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Impact of Sunscreen on Biosynthesis of Vitamin D in Females

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Abstract:- The use of Sunscreens has been increasing over the last few decades, its awareness among general masses as protector from cancer, wrinkles, dark spot and tanning of skin are being emerged as one of the foremost basis of greater than before use of sunscreen. Primarily exposure to sunlight is the main source of biosynthesis of vitamin D in lower epidermal layer of skin where UVB rays photolyze provitamin D (Synthesized from 7- hydrocholestrol) to previtamin D. Unfortunately dietary sources of vitamin D is very scarce. The richest source is fatty fishes (Tuna, Meckrel and salmon) and fish liver oil whereas lesser amounts are found in egg yolks, cheese and beef liver. This study was designed to find out the impact of sunscreen on biosynthesis of vitamin D in females who were recently diagnosed as hypoivitaminosis D patients in different clinics. The total 213 newly diagnosed patients of hypovitaminosis D were given questionnaire to get their feed back about the regular use of sunscreen formulations. Out of 213 subjects 159 (74.64%, having vitamin level in serum within a range of 3.69 to 11.48 ng/ml) were regularly using sunscreen and only 54 (25.35% having a range between 9.27 to 18.93 ng/ml) patients were found as intermittent user. The ratio of subjects covertly indicative that sunscreen (mostly SPF 15 and 30) may slow down the biosynthesis of Vitamin D by blocking the UVB rays. Further studies with larger sample size would be required for better interpretation.

Keywords:- *7- hydrocholesterol, Sunscreen, Previtamin D, Provitamin D, 25-hydroxyvitamin D_3.*

I. INTRODUCTION

Incidence of hypovitaminosis D has been disturbing the clinicians since last few years as hypovitaminosis D is considered to be an unattended malady that affect large majority of urban and suburban population. Vitamin D is a fat soluble vitamin that has long been considered to help the body to absorb the calcium and phosphorus. Vitamin D behaves like hormone as most of the organs and tissues have receptors for vitamin D, this indicates its role beyond the bone health. Several studies show that vitamin D might prevent cancer cell growth , enhance immunity thus help in controlling infections and reduce inflammations. The biosynthesis of vitamin D in the skin is the primary source of its production apart from supplements and food sources..

Worldwide more than 1 billion people have inadequate amount of this highly useful vitamin in blood. Several research papers have elaborated that hypovitaminosis D might be an important factor that have definite role in progression of innumerable ailments. We have been getting advice from various sources that we need to protect our skin from over exposure to sunlight that may cause skin cancer and few other skin tribulations. Use of sunscreen among general masses have increased manifolds particularly in outdoor going younger generation. The basic ingredients in commonly available sunscreen are Titanium oxide, Zinc oxide in mineral sunscreen and chemical sunscreen filters include- Avobenzone, Homosalate, Octocrylenen, Octinoxate, Octisalate and Oxybenzone etc. Sunscreen with SPF 15 blocks 93% UVB , SPF 30 blocks 96.7% and SPF 50 blocks 98% UVB . **Sayed Aliul Hasan abdi (2022)** et al. in their paper "Sunscreen ingredient octocrylene's potency to disrupt the vitamin D synthesis" suggested that octocrylene one of the ingredient of sunscreen interact with vitamin D binding protein, the vitamin receptor,and enzyme CYP2R1, indicating high risk of vitamin D abnormalities. **Neale R E. Khan SR**

et. al in their paper " The effect of sunscreen on vitamin D : a review" elaborated that there is little evidence that sunscreen decreases 25 (OH) D concentration when used in real-life settings. **Lois Y, Matsuoka MD** et. al. in their paper "Use of topical sunscreen for the evaluation of regional synthesis of vitamin D_3 " concluded that short term apply of sunscreen on whole body completely blocks the vitamin d response to UVB. **T. Passerson, R. Bouillom** (2019) et. al in their paper " Sunscreen photo protection and vitamin D status " suggested that sunscreen use for daily and recreational photo protection does not compromise vitamin D synthesis.

II. MATERIALS AND METHODS

We selected the female subjects from different clinics of medical practitioners and pathological labs who were between the age group of 15 to 30 years and on daily basis going out for educational or job purpose without using Naqab or Stall/Scraf or both. We considered only those subjects who were newly diagnosed and not started taking any form of supplement (Capsule/tablet or injection) of vitamin D. The subjects were given a questionnaire to procure information regarding use of sunscreen on daily

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basis or occasionally. Total 294 subjects were contacted out which 81 were excluded because they were not fulfilling the inclusion criteria. So total 213 patients could be contacted to ascertain the impact of sunscreen on biosynthesis of vitamin D.

III. RESULT

The study was designed to ascertain the impact of sunscreen on biosynthesis of vitamin D in newly diagnosed patients of hypovitaminosis D. It is likely to be considered that those subjects who were regularly using sunscreen SPF 15 and SPF 30 on exposed body parts to protect themselves from deterimrntal effects of sunlight on skin. Out of 213 subjects 159.

(74.64%, having vitamin level in serum within a range of 3.69 to 11.48 ng/ml) were regularly using sunscreen and only 54 (25.35% having a range between 9.27 to 18.93 ng/ml) patients were found as intermittent user. The regular users of sunscreen have taken lion's share and also having severe hypovitaminosis D (Vitamin D level in serum were found as low as 3.69 to 11.48 ng/ml) as compared with occasional users. Out of total number 62 were reported in age group of 15-20, 109 were reported in age group 20-25 whereas only 42 were reported in age group 25-30. The mean value of 25(OH)D in regular users of sunscreen was 5.62 ng/ml in serum whereas the mean value of occasional users of sunscreen was 14.48 ng/ml. The disparity between the value of 25(OH)D might be indicating that there is some association between use of sunscreen and level of vitamin D in circulating blood. The consolidated data having a mean value of serum vitamin D was 9.87 ng/ml which overtly throwing some hint that use of sunscreen may decreasing the biosynthesis of Vitamin D.

Outdoor duration in minute	Age 15 – 20 yrs	Age 20–25 yrs	Age 25-30 yrs	Mean Value of 25(OH)D In serum.
10-15	15	19	05	3.01 ng/ml
15-20	11	20	08	5.99 ng/ml
20-25	13	23	10	9.88 ng/ml
25-30	10	19	06	3.61 ng/ml
Total	49	81	29	5.62 ng/ml average value

Table 1: Showing number of different age group and their group mean value of vitamin D who were regular users of sunscreen.

Outdoor duration in minute	Age 15 – 20 yrs	Age 20–25 yrs	Age 25-30 yrs	Mean Value of 25(OH)D In serum.
10-15	02	11	03	8.98 ng/ml
15-20	04	08	02	15.41 ng/ml
20-25	06	07	05	14.45 ng/ml
25-30	01	02	03	19.11 ng/ml
Total	13	28	13	14.48 ng/ml average value

Table 2: Showing number of different age group and their group mean value of vitamin D who were occasional user of sunscreen.

Outdoor duration in minute	Age 15 – 20 yrs	Age 20–25 yrs	Age 25-30 yrs	Mean Value of 25(OH)D In serum.
10-15	15+02=17	19+11=30	05+03=08	11.99 ng/ml
15-20	11+04=15	20+08=28	08+02=10	5.99 ng/ml
20-25	13+06=19	23+07=30	10+05=15	10.16 ng/ml
25-30	10+01=11	19+02=21	06+03=09	11.36 ng/ml
Total	62	109	42	9.87 ng/ml average value

Table 3: Showing consolidated data of total number of different age group subjects and their mean value of vitamin D

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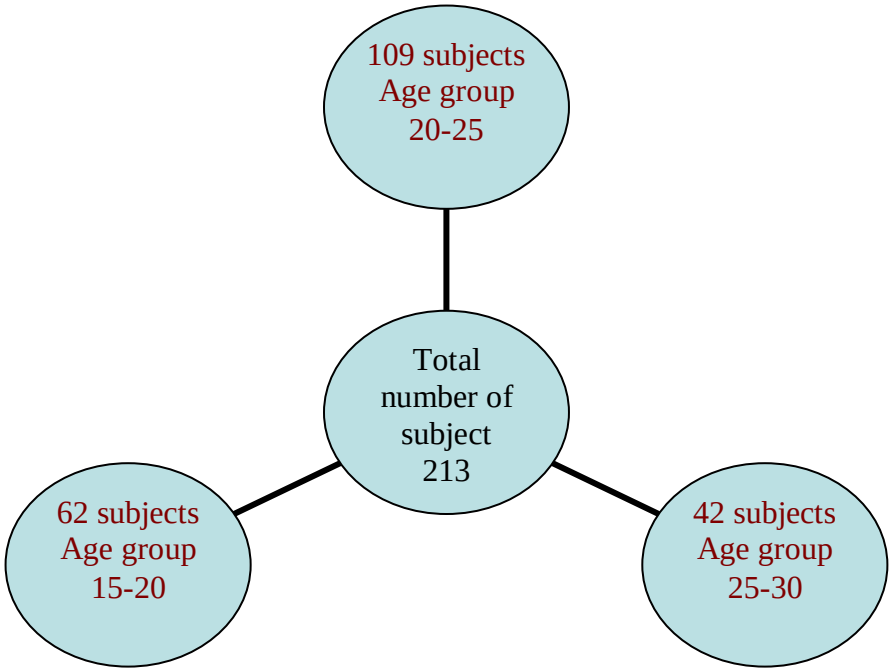

Fig. 1: Diagram showing total number of subjects and their distribution in different age group

IV. DISCUSSION

Sunlight being the major source of vitamin D synthesis in the skin may have some interfering effect by chemical sunscreen with SPF 15 and SPF 30 and its ingredients containing Avobenzone, Homosalate, Octocrylenen, Octinoxate, Octisalate and Oxybenzone etc. As per the paper of **Sayed Aliul Hasan Abdi** (2022) suggested that octocrylene one of the ingredient of sunscreen interact with vitamin D binding protein, the vitamin D receptor and enzyme CYP2R1, indicating high risk of vitamin D abnormalities. Although most of the papers are suggestive of very low or negligible effect of sunscreen on biosynthesis of vitamin D but present study and its finding signaling about some involvement of chemical sunscreen with biosynthesis of vitamin D.

V. CONCLUSION

Vitamin D is undoubtedly one of most important among other fat soluble vitamin that has been explored for its role in absorption of calcium and phosphorus. In recent time its action and participation in other physiological function has also became a area of research. Sunscreens having SPF 15 and SPF 30 may block UVB rays and reduce biosynthesis of Vitamin D. We could suggest from the result of this study that non vegetarian diets have some lead against Vegetarian Diets.

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