficient (VITAMIN D3)**	**TOTAL**
1-10	49(80.3%)	12(19.7%)	61(100%)
11-20	6(85.7%)	1(14.3%)	7(100%)
21-30	0	0	0
31-40	3 (100 %)	0	3(100%)
41-50	1 (100 %)	0	1(100%)
51-60	1 (100 %)	0	1(100%)
61-70	1 (100 %)	0	1(100%)
>70	1 (100 %)	0	1(100%)
x^2 =1.746 df=6 p value= ..942 ; not significant			

Table 4 : Level of vitamin D3 and Vitiligo Area Severity Index(VASI) SCORE

Variable	N	Mean ± SD	P value
VASI	75	5.17 ± 11.15	0.738
Serum Vitamin D3	75	24.07 ± 6.80	

Table 5 : Level of vitamin D3 and vitiligo disease activity score (VIDA)

	CASES		
VIDA	**Insufficient (VITAMIN D3)**	**Sufficient (VITAMIN D3)**	**TOTAL**
0	9(90%)	1 (10%)	10 (100%)
1	20(90.9%)	2(9.1%)	22 (100%)
2	9(81.8%)	2(18.2%)	11(100%)
3	9(69.2%)	4(30.8%)	13(100%)
4	15(78.9%)	4(21.1%)	19(100%)
TOTAL	62(82.7%)	13(17.3%)	75(100%)
x2 =3.245 df=4 p value= .518 ; not significant			

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