A PROSPECTIVE OUTPATIENT CASE CONTROL STUDY OF SERUM LIPID PROFILE IN ACNE VULGARIS PATIENTS- AN ORIGINAL RESEARCH ARTICLE

[1]Usha Kataria, [2]Yashdeep Malik, [3]Dinesh Chhillar , [4]Divya

[1]Associate Professor, [2]Senior Resident, [4]MBBS Student, Department of Dermatology, BPS Govt. Medical College for Women, Khanpur Kalan, Sonepat (Haryana), [3]Medical Officer, Sub-divisional Hospital, Gohana,Sonepat (Haryana).

ABSTRACT

BACKGROUND: Acne is one of the most common condition seeking dermatological consultation. The relationship between blood lipids and acne is not widely reported.

OBJECTIVE: To study the total serum lipid profile in acne patients and relation with acne grading in a rural background hospital.

DESIGN AND METHODS: A prospective case control study of Serum lipid profile in acne vulgaris patients in the outdoor department of dermatology in a tertiary care hospital from 1st March 2015 to 31st August 2015.

RESULTS: Out of 60 case study sample there were altered level of cholesterol in 11 patients, low level of HDL in 15 patients VLDL levels were normal in the great majority of patients.

CONCLUSIONS: Individuals with abnormal lipid profile have acne of different grades. The patients with grade-II and grade-III acne are more likely to have altered lipid profile and this must be taken into account for the treatment of the acne.

KEY-WORDS: Acne vulgaris; lipid profile; outpatient department; cholesterol;

INTRODUCTION:

Acne vulgaris (AV) is a chronic inflammatory disease of the pilosebaceous unit.[1] The pathogenesis of acne are currently attributed to multiple factors such as increased sebum production, alteration of the quality of sebum lipids, androgen activity, follicular hyperkeratinization and proliferation of Propionibacterium acnes.[2] It is characterized by open-closed comedones, papules, pustules and nodules. There is an alteration in serum lipid levels in acne patients. Human sebum is comprised mainly of triglycerides (TGs) (40-60%), wax esters (19-26%) and squalene (11-15%), with some cholesterol and cholesterol esters.[3] Increased sebum production and alteration of the quality of sebum lipids play a major role in acne pathogenesis.[4] Total cholesterol levels may affect the development of AV because both adrenal and gonadal androgens are

synthesized from cholesterol derived from the plasma.[5] Various studies had been done for hormonal etiology of acne.[6,7] Vergani C et al showed a significant reduction in HDL level in severe acne patients.[8] Literature on total serum lipid profile in acne patients is scanty. Acne is commonly classified by severity as mild, moderate or severe. Mild acne is classically defined as open (blackheads) and closed (whiteheads) comedones limited to face with occasional inflammatory lesions. Acne may be considered to be of moderate severity when a higher number of inflammatory papules and pustules occur on the face. Lastly, severe acne is said to occur when nodules and cysts are the characteristics facial lesions and involvement of the trunk is extensive.[9]

AIMS AND OBJECTIVES:

1. To study lipid profile alterations by determining the circulating levels of Total Cholesterol (TC), Triglycerides (TG), very low density lipoproteins (VLDL), and high density lipoproteins (HDL) in patients with acne vulgaris in comparison to healthy controls.
2. To study changes in individual lipid parameter in relation to grades of acne.

MATERIAL AND METHODS: -

A prospective case control study was carried out involving 60 patients of acne vulgaris and 60 age and sex matched healthy controls attending the outpatient department of dermatology of a rural background tertiary care hospital from 1st March 2015 to 31st August 2015. The study was approved by ICMR (reference Id-2015-02744) and IEC (BPSGMCW/RC94/IEC/15 dated 12 / 05 / 2015). All the patients were ruled out for any systemic or other dermatological ailment.

Inclusion Criteria:-

1. Age group of 15-45 years.
2. Acne vulgaris of any grade.

Exclusion Criteria: -

1. Obesity and hirsutism.
2. Pregnancy and lactation.
3. Oral contraceptive pills or any form of hormonal therapy.
4. History of cardiovascular disease.
5. Known history of lipid metabolic disorder or intake of drugs that affect lipid metabolism.

After taking written informed consent and counseling, their detailed clinical history and dietary history were taken. A thorough general physical examination, systemic examination and muco-cutaneous examinations were conducted and details of findings were recorded on a proforma. Acne vulgaris was graded using a simple grading system, which classifies acne vulgaris into four grades as follows.

Grade I: Comedones, occasional papules.

Grade II: Papules, comedones, few pustules.

Grade III: Predominant pustules, nodules, abscesses.

Grade IV: Mainly cysts, abscesses, widespread scarring.

Lab Investigations	**Reference Range**
1. S. Triglycerides	60 – 160 mg/dl
2. S. Cholesterol	150 – 220 mg/dl
3. S. HDL	25 – 40 mg/dl
4. S. LDL	less than 145 mg/dl
5. S. VLDL	30 – 52 mg/dl

6. FBS/RBS 60 – 110 mg/dl

Blood (2-3 ml) was collected by venipuncture from all participants after overnight fasting. The fasting status was verbally confirmed by subjects before the blood sampling. 2 ml of blood sample was collected and specimens were centrifuged for 15 min at 3,000 rpm and aliquots of plasma and serum samples for immediate biochemical analysis or storage at -80^0 C until analysis. Serum levels of lipid profile were measured by enzymatic methods using commercial kits from Roche diagnostics, Germany on Roche/Hitachi Modular P-800 analyzer. VLDL and LDL levels were calculated using Friedwald formula.

OBSERVATIONS AND RESULTS:

A total of 120 medical records of patients from BPS GMC were evaluated between the period of 1st march and 31st august of 2015. The case study sample was of 60 patients, age ranging from 15 to 45 years and 60 healthy controls of age and sex matched. The data were described in tables, with frequencies and measures of dispersion of lipids and the establishment of clinical indicators. Out of sixty patients as cases, six patients had grade -I (mild) acne; seventeen patients had grade-II (moderate) acne; twenty two patients suffered from grade-III (severe) acne and fifteen patient had grade-IV acne. **(Figure-1)** TC had a mean of 184.06 mg/dl **(Table 1),** with altered levels in 11 patients (17.2%): borderline high and high. The other patients 49 (81.67%) found themselves within the desirable range **(Table 2).** HDL mean was of 47.50 mg/dl **(Table 1)**, with low levels in 15 of the patients (25%) and normal levels in 45 patients (75%) **(Table 3).** VLDL levels were normal in the great majority of the 54 patients and were within the high range **(Table 4)** with a mean of 33.60. Finally, TG had a mean of 118.46 mg/dl **(Table 1)**, with 40 patients in optimal levels .Altered levels reached 33.34% of the patients: 10 were within borderline high range (16.67%), 10 (16.67%) were within high range and none of them were within very high range **(Table 5).**

When compared with the mean of the control group, there is a significant difference between cholesterol, TG, and VLDL of case and control with the mean of (184.06 and 167.41); (118.46 and 98.96); and (33.60 and 59.33) respectively. Whereas HDL mean of control (43.14) is less as compared to the mean of case (47.50). Correlations of the mean and the standard deviation lipid profile of case and control in the study of population was calculated. (**Table-6**)

DISCUSSION:

In the current study, the prevalence of dyslipidemia in the specified age group could be observed. Some parameters indicate a possible causal association between acne and dyslipidemia. The findings of our study show that acne patients have a correlation between altered lipid profiles as compared to non acne-patients. There is no specification of a particular sex in our study rather we have taken specific age group (15-45 years). In our study, lipid profile in acne patients showed an altered picture. The mean values for total cholesterol, triglycerides and VLDL showed a marked increase in acne patients. Arora et al performed a

study with 60 female patients who were divided into two groups, namely, acute acne vulgaris and control group. Patients with acne had higher levels (mean± standard deviation) of both TC (214.83±5.19 mg/dl) and LDL (161.3±3.08 mg/dl) when compared with control group, complying with the final results of this study.[5] However, low HDL was the most significant alteration (31.57±0.83 mg/dl), a fact that was not observed here.

Another study, including 166 patients with acne also had divergent results. When compared with the control group, no significant alterations in TC levels in patients with acne could be observed. Moreover, there was an expressive decrease in HDL levels and an increase in LDL levels. Regarding TG, no significant alterations in patients with acne were observed in this study or in the others found in the literature.[10]

Another study was done on 219 female patients of acne in Acne-in-Adult-Women Ambulatory Care Clinic with ages ranging from 21 to 61 years (mean of 32.23 years). The predominant clinical grade was papule-pustule acne (grade II) with 156 patients (71%). Regarding the lipid profile of the patients, there was a high increase in total cholesterol levels in 17.35% of the cases. High-density lipoprotein levels were low in 11.42% of the patients, with normal prevalence in 194 subjects. Low-density lipoprotein levels were normal in most patients (60.27%). Very-low-density lipoprotein values were normal in almost all patients (94.06%) and increased in only 13 patients (5.94%). Only 18 patients presented high levels of triglycerides (8.22%).[11]

CONCLUSION:

It can thus be concluded from our study that individuals with abnormal lipid profile tend to have acne of different grades; they tend to show a comparable study between groups of individuals with acne and without acne. It is also concluded that grades II and III acne are more likely to have total cholesterol and very low-density lipoprotein altered. Therefore the abnormal lipid profile may be considered as an etiological factor of acne and also reflects the severity of acne, so diet and drugs targeting abnormal lipid profile could be proved beneficial in acne management.

SUMMARY:

Studies have reported that both gender and abnormal lipid profile influence acne to occur amongst adolescents and young adults. However, much is known about the effect of gender on the association of altered lipid profile and acne amongst women. The current study was conducted to learn the relationship between dyslipidemia and acne in adolescents and young adults (15-45years) individuals so as to develop preventive strategies. A cross-sectional study was conducted on 60 patients of acne within the age group 15-45 years. Lipid profile was assessed in terms of levels of total cholesterol, TG, VLDL, and HDL. Increase in Serum levels of lipid profile, which were measured by enzymatic methods using commercial kits, were used to assess the severity of acne. Pearson's correlation coefficient was determined to find the association of lipid profile with acne between case and control group. Patients with grade II and III acne were found to be 39 out of 60. And also

patients with acne (case) have a significantly large altered lipid profile, especially total cholesterol and VLDL as compared to control. It could thus be concluded that abnormal lipid profile considered to be the etiological factor of acne of different grades.

CONFLICT OF INTEREST: None.
SOURCE OF FUNDING: Nil.

REFERENCES: -

1. Thiboutot D, Gollnick H, Bettoli V, Dréno B, Kang S, Leyden JJ, et al.New insights into the management of acne: An update from the Global Alliance to Improve Outcomes in Acne group. J Am Acad Dermatol 2009;60:S1-50.
2. Zouboulis CC. Acne and sebaceous gland function. Clin Dermatol 2004;22:360-6.
3. Cassidy DM, Lee CM, Laker MF, Kealey T. Lipogenesis in isolated human sebaceous glands. FEBS Lett 1986;200:173-6.
4. Katsuta Y, Iida T, Inomata S, Denda M. Unsaturated fatty acids induce calcium influx into keratinocytes and cause abnormal differentiation of epidermis. J Invest Dermatol 2005;124:1008-13.
5. Arora MK, Seth S, Dayal S. The relationship of lipid profile and menstrual cycle with acne vulgaris. Clin Biochem 2010;43:1415-20.
6. Thiboutot D. Hormones and acne: Pathophysiology, clinical evaluation, and therapies. Semin Cutan Med Surg 2001;20:144-53.
7. Placzek M, Arnold B, Schmidt H, Gaube S, Keller E, Plewig G, et al. Elevated 17-hydroxyprogesterone serum values in male patients with acne. J Am Acad Dermatol; 2005;53:955-8.
8. Vergani C et al. Low level of HDL in severe cystic acne.N.Engl.J Med 1986; 307:1151-2.
9. Kaminer MS. The many faces of acne.J Am Acad Dermatol.1995;32(3)s6-s14.
10. El-Akawi Z, Abdel-Latif N, Abdul-Razzak K, Al-Aboosi M. The relationship between blood lipids prolife and acne. *J Health Sci*. 2007;53(5): 596–9.
11. Cunha MGD, Batista ALF, Macedo MF et al. Study of lipid profile in adult women with acne. Clin Cosmet Investig Dermatol. 2015; 8: 449–54.

Figure-1:- Pie-chart shows the grading of acne. It is revealing that numbers of persons in grade 3 are more than other grade of acne.

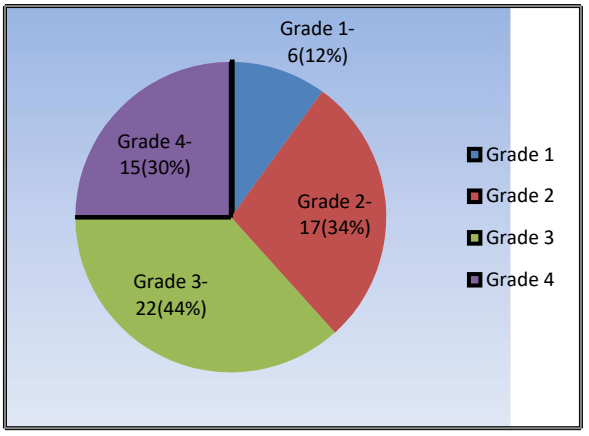

Table-1:- Table gives the mean and standard deviation of cholesterol, TG, HDL, VLDL (control) the p-value is <0.05 for cholesterol, TG, HDL, VLDL (control & Case) hence it is significant as significant value (For two tailed test) is 0.025, 0.049, 0.030, 0.006 i.e. < 0.05.

COMPARISON OF CONTROL & CASE GROUP

Lipid profile	Case (n=60) Mean±SD	Control (n=60) Mean±SD	p-value
Cholesterol	184.06±45.38	167.41±36.41	p<0.05
TG	118.46±51.01	98.96±56.04	p<0.05
HDL	47.50±9.30	43.14±11.92	p<0.05
VLDL	33.60±16.50	59.33±69.11	p<0.05

Table-2:- Total cholesterol profile.

Total Cholesterol Classificatio	Number of patients		% of patients	
	Case	control	Case	Control
Desirable (<200 mg/dL)	49	44	81.67	73.3
Borderline high (200–239 mg/dL)	4	16	6.67	26.6
High (>240 mg/dL)	7	0	11.66	0
Total*	**60**	**60**	**100**	**100**

Table 3: HDL profile.

Classification of HDL cholesterol	Number of patients		% of patients	
	Case	control	Case	Contro
Normal (>40 mg/dL)	45	20	75	33.3
Low (<40 mg/dL)	15	34	25	56.7
Total*	**60**	**60**	**100**	**100**

Table 4: VLDL profile.

Classification of VLDL cholesterol	Number of patients		% of patients	
	Case	control	Case	Control
Normal (<50 mg/dL)	54	45	90	75
Increased (>50 mg/dL)	6	5	10	25
Total	60	60	100	100

Table 5: Triglycerides profile.

Classification of Triglycerides	Number of patients		% of patients	
	Case	Control	Case	Control
Optimal (100 mg/dl)	40	39	66.67	50
Borderline high (130–159 mg/dl)	10	18	16.67	30
High (160–189 mg/dl)	10	7	16.66	11.6
Very high (>189 mg/dl)	0	4	0	6.6
Total	**60**	**60**	**100**	**100**

Table 6:- Showing auto correlations of mean and standard deviation lipid profile of case and control in the study of population.

Control variables		TG control	TG case	Cholesterol control	Cholesterol case	HDL control	HDL case	VLDL control	VLDL case
TG control	Pearson Correlation	1	-.252	.421**	-.043	-.034	.024	-.329*	-.085
	p-value		**.054**	**.001**	**.748**	**.803**	**.855**	**.011**	**.521**
	N	59	59	59	59	55	59	59	59
TG case	Pearson Correlation	-.252	1	.010	.187	.014	-.112	.080	-.007
	p-value	**.054**		**.940**	**.153**	**.919**	**.394**	**.544**	**.957**
	N	59	60	60	60	55	60	60	60
Cholesterol control	Pearson Correlation	.421**	.010	1	.076	.271*	-.208	.117	-.149
	p-value	**.001**	**.940**		**.563**	**.046**	**.112**	**.374**	**.257**
	N	59	60	60	60	55	60	60	60
Cholesterol case	Pearson Correlation	-.043	.187	.076	1	-.228	.016	.047	.302*
	p-value	**.748**	**.153**	**.563**		**.094**	**.903**	**.722**	**.019**
	N	59	60	60	60	55	60	60	60
Hdl control	Pearson Correlation	-.034	.014	.271*	-.228	1	-.282*	-.177	-.314*
	p-value	**.803**	**.919**	**.046**	**.094**		**.037**	**.197**	**.020**
	N	55	55	55	55	55	55	55	55
Hdl case	Pearson Correlation	.024	-.112	-.208	.016	-.282*	1	-.090	.024
	p-value	**.855**	**.394**	**.112**	**.903**	**.037**		**.492**	**.854**
	N	59	60	60	60	55	60	60	60
Vldl control	Pearson Correlation	-.329*	.080	.117	.047	-.177	-.090	1	-.098
	p-value	**.011**	**.544**	**.374**	**.722**	**.197**	**.492**		**.458**
	N	59	60	60	60	55	60	60	60
Vldl case	Pearson Correlation	-.085	-.007	-.149	.302*	-.314*	.024	-.098	1
	p-value	**.521**	**.957**	**.257**	**.019**	**.020**	**.854**	**.458**	
	N	59	60	60	60	55	60	60	60

****. Correlation is significant at the 0.01 level (2-tailed).**

***. Correlation is significant at the 0.05 level (2-tailed).**

TG=triglycerides; HDL= high density lipids; VLDL= very low density lipids