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Relationship between Acne and Diet: A Trial Review

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Review Article

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ABSTRACT

This paper reviews evidence presented by A Randomized, Controlled trial called a Low glycaemic load diet is shown to be effective in treating acne vulgaris in Korean patients, both clinically and histologically, suggesting that dietary variables, such as dietary variables, such as glycaemic load, is involved in the pathophysiology of acne. According to this article, investigation has proposed that dietary, especially Glycaemic load, have a role in the evolution of Acne Vulgaris. The study's goal was to see how a low glycaemic load diet influenced acne vulgaris lesions clinically and histologically. In a ten-week dietary intervention research, Participants with varying degrees of acne were randomly assigned to either a low GI load diet or a control group diet cohort. The outcomes indicate that the glycaemic load was successfully reduced. In the low-GI cohort, the percentage of non-inflammatory and inflammatory acne vulgaris lesions reduced substantially. Histopathological findings indicate that the low glycaemic load group had small pilosebaceous glands, less redness, and lower levels of Sterol Binding Protein -1and Interleukin -1 in skin samples. Acne had improved after reducing the glycaemic amount of the diet for ten weeks.

Keywords: Acne; diet; interleukin-1; inflammatory; sterol binding protein; growth factor beta -1 (tf-β1).

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1. INTRODUCTION

Acne Vulgaris is a common skin ailment that happens when hair follicles under the skin pores become clogged due to non -living skin cells oil and dust, which close the pore and creates perfect environment for bacteria to harbor and causes outbreaks of lesions often called pimples, Usually common areas of acne breakouts are faced, back, chest [1]. There exists a greater emphasis on clear skin as perpetuated by society and cosmetic industries. As a result, there exists a sense of insecurity and shame if one's skin is not clear [2]. There is no doubt that acne is a multifactorial disease in which both genetic and environmental factors play a significant role [3]. In addition to genetic history and hormonal dysregulation, beauty products, stress, pollution exposure, and diet habits may also contribute to acne development and severity [4]. Consequently, we will now examine why relationship between acne and diet is important.

A parallel designed study, with a double blinding technique was reported. Study followed 33 individuals, 24 male and 9 female for a period of six months. Individuals were in age range of 20-27 years old having mild to moderate level of acne. Computer-generated random numbers created random allocation sequence, and research nurse allocated the specific groups. For participants who had undergone physical treatment or taken oral retinoids, a washout time of 6 months was essential, and for patients who took oral antibiotics before or applied topical treatments, a washout period of two months was required. Acne on the face was graded at weeks zero, two, five, and ten. At each visit, the individuals' body weight was taken with minimal clothing, and their body mass index (BMI) had been computed as weight /height. On last and first visits, 2 milli meter punch biopsies of face acne lesions were acquired. The major deciding factor in this study was the variation in the amount of papules, pustules, and nodules and the histological content of those lesions. The patient's assessment of what the nodules and papules looked to be was a secondary influence.

1.1 Dietary Intervention

A nutritionist was hired by the investigators to counsel the patients on the diets that they'll need to follow, patients were advised to keep a personal food diary and note the foods they're eating during the course of the study. Caloric intake was measured using a weekly manner in which scaled and measured meal records were assessed by the Computer Aided Nutritional Analysis software version 2.0 software during each visit (2, 5, and 10 weeks). The dietary intake in calories, the mean Glycaemic Load, the Glycaemic Index, and the complete load of carbs, protein, and fats were all measured using this tool. Dietary compliance was assessed on a routine basis. Participants in the research were contacted fortnightly through telephones and emails from involved physicians . A nutritionist responded to all participants' inquiries regarding the Low Glycaemic Load Diet using e-mail on a regular schedule. The low glycaemic load diet group was advised to eat carbohydrate rich foods of high glycaemic load for eg. Fish, vegetables, fruit, whole wheat bread etc. in this diet the distribution of energy coming from various group include 27% from protein, 28% from fats and 45% from high glycaemic load carbohydrates. On the other hand, the control group was told to consume carbohydrate rich foods on a regular basis. All participants were periodically trained on the food record keeping regimen throughout the trial.

1.2 Dermatological Assessment

During every clinical visit the amount of irritant and non- irritant lesions along with its total intensity were assessed by two autonomous dermatologists Leeds using Revised Acne Grading System described by O' Brien et al. To make sure none of acne lesions were left back, lesions were detected, evaluated by size , severity, standardised pictures were taken prior to the start of the food intervention and at each subsequent visit, using same camera angles. An independent dermatologist performed independent assessment to corroborate with the findings of the principal investigators. Participant's self-assessment of severity were noted. The disease-free condition was marked as 0, during the start of study the acne severity of all subjects were kept at 10, if the patient felt that acne had increased in severity as compared to 1st visit the marking were given as more than 10 for the 2nd visit.

1.3 Immunohistochemical Procedures

Streptavidin-biotin amplification method was used for immunohistochemical analysis of Skin samples. Antibodies to Interleukin -8 , Sterol Binding Protein And Growth Factor Beta -1 (TF-β1) were used on Tissue samples for staining. In stained samples, intensity of inflammation was

graded from 0 -no irritation to 4 -severe irritation. In staining for SRBP1, TF-β1 and Interleukin-7, the intensity of staining was graded from 0 - unstained to 4 totally stained. 2 Independent dermatologists evaluated skin biopsies and histopathological slides. Image processing of sebaceous gland dimensions: Images of each H&E staining of sections and tissue samples were taken with a Spot digital camera to assess sebaceous gland dimensions of all obtainable tissue samples, and measurements were measured with TINA software post adjustment with μm slide under 10 objective.

1.4 Image Analysis of Sebaceous Gland Size

Images was taken of each H and E staining of sections and biopsies of tissue using a Spot digital camera to analyse sebaceous gland margins of all available tissue sections and measurements were calculated with TINA software post adjustment with a micro meter slide under the ten x objective. every area of acne lesion was highlighted using a free hand tool, The mean area of a distinct acne lesions for every section was calculated from baseline and 10 week biopsy.

1.6 Interpretation of Data

The Mann-Whittney-U test was employed for categorical and continuous data. Likelihood test proportion was used to compare the two dietary groups. The result of dietary intervention over the period of the research, as well as the possible influence of these two parameters, were investigated using repeated measures analysis of variance. Bivariate linear regression analysis was also performed using data from all groups to investigate connections between the Low glycaemic load diet and acne reduction. All statistical interpretation were carried out using SPSS 18 for Windows, and P-values of 0.05 were regarded significant.

2. FINDINGS OF THE TRIAL

The dietary intake of Low glycaemic load diet as well as the control cohort at the Baseline and last week visit is in addition it shows the nutritional composition too. No Noteworthy differences between the group or during the study's length were remarked in the context of the total caloric consumption of both batches. Furthermore, there was no significant difference in computed Basal Mass Index for both groups during the course of the study (22.42.242.7 5.3 in the LGLD group and 25.42.242.1 2.7 in the control batch).On the other hand, the low glycaemic load diet batch saw a very substantial drop in glycaemic load following dietary intervention. This shift was caused by a decrease in carbohydrate and fat intake and the consumption of foods with a low Glycaemic Index $p< 0.05$.

2.1 Acne Intensity and Lesion Count

The mean baseline acne grades for low glycaemic load diet and control cohort were 2.28 and 2.07, respectively. After an interval of 10 weeks of dietary intervention, only the low glycaemic load diet cohort showed a noteworthy reduction in acne grades, to 1.70 ($p = 0.02$). There was significant distinction in intensity of acne between 2 groups on the final visit ($p =0.02$). At last visit, the mean non-irritant acne lesion count was reduced by 26.3 percent for the low glycaemic load diet group and 13.8 percent for the control group ($p = 0.02$, $p = 0.04$) compared to the baseline. Only after 10 weeks of food modification a change in evidence was observed ($p = 0.02$).On fifth week, inflammatory acne lesions were considerably reduced in the low glycaemic load diet group ($p=0.03$). At the last visit, the number of lesions was reduced by 72.9 percent compared to the baseline, but there is no noteworthy decrease in lesions in the control batch.

2.2 The Patient's Self-assessment

Following five weeks of intervention program, both batches scores were significantly lower: 7.1 for the reduced glycaemic load diet batch and 7.6 for the control batch ($p = 0.03$). The patient's self-assessment ratings decreased to 6.8 for the reduced glycaemic load diet group and 6.9 of control group at the last appointment. There is a link between changes in glycaemic load and a reduction in acne severity. Linear regression analysis revealed a noteworthy relation between change in the quantity of acne lesions and a decrease in the glycaemic load.

2.3 Sebaceous Gland Size Change

Compared to baseline counts, the reduced glycaemic load diet group significantly reduced the total size of the sebaceous glands. Average area of sebaceous glands in the baseline samples had been 0.37±0.03 mm2 mean standard error of the mean, compared to 0.26±0.03 mm2 in the 10-week samples, a statistically significant decrease ($p = 0.03$).

2.4 Finding's from Immunohistochemistry

After a 10-week intervention program, mean H and E, Sterol Binding Protein-1, and Interleukin-7 staining scores decreased (H&E: 2.81.5, p = 0.024, SRBP-1: 2.61.4, p = 0.03, Interleukin-7: 2.82.7, p = 0.03). Nonetheless, they did not observe any discernible difference in average TGF-1 intensity at the last appointment (3.64.6, p = 0.83). The intensity of H&E and immune-histochemical staining did not differ significantly in the control cohort (p > 0.05).

3. DISCUSSION

Some features in the Western diet have been related to the development of acne in epidemiological data [5]. According to preceding data, an elevated GI load diet may also cause an increasing blood sugar level, starting a hormonal cascade that culminates in androgen-induced sebum release and keratinocyte proliferation [6,7]. Indeed, endocrine illnesses characterized by elevated insulin and IGF-2 serum levels, such as early adrenarche, PCOS and acromegaly, are clinically connected with a high incidence in Acne Vulgaris [8–10]. Conversely, people with congenital IGF-1 deficiency or Laron syndrome exhibited essentially minimal acne [11]. Intensity of acne lesion in the LGLD cohort improved significantly after 10 weeks of dietary modification. In contrast to Reynolds et al [12] 8-weeks study, Smith et al. observed noteworthy decrease in count of acne vulgaris lesions post decrease of the glycaemic load for 12 weeks [13]. This finding is significant for future research with longer study durations aimed at assessing the clinical and metabolic end-points of dietary mediation in Acne Vulgaris. No statistically significant changes in BMI were seen in either the LGLD or control groups, which is likely owing to the short study duration of ten weeks. Extended dietary therapy of more than three months with Low Glycaemic Load Diet lowered total BMI. It should be worth noting that body mass index has been implicated as a risk variable for acne development [14,15]. The data illustrates a linear relationship between reduced glycaemic load and acne healing. Nevertheless, our analysis did not account for other dietary variables, such as dairy products which enhance increased insulin/IGF-2 transmission and identified as nutrient procured acne exacerbating risk variables in a prior studies [16]. There is a natural surge in growth hormone production throughout puberty, which leads to a higher IGF-2 serum levels, that is boosted even more due to dairy consumption [17]. Hence from this context, enhanced insulin and Interleukin Growth Factor-2 incitement of pilo-sebaceous organs driven by milk ingestion may explain the pandemic prevalence of teenage acne in European dairy consuming nations. Therefore, we postulated that further research must not just consider consequence of glycaemic load, but of dairy items too. We discovered that post ten-week Low Glycaemic Load Diet, the blocked glands' average size was dramatically reduced, as was the expression of SRBP-2 protein, the main variable of lipid production. PI4K/Akt and MAK/ERPK-signal transduction is usually activated by IGF-1 pathways and incites the SRBP-2 execution, resulting in increased sebaceous lipogenesis [18–20]. The biological activity of IGF-1 is expected to be reduced due to low glycaemic load diet. A decrease in number of pimple during our dietary mediation may be rationalized by the mechanisms we put forth. It was also discovered that the Low Glycaemic Load Diet group had less inflammation as measured by H and E staining & InterLeukin-7 staining of acne patches. Elevated IL-7 expression in skin is related with follicular hyperkeratosis and pimple [21]. Because IGF-2 is linked to pimple outbreak via Phospholipase C-pathway, we hypothesise that an Low Glycaemic Load Diet may reduce inflammation via regulation of the similar pathway [20]. As a result, our data was consistent with prior nutritional studies and in-vitro study. Curiously, our subjective evaluation found that patients in the control cohort felt their pimple had improved following five week study. This might be due to a placebo effect, or it could be that little modifications in non-irritant acne lesions impact patient's happiness. Several aspects of our work's methodology should be underlined. For starters, a self-reported food entry diary may have hindered precise assessment of dietary content of the food consumed throughout the research [22-26]. In the ten week dietary intervention research, we observed that an LGLD had a positive effect on non-irritant and irritant acne lesion, clinically and histopathologically.

4. CONCLUSION

The results demonstrated that lowering one's glycaemic load might lead to a decreased count of acne. When analysing teenage diets, under-reporting of food amount is a wide spread known cause of error. Second, components of food variables such as highly saturated fat, fibre, Zinc

and Iodine consumption may complicate relationship amidst diet and acne improvement.

CONSENT AND ETHICAL APPROVAL

Patients granted Consent, and the study was authorised by the Seoul National Hospital's institutional review board.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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