The Influence of Dietary Habits on Acne

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Abstract: According to data of foreign authors, the risk of development and severity of course of acne may be aggravated by the consumption of milk and dairy products, high-carbon or rich in hidden fats diet etc. The purpose of this study is to detect the influence of national eating preferences upon the development of acne of young people and to identify the pathogenetic importance of milk and dairy products for such patients. A case-control study was conducted with the participation of 523 students. Respondents were offered to fill in specially developed questionnaires–inquirers for establishing the dietary habits of the students or their eating preferences such as frequency of consumption of milk and dairy products, high-carbon food, chocolate, carbonated beverages. It was detected that the high-carbon diet increases the risk of acne occurrence; consumption of high-carbon food in the group of persons with skin pathology made up 67.7%, while in the group without acne it was 32.6%. Among the persons with the highest level of consumption of milk and dairy products the risk of acne development is significantly higher than among those persons, who consume such products significantly less frequently.

Key words: Acne · Diet · Dietary habits · High-carbon diet · Milk · Chocolate

INTRODUCTION

In modern medicine, the question of relations between nutrition and health of population remains one of the topical issues. Improper diet definitely exerts influence upon the main figures of morbidity and mortality while certain ethnic and geographical regularities of nutrition determine the factors of the risk of development of a number of serious diseases of modern society.

Acne is a chronic multifactorial disease of sebaceous-hair follicle of skin based on 4 pathogenetic mechanisms: hyperproduction and imbalance of sebum lipids; hyperkeratosis sebaceous gland ducts; activation of bacterial flora on the skin surface; development of inflammation. According to data of numerous studies, the prevalence of acne of young people reaches up to 85-90%, while among adults - 5% of women and 1% of men. The topicality of study of this problem is grounded not only by tendency of acne to the chronic recurrent course, high prevalence and resistance to conducted treatment, but also by formation of stable psychoemotional disorders, social and occupational disadaptation [1-3].

It is known that the skin is the main element of metabolism of sex steroid hormones and the "targets" of their actions are - epidermis, hair follicles, sebaceous glands and fibroblasts. Overproduction of sebum can arise against functional or organic endocrine disorders [4-6]. Changes in functional activity of the endocrine system of adolescents in different stages of puberty have their own characteristics: at each stage there is a series connection and functioning of the endocrine glands, hormones and bioactive substances. In addition, the there is a change in mechanisms of the central regulation of the hypothalamic-pituitary axis, which also affects the secretion of sex steroid hormones.

During prolonged overproduction of sebum compensatory hyperkeratosis in the hair follicle is gradually developing, resulting in violation of the outflow of secretion and its accumulation in the crater of the sebaceous glands. Prolonged accumulation of secretions and its pressure on the clogged funnel follicle leads to the formation of cystic cavity and to the appearance of clinical symptoms of the disease - closed comedones [7].

An important aspect is the participation of Propionibacterium acne in the development of phlogosis around the sebaceous glands [8-11]: there is a synthesis of chemoattractants at early stages, lipases, prostaglandin substances, etc., which leads directly to a decrease in resistance and damage to the wall of the follicle.

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Thereafter, the activation of the complement system begins. In response, the taxis neutrophils focus and synthesis of antibodies occur, that causes phlogosis and more damage to the follicle epithelium.

The role of nutrition in pathogenesis of acne is evaluated by various specialists in different ways. However, according to data of foreign colleagues, the risk of development and severity of course of acne may be aggravated by the consumption of milk and dairy products, high-carbon or rich in hidden fats diet etc. [12-16]. According to data of the Nation-wide study of the condition of people nutrition in Kazakhstan, (WHO European Bureau and UNDP Project, 1996), the dietary habit of population of the Republic of Kazakhstan is the increased share of consumption of bakery and macaroni foods, meat of various kind, whole milk, kefir, koumiss, animal fat, sugar and tea in their diet [17]. Considering those dietary habits of Kazakhstani people it is necessary to identify their pathogenetic importance in the development t of acne of young people.

The purpose of the study is to detect the influence of national eating preferences upon the development of acne of young people and to prove the pathogenetic importance of milk and dairy products for patients suffering from acne.

MATERIALS AND METHODS

A case-control study was conducted with the participation of the first and second year students of JSC "Astana Medical University", Astana, Republic of Kazakhstan. Respondents were offered to fill in specially developed questionnaires–inquirers, consisting of two subject parts. The first part of the questionnaire was to detect the presence of acne (a criterion of positive answer was the presence of even single inflammatory papulopustule elements and non-inflammatory elements), their localization, concurrent pathology as well as the grade of severity of acne. The examined patients were offered to make their own evaluation of the severity of the course of disease on the basis of three-stage scale adopted by the International Alliance of acne treatment (2009): easy - to 20 papulopustule elements, the average - from 20 to 40, may be single units, the heavy - more than 40 papulopustule elements and / or conglobata elements. The second part of the questionnaire was intended to establish the dietary habits of the students or their eating preferences such as frequency of consumption of milk and dairy products, high-carbon food, chocolate, carbonated beverages.

Statistical significance of figures was calculated using Student's criterion.

In order to evaluate the character and strength of link between the development of acne and consumption of milk and dairy products a coefficient was calculated using rank correlation method (Speerman). For this purpose, acne disease was marked as four ranks: 0 – absence; 1 – light grade of severity; 2 – moderate grade; 3 – severe grade. The ranks of consumption of milk and/or dairy products were the following: 0 – does not take; 1 – less than 1 time a week; 2 – 1 time a week; 3 – 2-3 times a week; 4 – more than 3 times a week; 5 – every day.

In order to study the cause-and-effect relationship between the frequency of consumption of dairy products and the development and progression of acne disease we used variance analysis of single-factors uneven complexes. The frequency of consumption of dairy products was taken as regulated (organized) factors and the grade of severity of acne disease or its absence was taken as effective characteristic.

RESULTS

523 students aged 17 - 18 of the first and second year of JSC "Astana Medical University" participated in the questionnaire poll, including 403 girls (77.1%) and 120 boys (22.9%). In the course of the study it was established that the prevalence of acne among the examined persons was 82.4% (431 from 523). At the same time, there was no material gender difference detected: among girls the prevalence of acne was 80.9% while among the boys it was 87.5% (p>0.05). According to this characteristic, all respondents were divided into two groups: A group (persons with acne) – 431 persons and B group (persons without acne) – 92 persons.

In A group, acne elements were mainly located on the face skin (377 patients with acne, i.e. 87.5%) and on the back (134, i.e. 31.1%) and only 41 persons (9.5%) had acne on the chest skin. 318 examined persons (73.8%) evaluated themselves the grade of severity of acne disease as light one and 98 persons (22.7%) and 12 persons (3.5%) as moderate and severe respectively.

As regards the concurrent pathology in the examined group, the first place is occupied by digestive diseases – 31.4% (A group– 34.3%, B group – 17.4%), then anaemia (19.7%; A group – 19.3%, B group – 21.7%), endocrine pathology (8.0; A group – 5.4%, B group – 8.5%), other skin diseases (6.5%; A group – 6%, B group – 8.7%), hepatitises (2.6%; A group – 2.6%, B group – 0%) (Table 1).

Table 1: Prevalence of concurrent pathology among the examined persons, abs. (%)

Item No.	Concurrent pathology	Total number (n=523)	A group (n=431)	B group (n=92)
1	Digestive diseases	164 (31.4%)	148 (34.3%)	16 (17.4%)
2	Anaemia	103 (19.7%)	83 (19.3%)	20 (21.7%)
3	Endocrinopathy	42 (8%)	37 (8.5%)	5 (5.4%)
4	Dermopathy	34 (6.5%)	26 (6%)	8 (8.7%)
5	Hepatitises	11 (2.6%)	11 (2.6%)	0 (0%)

Table 2: Food type preferences

Item No.	Food type preferences	A group (n=431)	B group (n=92)
1	High-carbon food	292 (67.7%)	30 (32.6%)
2	Protein food	180 (41.8%)	49 (53.3%)
3	Spicy food	118 (27.4%)	25 (27.2%)
4	Salty food	80 (18.6%)	17 (18.5%)
5	Fatty food	56 (13%)	9 (9.8%)
6	Lenten food	15 (3.5%)	5 (5.4%)
7	Vegetarian food	15 (3.5%)	1(1.1%)

Table 3: Frequency of consumption of milk and dairy products

Item No.	Frequency of milk consumption	A group (n=431)	B group (n=92)
1	Every day	244 (56.6%)	10 (10.9%)
2	More than 3 times a week	96 (22.3%)	20 (21.7%)
3	2-3 times a week	33 (7.7%)	31 (33.7%)
4	1 time a week	28 (6.5%)	17 (18.5%)
5	Less than 1 time a week	18 (4.2%)	9 (9.8%)
6	Do not consume	12 (2.8%)	5 (5.4%)

Table 4: Frequency of consumption of tee with milk

Item No.	Frequency of consumption of tee with milk	A group (n=431)	B group (n=92)
1	Every day	187 (43.4%)	7 (7.6%)
2	More than 3 times a week	101 (23.4%)	9 (9.8%)
3	2-3 times a week	54 (12.5%)	10 (10.9%)
4	1 time a week	36 (8.4%)	14 (15.2%)
5	Less than 1 time a week	28 (6.5%)	22 (23.9%)
6	Do not consume	25 (5.8%)	30 (32.6%)

Menstrual cycle disorder among the examined was registered with 146 (36.2%) girls: in A group – 138 (42.4%), in B group B – 13 (17.4%).

It was established that respondents from A group gave preference to high-carbon (292- 67.7%), protein (180- 41.8%), spicy (118- 27.4%), salty (80-18.6%), fatty (56-13%), lenten (15-3.5%), vegetarian (15-3.5%) food. In B group B 49 (53.3%) respondents gave preference to protein food, 25 (27.2%) – spicy, 30 - (32.6%) high-carbon, 17 (18.5%) – salty, 9 (9.8%) - fatty, 5 (5.4%) -lenten, 1 (1.1%) – vegetarian food (Table 2).

56.6% pollees with acne took milk and dairy products every day and 22.3% more than three times a week (as against 10.9% and 21.7% among the persons without acne manifestation, respectively). At the same time, 33.7% of students without skin changes took milk and dairy products 1 time a week and 18.5% - 2-3 times a week (among the persons with acne 6.5% and 7.7% respectively) (Table 3).

Frequency of consumption of tee with milk in the two groups is presented in Table 4:

Determination of regularity between the development of acne and the category of milk consumed demonstrated that the examined persons with acne gave preference to whole types of milk in 59% of cases (in the second group – 14.3%) and in B group B 66% of examined persons consume milk with low fat content.

As regards the consumption of chocolate and carbonated beverages, no material differences were determined among the two groups (Tables 5,6).

Table 5: Frequency of consumption of chocolate

Item No.	Frequency of consumption of chocolate	A group (n=431)	B group (n=92)
1	Every day	115 (26.8%)	19 (20.7%)
2	More than 3 times a week	70 (16.2%)	13 (14.1%)
3	2-3 times a week	100 (23.2%)	17 (18.5%)
4	1 time a week	54 (12.5%)	12 (13.0%)
5	Less than 1 time a week	38 (8.8%)	14 (15.2%)
6	Do not consume	54 (12.5%)	17 (18.5%)

Table 6: Frequency of consumption of carbonated beverages

Item No.	Frequency of consumption of carbonated beverages	A group (n=431)	B group (n=92)
1	Every day	69 (16.0%)	14 (15.2%)
2	More than 3 times a week	92 (21.3%)	15 (16.3%)
3	2-3 times a week	77 (17.9%)	24 (26.1%)
4	1 time a week	131 (30.4%)	18 (19.6%)
5	Less than 1 time a week	46 (10.7%)	17 (18.5%)
6	Do not consume	16 (3.7%)	4 (4.3%)

Table 7: Results of the analysis of variance

Variations	Degree of freedom	Sum of squares	Variances (S^2)	Ff	Fst 5%	Fst 1%
According to A factor	3	25.15	8.38	8.46	2.8	4.2
Residual	57	56.6	0.99			
Total	60	81.75	-			

At the same time, the effect (η^2) makes up 0.69 or 69%.

In order to determine the pathogenetic importance of consumption of milk and dairy products in the development of acne 90 questionnaires of respondents from the total group were selected using random sampling method.

It was established that 93% of examined persons, who consume dairy products every day, suffer from acne; most often of moderate grade of severity – 79%. Almost 1.5 times less frequently (65%) it was registered with young people, who consume dairy products no more than one time a week.

It should be noted that persons, who do not consume dairy products at all, may also suffer from acne. Particularly, this group includes patients with severe form of acne disease, who deliberately refuse dairy food being aware of adverse consequences of the course of pathology.

Using the correlation analysis method it was established that there is a strong direct correlation between the frequency of consumption of milk and dairy products and the occurrence and the grade of severity of acne disease ($\rho = 0.97$).

The analysis of variance was performed, which demonstrated the said direct relation (Table 7).

DISCUSSION

According to data of the case-control study performed, the prevalence of acne among the second year students of JSC "Astana Medical University" aged 17-18 years makes up 82.4% (431 from 523). At the same time, there was no material gender difference detected: among girls the prevalence of acne was 80.9% while among the boys it was 87.5%.

The disease is mainly of light grade of severity (73.8%); it is usually located on the skin of face (87.5%) and back (31.1%).

It was established that in the group of examined persons with acne digestive diseases occur reliably more frequently as against the group of persons without this pathology (34.3% as against 17.4%; p<0.001); persons with menstrual cycle disorders significantly prevail among the girls with skin manifestations (42.4% as against 17.4%; p< 0.001).

It was detected that the high-carbon diet increases the risk of acne occurrence; consumption of high-carbon food in the group of persons with skin pathology made up 67.7%, while in the group without acne it was 32.6% (p<0.001).

Among the persons with the highest level of consumption of milk and dairy products (every day, more than three times a day) the risk of acne development is significantly higher than among those persons, who consume such products significantly less frequently (p<0.001).

There is a strong direct correlation between the frequency of consumption of dairy products and the risk of occurrence and progression of acne disease.

The pathogenetic influence of dairy products in case of acne disease was proved; the effect is 0.69 or 69%.

No relation between the occurrence of acne and the consumption of chocolate and carbonated beverages between the two groups was established.

Thus, the study performed proves the dependence of acne development of young person's on food nature, particularly the consumption of high-carbon food, milk and dairy products.

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