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CORRELATION OF GLYCEMIC INDEX AND SERUM INSULIN LIKE GROWTH FACTOR-I IN ACNE VULGARIS PATIENTS

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ABSTRACT

BACKGROUND: Acne vulgaris disease is often, recurrent inflammatory condition of the pilosebaceous unit. Diet has important role in acne pathogenesis, acne as a syndrome of insulin resistance, also predicting its severity is associated with higher value of the glycemic index (GI) and higher values of Insulin like Growth Factor-1 (IGF-1). **OBJECTIVES:** This study was done to determine glycemic index and serum IGF-1 levels in patients with acne and healthy controls and to associate them with acne disease and its severity. **MATERIAL AND METHOD:** 200 individuals (100 patients each of study and control group) were included. Clinical diagnosis of acne was made and assessment of severity was done with the help of Global Acne Grading System. A three day diet history was taken and GI was determined by dietary glycemic loads. Levels of IGF-1 was determined using the R&D Systems Human Insulin Growth Factor-1 ELISA kit. **RESULTS:**Comparison of GI and serum IGF-1 levels between cases and controls showed high significance. GI and IGF-1 across the spectrum of mild, moderate, and severe acne showed p-value to be highly significant between mild and severe acne (p=0.000). Thus showing more severe acne in patients taking high GI foods with increased serum IGF-1 levels. **CONCLUSION:** High GI food correlated with high serum IGF-1 levels, which further exacerbate acne. Therefore, diet and IGF-1 has shown to be important in pathogenesis of acne.

INTRODUCTION

Acne vulgaris disease is often, recurrent inflammatory condition of the pilosebaceous unit which is multifactorial and complex, including environmental, large sebum production by the sebaceous glands, occlusion of the follicles , hyper proliferation of Propionibacterium bacteria leads acne disease and inflammation. Diet in routine lifestyle may effect endocrine factors which is associated with acne.[1] Glycemic Index (GI) is a system of classifying the glycemic response of carbohydrates. High GI leads to acute hyperinsulinemia and is associated with increased androgen bioavailability and free concentrations of Insulin Like Growth Factor-I (IGF-I).[2]

MATERIAL AND METHODS

This cross-sectional study was done to explore the correlation of the severity of acne vulgaris with glycemic index and IGF-1 levels over a period of 18 months (January 2017 to June 2018) conducted in department of dermatology on OPD basis in a tertiary care centre.

After obtaining informed written consent from all the patients and controls, 200 individuals (100 each of study and control group) in between the age of 14 and 45 years with mild, moderate, severe and very severe acne without any systemic and skin disease and patients not on any oral or topical treatment for 6 months were included. Patients presently on oral and topical medications like antibiotics, benzoyl peroxide or retinoids, applying topical cosmetic products and history of any prior chronic illness or drug intake or metabolic/endocrine disorders like diabetes mellitus, hypo/hyperthyroidism were excluded.

The data were collected in a proforma which included demographic details, duration and severity of acne, systemic examination and GI. Clinical diagnosis of acne was made and assessment of severity was done with the help of Global Acne Grading System.[3] Distribution and intensity of pilosebaceous units were evaluated on total 6 localities (face / forehead, left and right cheeks, nose, chin, chest and upper back) and factor for forehead, left and right cheeks, nose, chin, chest

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and upper back is 2,2,2,1,1,3 respectively. Each type of lesion is given a score depending on severity:No lesions = 0, Comedones = 1, Papules = 2, Pustules = 3,Nodules = 4.The score for each area (Local score) was calculated by using this : Local score = Factor × Grade (0-4). The global score is the addition of local scores, and acne severity was graded using the global score. Severity was assessed on total score considered mild if score is in range of 1-18 ; moderate if score is in range of 19-30,;severe if score is in range of 31-38; and very severe if score is above 39.[3] To Calculate Dietary Glycemic Index; daily dietary GI for three separate days were calculated from diet proforma which was given by patients on dietary chart for three days from day of first visit. The dietary GI was calculated by the help of formula Σ(GI for food item × proportion of total carbohydrate contributed by food item) and the mean of three readings was taken. The Glycemic index values used had glucose as the reference food and were taken from reference tables [4] and from Glycemic index website of Sydney University. [5,6] To check IGF-1 Level blood sample was taken between 9 AM -11 AM to avoid any circadian variation in IGF-1 level.[7] To collect 2 ml of blood sample ethylene-diamine-tetra-acetic-acid (EDTA) tube was used. It was centrifuged for 15 minutes at 1000 rpm. Plasma samples were aliquot and stored at 2-8◦C. For IGF1 level estimation, the R&D Systems Human IGF1 enzyme-linked immunosorbent assay kit (Cat. DG 100) was used.[8]

Assessment and analysis

To analysis the values Statistical software, SPSS version 17.0 Trial was used. Cross-sectional statistics were used to show feature and characteristic of data. To check normality of data Kolmogorov-Smirnov test was applied. Mean IGF-1 levels and GI were compared between cases and controls by Mann Whitney U test or either students t test depending on parametric and nonparametric distribution. P value< 0.05 was considered significant.

RESULTS

100 patients with acne disease were included in the study for comparison of results with 100 age and sex matched healthy controls. The age of patients included in the study was in the range of 14 and 45 years. The mean age was 22.12±4.7 and 23.42±5.5 years of cases and control. There was insignificant difference in mean age in cases and controls (p= 0.074).There were 48% males in cases and 51% in controls and 52% females in cases and 49% in controls. No significant difference in frequencies of different gender was noticed in cases and controls (p= 0.389). (Table 1)

Assessment of severity of acne disease was done and we found 40 (40%) patients were classified as mild disease, 41 (41%) as moderate disease, 18 (18%) as severe disease and 1 (1%) as very severe disease. On comparison of GI between Cases and Controls mean GI was 141.15 in cases and 59.85 in control. Comparison of GI levels by Mann-Whitney test between cases and controls was significantly different with a highly significance (p <0.001) value (Table 2).

On comparison of GI Values with Acne Severity values of GI across the spectrum of mild, moderate and severe acne showing p-value to be highly significant between mild and severe (p <0.001) but not between moderate and severe acne. (Mean ranked 26.53 for mild, 55.49 for moderate, 89.69 for sever and 89.69 for very severe acne respectively).(Table 3)

On Comparison of IGF-1 between cases and controls the mean of IGF-1 was 146.98ng/ml in cases and 84.03ng/ml in control. Mann-Whitney test between cases and controls showed significantly different with a highly significant (p <0.001) value. (Table 4)

On Comparison of IGF- 1 (ng/ml) Values with Acne Severity values of IGF-1 across the spectrum of mild, moderate and severe acne showing p-value to be highly significant between mild and severe (p <0.001) but not between moderate and severe acne. (Mean ranked 98.11ng/ml for mild, 104.52ng/ml for moderate, 128.33ng/ml for severe and 140.00ng/ml for very severe acne respectively). (Table 5)

Correlation between Age, GAG, GI & IGF-1 (n = 100) ;We found non-significant correlations of age with all (GAG, IGF-1) except GI by Spearman Correlation. (Table 6)

DISCUSSION

Glycemic Index (GI - available dietary carbohydrate) of dietary food has been directly associated to insulin response and low GI diets have been shown to decrease IR.[9]

Acne pathophysiology is aggravated due to Hyperinsulinemia because of its association with increased bioavailability of androgen levels and free concentrations of insulin-like growth factor I (IGF-I).[5]

In present study, Glycemic Index (GI) mean rank levels were

Table 1. Distribution of Cases and Controls According to Different Age Groups

AgeGroup			CONTROL		*p* value
	Frequency	Percent	Frequency		
<15	4	4.0	4	4.0	0.422
15-25	75	75.0	67	67.0	
25-35	20	20.0	25	25.0	
35-45	1	1.0	4	4.0	
Mean±SD	22.12±4.7		23.42±5.5		0.074
Male	48	48.0	51	51.0	0.389
Female	52	52	49	49	
TOTAL	100	100.0	100		

Table 2. Comparison of Glycemic Index (GI) Between Cases and Controls Ranks

	Cases	N	Mean Rank	
Glycemic Index(GI)	Cases	100	141.15	14115.00
	Control	100	59.85	5985.00
	TOTAL	200		
			Glycemic Index	
Mann-Whitney U			935.000	
Wilcoxon W			5985.000	
Z			-9.944	
Asymp. Sig. (2-tailed)			0.001	

Table 3. Comparison of Glycemic Index (GI) by Severity

Global Acne Grading (GAG)		N	Mean	Test Statistic[a,b]	Glycemic Index
Glycemic Index (GI)	Mild	40	26.53	Chi-Square	64.487
	Moderate	41	55.49	df	3
	Severe	18	89.69	Asymp. Sig.	0.001
	Very Severe	1	99.50		
	TOTAL		100		
a. KruskalWallisTest b. Grouping Variable: severity					

Table 4. Comparison of IGF between Cases and Controls Ranks

	Cases	N	Mean Rank	
IGF -1 (ng/ml)	Case	100	146.98	14697.50
	Control	100	84.03	8402.50
	TOTAL	200		
			IGF -1 (ng/ml	
Mann-Whitney U			2352.500	
Wilcoxon W			8402.500	
Z			-6.470	
Asymp. Sig. (2-tailed)			0.001	

Table 5. Comparison of IGF 1 (ng/ml) Values with Acne Severity

Global Acne Grading		N		Test Statistic[a,b]	IGF 1 (ng/ml)
IGF -1 (ng/ml)	Mild	40	98.11	Chi-Square	58.144
	Moderate	41	104.52	df	3
	Severe	18	128.33	Asymp. Sig.	0.001
	Very Severe	1	140.00		
	TOTAL	100			
a. KruskalWallisTest b. Grouping Variable: severity					

significantly (p value 0.001) different between cases and controls. GI levels were also significantly associated with acne severity (p value 0.001) by Spearman correlation (mean ranked 26.53 for mild, 55.49 for moderate, 89.69 for severe and 99.50 for very severe acne respectively) which is concordant to the research done by Cerman AA et al [10] . Smith RN et al [7]

Table 6. shows significant correlations between GI and IGF-1 with GAG by Spearman Correlation

Spearman's rho		Age	Global Acne Grading	GI	
AGE	Correlation Coefficient	1.000	-0.090	-0.205**	-0.085
	Sig. (2-tailed)	.	0.376	0.004	0.234
GLOBAL ACNE GRADING	Correlation Coefficient	-0.090	1.000	0.798**	0.754**
	Sig. (2-tailed)	0.376	.	0.000	0.000
GI	Correlation Coefficient	-.205**	0.798**	1.000	0.643**
	Sig. (2-tailed)	0.004	0.000	.	0.000
IGF1 (ng/ml)	Correlation Coefficient	-0.085	0.754**	0.643**	1.000
	Sig. (2-tailed)	0.234	0.000	0.000	.
**. Correlation is significant at the 0.01 level (2-tailed).					

also found in acne disease and insulin sensitivity after a low glycemic load dietary meal and mean total lesion counts had decreased more (P=0.03) in the low-glycemic-load group (-23.5±3.9) than in the control group (-12.0±3.5) concordance to present study. Study done by Reynolds RC et al [11] agreed that diets differed significantly in GI but not in macronutrient distribution or fiber content and expressed that facial acne got better on both dietary meal (low GI −26 ± 6%, p = 0.0004 and high GI −16 ± 7%, p = 0.01), but difference between diets did not reach significance. Change in insulin sensitivity was not different between diets and did not correspond with change in acne disease severity (Pearson correlation r = −0.196, p = 0.244). Longer duration, greater reductions in glycemic load or/and weight loss may be mandatory to perceive significant improvements in acne disease.

In present study, IGF-1 levels were significantly associated with acne severity which is concordant to the research done by Saleh et al [12]. In present study, IGF-1 values correlated strongly with all the Age, GAG, and GI & IGF-1. Regarding the relationship of GI with age, GAG and IGF-1 were found to have significant Spearman Correlation. There was statistically insignificant correlation in of age with all (GAG, IGF-1) except GI which is inconcordance to study by Rahaman et al[13] and Wulan et al[14] where there was more value of IGF-1 levels in different grades of acne disease severity.

CONCLUSION

High GI food correlated with high serum IGF-1 levels, which further exacerbate acne. Therefore, diet and IGF-1 has shown to be important in pathogenesis of acne.

Declaration of patient consent: The authors certify that they have obtained written informed consent from all the patients. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understood that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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REFERENCES

1. Cordain L, Lindeberg S, Hurtado M, Hill K, Eaton SB, Brand-Miller J. Acne vulgaris: a disease of Western civilization. Arch Dermatol. 2002;138(12):1584–90.
2. CAMPBELL GG. The relation of sugar intolerance to certain diseases of the skin. Br J Dermatol. 1931;43(6):297–304.
3. Doshi A, Zaheer A, Stiller MJ. A comparison of current acne grading systems and proposal of a novel system. International journal of dermatology. 1997 Jun 1;36(6):416-8.
4. Belisario JC. Acne vulgaris: its aetiology and treatment. Australas J Dermatol. 1951;1(2):85–111.
5. Fulton JE, Plewig G, Kligman AM. Effect of chocolate on acne vulgaris. Jama. 1969;210(11):2071–4.
6. Cordain L. Implications for the role of diet in acne. In-Seminars in cutaneous medicine and surgery 2005 Jun 30 (Vol. 24, No. 2, pp. 84-91). WB Saunders.
7. Smith RN, Mann NJ, Braue A, Mäkeläinen H, Varigos GA et al. The effect of a high-protein, low glycemic–load diet versus a conventional, high glycemic–load diet on biochemical parameters associated with acne vulgaris: A randomized, investigator-masked, controlled trial. J Am Acad Dermatol. 2007;57(2):247–56.
8. Chew I, Brand JC, Thorburn AW, Truswell A. Application of glycemic index to mixed meals. Am J Clin Nutr. 1988;47(1):53–6.
9. Emiroğlu N, Cengiz FP, Kemeriz F. Insulin resistance in severe acne vulgaris. Advances in Dermatology and Allergology/Postępy Dermatologii i Alergologii. 2015 Aug;32(4):281.
10. Çerman AA, Aktaş E, Altunay IK, Arıcı JE, Tulunay A, Ozturk FY. Dietary glycemic factors, insulin resistance, and adiponectin levels in acne vulgaris. Journal of the American Academy of Dermatology. 2016 Jul 1;75(1):155-62.

11. Reynolds RC, Lee S, Choi JYJ, Atkinson FS, Stockmann KS, Petocz P, et al. Effect of the Glycemic Index of Carbohydrates on Acne vulgaris. Nutrients. 2010;2(10):1060–72.

12. Saleh BO. Role of growth hormone and insulin-like growth factor-I in hyperandrogenism and the severity of acne vulgaris in young males. Saudi medical journal. 2012 Nov 7;33(11):1196-200.

13. Rahaman SM, De D, Handa S, Pal A, Sachdeva N, Ghosh T, Kamboj P. Association of insulin-like growth factor (IGF)-1 gene polymorphisms with plasma levels of IGF-1 and acne severity. Journal of the American Academy of Dermatology. 2016 Oct 1;75(4):768-73.

14. Wulan IG, Hidayati AN, Sukanto H. Profile of Serum Insulin-like Growth Factor-1 Levels in Patients with Acne Vulgaris. Berkala Ilmu Kesehatan Kulit dan Kelamin. 2016 Oct 31;28(2):104-12

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