Comparative study of dietary habits between acne patients and a healthy cohort

Sir,

Acne is the most common skin disease, affecting nearly 85% of the people at some time of their lives, being more frequent in adolescents.[1] Acne and diet have been historically associated, but this association is still very controversial.[1,2]

Population studies suggest a lower prevalence of acne in rural populations compared with western civilizations, and an increase in acne lesions when a western style of life is adopted.[1] In the last decades, a series of prospective controlled trials have supported the association between specific dietary elements and acne.[2] An association between cow milk ingestion and high glycemic index foods and increase in acne lesions has been noted; inversely, low glycemic index diet could be associated with a reduction in the number of acne lesions.[1]

An analytic study was made in our Department of Dermatology between November 2009 and April 2010 to evaluate dietary habits in acne patients compared with a healthy cohort to search for possible associations of certain food products with acne.

Every patient who consulted in our center with the diagnosis of acne vulgaris with age between 13 and 25 years was invited to participate in this study. Informed consent was signed.

A healthy cohort (control group) of 40 patients was recruited with age between 13 and 25 years. Sex, age and body mass index (BMI) were consigned. In the acne group, severity and extension of the disease, evolution time and treatment received were evaluated. We also recorded the presence of acne exacerbations attributed to stress, menstruation and specific foods, reported by patients with acne.

An alimentary survey was applied to every patient in both groups and included specific foods and its ingestion proportions in a normal week. Some of the surveyed foods were chocolates, carbonated drinks, juices, sweets, cakes, pies, junk food, milk and milk products, dried fruits, bread, white rice, potatoes, fish and shellfishes, fruits and vegetables.

Statistical analysis was made with the non-parametric Mann-Whitney test using STATA 10.0. Statistically significant results were considered when a *P*-value was ≤ 0.05.

A total of 40 patients were included in the acne group. Table 1 lists the patient's baseline characteristics. No statistically significant differences were found between both groups. Mean duration of acne in the participants was 2.7 years.

Seventy percent of acne patients noted an increase in acne lesions with stress, and 42% noticed an exacerbation with menstrual period.

In the acne group, 58% noticed an exacerbation with foods, particularly dairy, mayonnaise and butter in 30%, chocolate in 27% and nuts in 12.5%.

Comparing both groups' alimentary habits, the acne group referred greater ice cream ingestion (75% versus 47%, $P = 0.021$), juices with sugar (65% versus 35%,

Table 1: Basal characteristics of the study population

	Acne group (n = 40) (%)	Control group (n = 40) (%)	*P*
Mean age (years)	19	21	0.952
Sex (female)	27 (56)	21 (43)	0.127
Mean weight (kg)	63.6	62.1	0.566
Mean height (m)	1.69	1.68	0.579
Mean BMI (kg/m^2)	22.0	21.73	0.621
Smoking	8 (20)	7 (17.5)	0.781
Alcohol consumption	18 (45)	22 (55)	0.251
Physical activity	32 (80)	28 (70)	0.220
Acne characteristics			
Non-inflammatory	4 (10)		
Inflammatory	36 (90)		
Mild	14 (35)		
Moderate	11 (27.5)		
Severe	11 (27.5)		

BMI: Body mass index

$P = 0.007$), carbonated drinks (67% versus 47%, $P = 0.05$), milk (97% versus 82%, $P = 0.028$), bread (95% versus 72%, $P = 0.013$) and white rice (100% versus 90%, $P = 0.05$). Also, a lower consumption of fruits (85% versus 97.5%, $P = 0.05$) and vegetables (75% versus 97.5%, $P = 0.03\%$) were noted in the acne group.

Patient's perception of dietary factors causing or exacerbating acne is common.[3] As reported elsewhere, more than 50% of our patients noted a food-related exacerbation in this study with dairy products, mayonnaise, butter, chocolate and nuts.

Our results support what is already reported in the literature, namely a higher consumption of milk and high glycemic index foods (ice creams, juices with sugar, carbonated drinks, bread and white rice) in acne patients compared with healthy individuals. It is worth noting a lower fruit and vegetables consumption in the acne group compared to the control group, to which can be interpreted as a protective factor for acne development in this latter group. This latter association is not well documented in the literature,[4] but we believe this point is remarkable not only for acne prevention and treatment but also to stimulate healthy habits in adolescents and young adults.

High glycemic index foods lead to hyperglycemia, reactive hyperinsulinemia and a resulting increase in insulin like growth-factor 1 (IGF-1) formation, increased androgens and an altered retinoid signaling

Table 2: Review of studies evaluating acne and diet

Author	Characteristics	Main outcome
Tan *et al*.*	Patients complete a self-reported questionnaire	32% of the patients believe diet caused or influenced acne
Rigopoulos *et al*.†	Patients complete a self-reported questionnaire	62% of the patients believe diet caused or influenced acne
Suh *et al*.‡	Patients complete a self-reported questionnaire	Alcohol (50%) and chocolate (19%) were thought to trigger acne by patients
Law *et al*.§	Cross-sectional study from a traditional Chinese medicine approach (Yin and Yang)	They did not find any statistically associated food when the sample was analyzed as a homogeneous group The Yin group who consumed food from street stalls had less acne. The Yan group who consumed desserts and fresh fruit juices had more acne
Adebamowo *et al*.‖	Patients complete a self-reported questionnaire	Intake of milk and dairy products was associated retrospectively to teenage acne
Adebamowo *et al*.**	Prospective cohort study	Consumption of skim milk was associated to acne development
Smith *et al*.††	A prospective, randomized trial comparing low glycemic-load diet with a conventional high glycemic-load diet	A reduction in the total and inflammatory number of acne lesions were found in the low glycemic-load group
Smith *et al*.‡‡	A prospective, randomized trial comparing low glycemic-load diet with a conventional high glycemic-load diet	In the low glycemic-load group, acne lesions reduced in 56% compared with a 38% reduction in the high glycemic-load diet. Patients also reported a decrease in skin oiliness
Costa *et al*.§§	A prospective, controlled trial in which patients' diet was supplemented with 3 daily grams of omega-3 fatty acids for 3 months	No improvement in acne. There was a quantitative reduction of the size of sebaceous glands in skin biopsy
Michaëlsson *et al*.‖‖	A randomized controlled trial to evaluate the effects of zinc and in combination with vitamin A and a placebo group	The zinc group decreased acne severity in 85%, similar to the zinc plus vitamin A group
Fulton *et al*.***	Crossover study evaluating consumption of chocolate bars versus placebo bars for 4 weeks	No differences were found between both groups

*Tan JK, Vasey K, Fung KY. Beliefs and perceptions of patients with acne. J Am Acad Dermatol 2001;44:439-45, †Rigopoulos D, Gregoriou S, Ifandi A, Efstathiou G, Georgala S, Chalkias J, *et al*. Coping with acne: beliefs and perceptions in a sample of secondary school Greek pupils. J Eur Acad Dermatol Venereol 2007;21:806-10, ‡Suh DH, Kim BY, Min SU, Lee DH, Yoon MY, Kim NI, *et al*. A multicenter epidemiological study of acne vulgaris in Korea. Int J Dermatol 2011;50:673-81, §Law MP, Chuh AA, Molinari N, Lee A. An investigation of the association between diet and occurrence of acne: a rational approach from a traditional Chinese medicine perspective. Clin Exp Dermatol 2010;35:31-5, ‖Adebamowo CA, Spiegelman D, Danby FW, Frazier AL, Willett WC, Holmes MD. High school dietary dairy intake and teenage acne. J Am Acad Dermatol 2005;52:207-14, **Adebamowo CA, Spiegelman D, Berkey CS, Danby FW, Rockett HH, Colditz GA, *et al*. Milk consumption and acne in teenaged boys. J Am Acad Dermatol 2008;58:787-93, ††Smith RN, Mann NJ, Braue A, Mäkeläinen H, Varigos GA. The effect of 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;57:247-56, ‡‡Smith RN, Braue A, Varigos GA, Mann NJ. The effect of low glycemic load diet on acne vulgaris and the fatty acid composition of skin surface triglycerides. J Dermatol Sci 2008;50:41-52, §§Costa A, Alchorne MM, Michalany NS, Lima, HC. Acne vulgaris: a pilot study to assess an oral treatment with essential fatty acids using clinical, digital, and pathological analyses. An Bras Dermatol 2007;82:129-34, ‖‖Michaëlsson G, Juhlin L, Vahlquist A. Effects of oral zinc and vitamin A in acne. Arch Dermatol 1977;113:31-6, ***Fulton JE Jr, Plewig G, Kligman AM. Effect of chocolate on acne vulgaris. JAMA 1969;210:2071-4

pathway related to acne.[5] A low glycemic index diet decreases IGF-1 levels and improves acne.[1] Dairy products contains placenta-derived progesterone and dihydrotestosterone (DHT) precursors, including 5α-androstanedione and 5α-pregnanedione. Other compounds of milk are growth stimulating hormones and IGF-1, among others.[6] Milk increases IGF-1 levels by 10–20% in adults and 20–30% in children.[6]

The important proportion of patients with acne who relate stress and menstrual period to exacerbations is also remarkable, considering the role of hormones in acne.[4] Significant changes in follicular duct and even duct orifice blockages occur during menstrual period.[4]

Our study confirms what is published elsewhere [Table 2], indirectly evidencing that alimentary habits may influence acne apparition and exacerbations. We propose patient education and counseling about the ingestion of these probably related foods as part of acne treatment. We also encourage patients to increase fruits and vegetables consumption.

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