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Correlation of acne with dairy products - Fact or a Misconception

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Abstract

Introduction: Nutrition and diet are affecting overall health. Acne is one of the most common dermatological conditions. Excess sebum, hormones, bacteria and hyper proliferation of follicular cells are the major etiologic factors for acne. Hormones sourced from and stimulated by dairy and high glycemic load foods, all appear to contribute to this overstimulation. Hence this study was done as currently the relationship of diet and acne is not clear.

Materials and Method: It is a cross sectional questionnaire based study. 200 Clinically diagnosed acne vulgaris patients between the age group of 15-30 years were enrolled for the study. Informed written consent was obtained from all patients. A detailed history and clinical examination was taken and all patients were asked to complete self-structured questionnaire based on diet & acne. Digital photograph and grading of acne using Michelson's acne severity index was done. All the statistical analyses were carried out using IBM SPSS Statistics software version 2015.

Results: Out of these 200 patients with positive correlation to diet in acne, 145(72.5%) were females & rest 55(27.5%) males. Dietary intake of the patients in this study included - Milk & milk products (60%), Chocolate (41%), Nuts (38%), Cakes/ biscuits (36%), followed by Oily food and Eggs. Among the 120 patients consuming milk products, 76% were on whole milk & 24% skim milk. Acne severity increases proportionately with the consumption of whole milk and mostly seen in patients consuming more than 14 servings of milk per week. Positive association of body weight and acne p=0.011. Mean age of the subjects was 26.15+/-2.5(years).

Conclusion: According to this study diet could play a role in pathogenesis of acne and high glycemic diet could aggravate acne. However, in addition to high glycemic diet, a positive association of acne with moderate-to-high intake of dairy products was also made. It was more in whole milk compared to patients on skim milk.

Keywords: Glycemic load, Diet, Dairy, Nutrition, Acne

Introduction

Although acne is not physically disabling, its psychological impact can be striking. Severe acne is associated with low self esteem, poor body image, social withdrawal, and depression.[(1)] Adolescent acne is typically the result of clogged, infected, pilosebaceous follicles. Adults may experience fewer comedones and more inflammatory lesions.[(2)]Acne may manifest in the form of non inflammatory comedones, superficial inflammatory lesions (papules, pustules), and/or deeper inflammatory lesions (nodules, cysts). Inflammatory lesion formation occurs most commonly when Propionibacterium acnes colonizes the pilosebaceous unit, triggering follicular rupture and a neutrophil cascade.[(3)] Rarely, acne may have nonbacterial causes.[(4)] Hormones may increase sebum production and cause follicular cells to hyperproliferate and block the follicular opening, forming a comedo.[(5)] Complete follicle blockage results in closed comedones (i.e. "whiteheads"), whereas incomplete blockage results in open comedones ("blackheads"). Comedo formation typically occurs over the course of 2–3 weeks. Hippocrates wrote: "Let food be your medicine, and let medicine be your food." The last decade has witnessed an enormous increase in public awareness of the cause-and-effect relationship between diet and health.[(6,7)] Acne is the most prevalent skin condition, affecting to some degree 85% of the population aged 11–30 years.[(8)] It is not a life-threatening condition; however, it lasts for years; it can cause scars and furthermore as Koo wrote: "It is important to look beyond the physical scarring, for there is no disease that has caused more insecurity and feelings of inferiority than acne".[(9)] Despite the high prevalence of acne vulgaris in adolescents the overall knowledge pertaining to the causes, natural course, and therapy was found in several studies to be very low.[(10,11,12)] Unfortunately though, convincing trials are lacking as it turns out that there are no meta-analyses, or well-designed scientific trials that follow evidence-based guidelines for providing solid proof in dealing with this issue.[(6,7)]

Aim and Objectives

1. To study the positive correlation between diet and acne & association of glycemic load diet with acne.
2. To study the association of acne with milk consumption.

Materials and Method

It is a cross sectional questionnaire based study. Two hundred clinically diagnosed acne vulgaris patients were included in the study. Age group of the patients enrolled were between 15 and 30 years. Informed written consent was obtained from all patients. A detailed history and clinical examination was taken and all patients were asked to complete self-structured questionnaire based on diet & acne. Clinical

digital photograph were taken. Acne lesions count and severity of acne were assessed using Michelson's acne severity index.

In Michelson's acne severity index, number of comedones, papules, pustules, infiltrated and cystic lesions are counted. Severity index is 0.5 for comedones, 1 for papules, 2 for pustules, 3 for infiltrated lesions and 4 for cystic lesions. Multiplying each type of lesion with its severity index and adding score together give the final score.[10]

BMI calculated as the formula = weight(kg)/ height (cm^2)

Inclusion criteria:

- Patients of the age group 15-30 years, clinically diagnosed as acne vulgaris.
- Patients with truncal acne were also included along with facial acne.

Exclusion criteria:

- Patients with nodulocystic acne were excluded
- Patients with comorbidities like hormonal imbalance, systemic illness were excluded
- Patients on medications for any underlying illness were excluded

Statistical analysis: All the statistical analyses were carried out using IBM SPSS Statistics software version 2015. Prevalence ratio was used to know the association of acne and milk intake. p value of less than 0.05 was considered to be significant. Mean and standard deviation was used.

Results

200 patients were enrolled in the study. Age group of the patients varied from 15-30 years. Among 200 patients, 145(72.5%) were females & 55(27.5%) males. Acne severity index of less than 20 had mean body mass index 23 (normal). Acne grading of 20-60 had BMI of 26 which was considered as overweight. Acne grading of the participants ranging from 60-80 had BMI of 33.5 which is categorized as obese. BMI 38 which is severely obese had acne severity index >80. (See Table 1)

Table 1: Association of acne severity index (Michelson's grading) with body mass index (kg/cm^2)

Acne severity index	Body mass index
< 20	23
20-60	26
60-80	33.5
>80	38

Mean age of the subjects was 26.15±2.5 (years)

Dietary intake of the patients in this study included - Milk & milk products in120 (60%) patients, Chocolate in 82 (41%) patients, Nuts 76 (38%), Cakes/ biscuits 72 (36%), followed by Oily food 69 (34.5%) and Eggs 54 (27%). (See Table 3 & Graph 1). Among the 120 patients consuming milk products, 76% were on whole milk & 24% skimmed milk.

Acne severity index were lowest in patients consuming milk < 4 servings / week (1 serving = 250ml) i.e patients had most commonly mild acne. Amount of intake of milk & milk containing beverages per day calculated as 250ml/ 1 serving. In patients consuming 4-7 glass per week, patients had mild to moderate acne. 40 patients belonged to the group consuming 7- 14 servings per week. Among these most of them belonged to moderate grade. Patients consuming more than 14 servings of milk per week had severe acne. (Table 2) Positive association of body weight and acne p=0.011. Prevalence ratio comparing acne prevalence at the highest (more than 14 glass of milk intake per week) to lowest (less than 4 servings of milk per week) intake categories were computed. Total milk intake was associated with severe acne (prevalence rate = 1.34, 95% confidence interval).

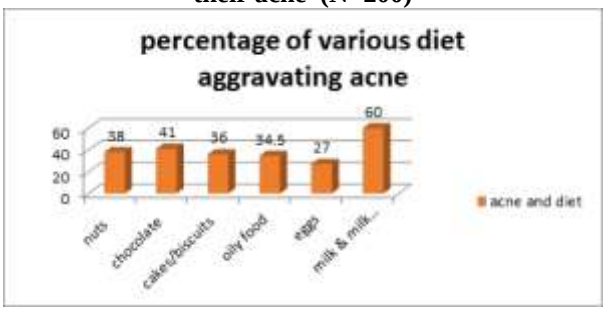
Table 2: Correlation of acne severity with intake of milk (1 Serving = 250ml)

Acne severity			Intake
Mild	Moderate	Severe	
10	10	25	>2 servings / day (n=45)
10	20	10	7-14 servings / week (n=40)
10	10	5	4-7 servings / week(n= 25)
5	3	2	< 4 servings / week(n=10)

Table 3: Percentage of various diet aggravating their acne (N=200)

Dietary items consumed	No. of participants	Percentage (in %)
Nuts	76	38
Chocolate	82	41
Cakes/ biscuits	72	36
Oily food	69	34.5
Eggs	54	27
Milk & milk products	120	60

Graph 1: Percentage of various diet aggravating their acne (N=200)



Discussion

In a study conducted prevalence of acne in two non- Westernized isolated populations: the Kitavan Islanders of Papua New Guinea and Ache hunter gatherers of Paraguay.[13] The diet of the Kitavan people as well as the Ache community includes mainly "traditional foods" composed of mainly locally cultivated foods. An analysis of 1,200 Kitavan subjects (including 300 aged 15–25 years) and 115 Acne subjects (including 15 aged 15–25) found not a single case of acne of any grade. The authors suggested that the absence of acne in non-Westernized societies is attributable to environmental factors, mainly local diets, which have a substantially lower glycemic index than a Western diet.

Studies done by Lovejoy JC, Roth J, it indicated that there is a link between dietary fat intake and insulin resistance.[14-17]

It is proposed that high glycemic indexes lead to hyperinsulinemia and a resulting cascade of endocrine consequences (increased androgens, increased insulin-like growth factor 1, altered retinoid signalling pathways), which mediate acne.[13,18]

It has been hypothesized that high-fat or high-carbohydrate foods may exacerbate acne by production of more comedogenic sebum— by increasing blood lipid levels or by producing "less fluid sebum"[19] and thence greater obstruction of pilosebaceous follicles, setting the stage for follicle rupture and secondary inflammatory changes.

Several human studies have also demonstrated that diet may change the amount and composition of excreted sebum, i.e., an increase in lipid secretion when either excess carbohydrates or fats were given.[20-23] An important study by Pappas et al.[24] showed that sebaceous glands can and do use fatty acids from the bloodstream for the synthesis of sebum.

The studies of acne and chocolate of Grant and Anderson[25] and Anderson[26] have considerable methodological shortcomings. They performed trials of chocolate, milk, and roasted nuts in university students and found no effect on acne. Whereas in our study out of 200, 41% were associated with acne aggravating on consumption of chocolate.

In 1949, Robinson reported 1,925 patients who kept food diaries and found that milk was the most common food implicated in acne flares,[27] like in our study wherein 60% (120) were positively correlated with acne severity.

A study by Adebamowo *CA*, was published which linked acne to the consumption of milk.[28]

A paper also supporting an association between milk consumption and acne was based upon the Nurses' Health Study II cohort.[29] The study revealed that intake of milk during adolescence was associated with history of teenage acne. This association was more marked for skimmed milk than for other forms of milk, suggesting that the finding is unlikely to be caused by the fat content of milk. The authors hypothesize that this association may be caused by the presence of hormones and bioactive molecules in milk. It was shown that acne in teenagers correlates with hormonal activity.[30] Milk contains placenta- derived progesterone and other dihydrotestosterone (DHT) precursors, including 5a-pregnanedione and 5a-androstanedione. These compounds are only a few enzymatic steps away from DHT, the main acne stimulator, and the enzymes required to mediate the change are present in the human pilobaceous unit.[31] In addition milk contains a multitude of growth-stimulating hormones.[32] The most likely of all candidates for co-stimulation with the steroid hormones of pilosebaceous function and dysfunction is insulin-like growth factor-1 (IGF-1), which is present in ordinary milk. IGF-1 stimulates the synthesis of androgens in the ovary, adrenals, and testicles.

Insulin itself and, even more so, IGF-1 have been demonstrated to stimulate hair follicle growth and sebocyte growth.[33,34] Accordingly, it was shown that the blood level of IGF-1 in pre-pubertal, pubertal, adolescent, and early adult humans resemble accurately the prevalence curve of acne in this population. Human and bovine IGF-1 share the same amino acid sequences and several milk proteins protect IGF-1 from digestion in the gut.[35] Therefore, it is likely that IGF-1 may mediate some of the effects of comedogenic factors, like androgens, growth hormone, and glucocorticoids.[36] An alternative hypothesis explaining the association between milk and acne suggested that the iodine content of milk might also be playing a role

in the development of the acne.[37] It was claimed that iodine intake could exacerbate acne.

In a study by Smith RN, they included that the improvement in acne and insulin sensitivity after a low-glycemic-load diet suggests that nutrition-related lifestyle factors may play a role in the pathogenesis of acne.[38]

Conclusion

According to this study diet could play a role in pathogenesis of acne and high glycemic diet could aggravate acne. However, in addition to high glycemic diet, a positive association of acne with moderate-to-high intake of dairy products was also made. It was more in whole milk compared to patients on skim milk. The hormonal effects of dietary components, such as glycemic index levels or fat or fibre intake, may mediate the effect of diet on acne risk. Acne severity increases proportionately with the consumption of whole milk and mostly seen in patients consuming more than 14 servings of milk per week.

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