Effect of Milk and Dairy Products upon Severity of Acne for Young People

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Abstract: According to data of foreign authors, one of the controversial factors in the pathogenesis of acne in teenagers is the eating of fat, normal and low-fat milk and dairy products with prepared from skimmed milk. It is known that the basis of nutrition of the Kazakh people is products of animal origin, among which there are about 260 kinds of dairy products. This led to the goal of the study on the influence of milk and milk products in the severity of acne in young people. Material and Methods: cross-sectional study of 182 respondents using a specially designed questionnaire. The participants were divided into two matched groups; the only difference was the presence / absence of acne elements. Results: The risk of acne occurrence is significantly higherfor people with the highest milk and dairy product consumption level than for people who consume such products much less often. There is a strong reliable correlation between milk and dairy product consumption frequency and the risk of acne occurrence and development. Pathogenetic influence of milk and dairy products upon acne is proved. The power of influence is 0.22 (22%) for females and 0.13 (13%) for males.

Key words: Acne · Pathogenesis · Diet · Nutritional habits · Milk and dairy products

INTRODUCTION

A diet plays a great role in many skin diseases, but dermatologists often have problems when it comes to dietary recommendations for a specific patient [1, 2].

Nowadays, one of the most discussed matters related to acne aetiopathogenesis is the role of alimentary factors, specifically national nutritional habits in various regions and the role of a diet [3-5]. A great number of works was published in the last few decades, devoted to connection between acne and consuming certain types of food [6, 7]. However, existing data are rather contradictory, are often too descriptive, are not always organized in the proper way and are rarely based on evidentiary medicine.

In 2007, V. Treolar [8] claimed that effectiveness of diet therapy for acne treatment had been neither proved nor overturned. Most of other authors have the same opinion [9-11].

According to N. Qureshi and E.J. Lowenstein [12] (2011), researchers will have to finally prove cause-and-effect relationship between diet and acne, which exists according to traditional general opinion.

According to academic T.S. Sharmanov, WHO data proves that 60% of all deaths are this or that way related to certain preventable types of malnutrition and development of non-infectious diseases [13-15].

Thus, in our opinion, the main reason why there are not scientific recommendations for development of specific medical diets for acne patients is the fact that there are no studies proving effect of alimentary factors upon the course of acne disease.

The main concept of clinical epidemiology is the following: each clinical solution must be based on scientifically proved facts, which is "evidence-based medicine".

According to certain researchers, the role of diet in acne genesis takes the third position after androgenic hormones and genetic reasons [16].

Up to 1960ies, there was an opinion that certain types of food increase the risk of acne occurrence and its severity. However, further studies did not produce convincing evidence on this matter. In the last 10-15 years researchers got interested in the discussed matter again, as dermatologists cannot deny pathogenetic connection between nutrition and acne any more.

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The acne triggering factor being discussed is the alimentary factor: dietary preferences or national nutritional peculiarities of patients. A great number of works was published in the second half of the 20th century, trying to prove or overturn such relationship. However, all the previous studies were observations of separate specialists, based only on subjective feelings of patients as to relationship between acne and nutritional habits, with no evidence base. Starting from 2005, large-scale randomized epidemiologic studies have been performed, which give a chance to draw some conclusions as to effect of certain nutritional habits of the risk of acne occurrence and its severity.

Based on data of other researchers, relationship between the risk of acne occurrence and its severity and consuming rich [17], normal or fat-free milk, as well as dairy products made of skim milk [18-21], which is due to comedogenic effect of hormones and hormone-active substances associated with lipid fractions of cow milk [7, 22-24].

Hormone-active substances of milk have stimulating effect upon insulin which activates insulin-like growth factor 1 (IGF-1) capable of increasing testosterone level and reducing SSBG production [22]. This is the principle of evolution of all mammals, which is intended to create anabolic conditions and stimulate growth of a newborn in the infant feeding period [25].

Rich milk contains predecessors of reproductive hormones (estrogen, progesterone and androgen) - androstenedione and dihydroepiandrosterone sulphate, as well as 5α-reductase steroids (5α-androstenedine, 5α-pregnonadione and dihydrotestosterone), some of which can stimulate growth of non-inflammatory acne elements - comedones. A special role is given to dihydrotestosterone, which is direct stimulator of sebocyte proliferation and aging [26-28]. Besides, milk and dairy products contain bioactive molecules, such as transforming growth factor -β (TGF-β), hormone peptides, glucocorticoids, which in turn can stimulate insulin production. Insulin activates insulin-like growth factor 1 (IGF-1) which decreases production of globulin (which binds reproduction hormones) and increases testosterone level, resulting in boosting of the pilosebaceous complex [29].

Aside from hormones and hormone-like substances, serum proteins of milk are powerful inducers of glucose-dependent insulinotropic peptide secreted by enteroendocrine K-cells. When K-cells react with hydrolyzed serum protein, irreplaceable amino acids are produced which stimulate production of insulin by β-cells of the islet apparatus of the pancreas [25].

Increased level of insulin and IGF-1 induce activity of the phosphoinositide-3-kinase/Akt pathway, which decreases nuclear content of the Fox01 transcription factor - key regulator of nutrigenomic genes, which are targets for oil gland cells. Nuclear deficit of Fox01 is related to all main factors of acne pathogenesis: transactivation of androgen receptors, comedogenesis, increased lipogenesis of oil glands, follicular inflammation [19, 25].

Not so far ago mammals have been discovered to have a target ripamycin complex 1 (mTORC1), which is involved in using milk protein in "alimentary signalling" (i.e. inducing functional activity of oil glands) for acne patients who prefer diet with high glycemic index and also have increased level of insulin, IGF-1 and leucine [21].

In spite of the above mentioned, results of study performed with Hong Kong University graduates show that consuming dairy and soybean products is associated with decreased risk of acne [30]. These exclusive data are probably attributable to the fact that residents of South-East Asia consume much less milk and dairy products compared to population of other continents.

The basis of this study was the fact that nutrition of Kazakhstan people was based on animal originating products, which include 260 different dairy products: ayran, kurt, suzbe, irishmik, sarsu and many more [31].

The abovesaid was the motivation for the purpose of this study devoted to the effect of milk and dairy products upon severity of acne for young-aged people of the city of Astana.

Material and methods: the thesis work belongs to confirmatory works by the nature of its goal. Statistical analysis data, including non-parametric x^2, correlation and dispersion analysis, were used to obtain argumentative results.

One-moment cross-sectional study of 182 respondents based on specially designed questionnaires is provided. This patients include the study group (group A) of 90 patients with semi-severe and severe forms of acne, of which 38 (42.2%) are women and 52 (57.8%) are men. The reference group (group B) is made of 92 people with absolutely no (even not singular ones) signs of non-inflammatory or inflammatory acne elements: 36 (39,1%) women and 56 (60,9%) men. The groups were comparable by the number of women and men and by the age of patients.

Results and discussion: 55,6 % of respondents with acne (group A) consumed milk and dairy products daily and 21,1% - more than three times a week (compared to 10,9% and 21,7% for patients with no signs of acne). At the same time, 33,7% of students with no cutaneous

findings consumed milk and dairy products 2-3 times per week and 18,5% consumed milk and dairy products once per week (8,9% and 7,8% correspondingly for patients with acne) (Table 1).

Table 1 shows that patients with acne consume more milk and dairy products. So, there are five times as many people consuming milk and dairy products daily among the acne patients compared to the reference group (χ^2=41.1; p<0.001). And vice versa, the number of patients consuming these products not more than 2-3 times per week was 8.9% among group A, compared to 33.7% in reference group B, which is 3.8 times as more (χ^2=98.6; p<0.001). Figure 1 shows the tea with milk consumption frequency in both study groups.

This means there are similar intergroup differences for the tea with milk consumption frequency. The relative number of people drinking tea with milk daily is six times as many in group A than in group B (χ^2=33.74; p<0.001). The situation becomes opposite as the tea with milk consumption frequency decreases. So, the relative number of respondents drinking tea with milk less than once per week is 4.4% for group A, compared to 9.8% for group B, which is more than twice as much (χ^2=8.8; p<0.01). 6.7% of patients with acne drink tea without milk, while there are more than five times as many such people in the reference group - 32.6% (χ^2 =19.29;p<0.001).

It turned out that the number of people who prefer rich milk is 4 times as high among acne patients than among respondents without acne (p<0.001), while the number of people preferring milk with low fat content is almost twice as low (p<0.001) (almost twice as low for people who prefer fat-free milk (p<0.01)). That is, more than half patients with acne prefer rich milk and only 6.8% prefer fat-free milk. At the same time, 66% of young people with no acne consume milk with low fat content and only 14.3% of them consume rich milk, which is more than 4.5 times as low.

The study intended to identify correlation between acne development and the type of milk consumed showed that respondents with acne prefer rich types of milk in 59% of cases (14.3% for the second group), while 66% of respondents in group B consume milk with low fat content (Figure 2).

90 questionnaires of respondents from the whole group were randomly selected in order to identify pathogenetic significance of types of milk and dairy products preferred.
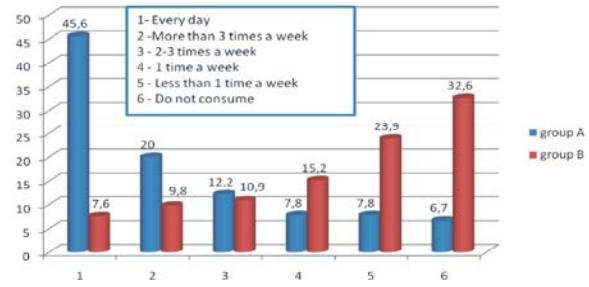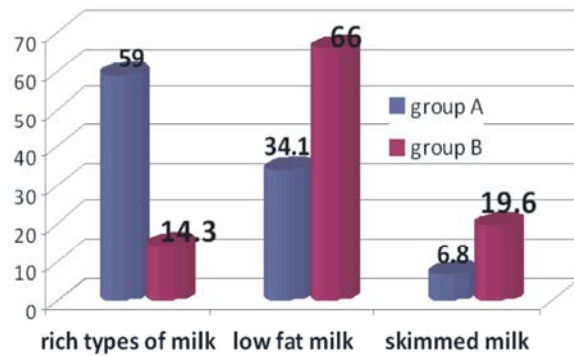

Fig. 1: Tea with milk consumption frequency

Fig. 2: Categories of milk preferred by patients (%)

Table 1: Milk and dairy product consumption frequency

No	Milk consumption frequency	Group A(n=90)	Group B(n=92)
1	Daily	50 (55,6%)	10 (10,9 %)
2	More than 3 times per week	19 (21,1%)	20 (21,7%)
3	2-3 times per week	8 (8,9%)	31 (33,7%)
4	One per week	7 (7,8%)	17 (18,5%)
5	Less than once per week	4 (4,4%)	9 (9,8%)
6	Do not consume	2 (2,2%)	5 (5,4%)

Table 2: Correlation between milk consumption frequency and disease severity

Males				Females			
rs	sr	t	p	rs	sr	t	p
0,48	0,12	4,33	<0,001	0,53	0,14	3,8	<0,001

The study shows that 93% of respondents consuming dairy products daily have acne, usually in semi-severe form (79%). The number is almost 1.5 times lower (65%) for young people consuming dairy products not more than once per week.

It should be mentioned that patients who consume no dairy products at all may also have acne. They are usually patients with severe form of acne who do not use milk-based food deliberately, being aware of negative effect thereof upon their pathology.

Table 3: Results of dispersion analysis intended to identify effect of milk/dairy product consumption frequency upon acne severity for girls

Variance	Degrees of freedom	Sums of squares	Dispersions (S^2)	Ff	Fst 5%	1%
By factor A	3	18,13	6,04	3,08	2,9	4,4
Residual	34	66,63	1,96			
Total	37	84,76	-			

Table 4: Results of dispersion analysis intended to identify effect of milk/dairy product consumption frequency upon acne severity for girls

Variance	Degrees of freedom	Sums of squares	Dispersions (S^2)	Ff	Fst 5%	1%
By factor A	2	33,03	16,515	3,61	3,2	5,1
Residual	49	223,97	4,57			
Total	51	257,00	-			

Correlation analysis showed that the milk/dairy product consumption frequency has a strong direct correlation relationship with the severity of acne (Table 2).

Table 2 shows that girls with acne have a strong correlation between milk/dairy product consumption frequency and disease severity.

This fact became basis for dispersion analysis intended to identify possible cause-and-effect relationships.

Thus, dispersion analysis proves reliable influence of dairy products upon the development of acne for young girls (p<0,05).

The power of influence (η^2) is 0.22, or 22%, which is quite much for an alimentary factor.

Results of dispersion analysis in Table 4 show that the effect of milk/dairy product consumption is also statistically significant for males (p<0.05). The power of influence (η^2) is 0,13, or 13%, which is 1.7 times less than for girls.

It should be mentioned that it would not be completely correct to extrapolate information from specialized world literature on the effect of dairy products upon the risk of acne occurrence and development to the general population of the Republic of Kazakhstan. The reason is that nutrition peculiarities of Kazakhstan people can be historically attributed to the nomad way of life. Cattle breeding was the main type of economic activity in Kazakhstan. That is why meat and milk were the basis of nutrition. This also applies to healing properties of animal originating products, which were used to cure and prevent various types of disease.

However, this does not mean that regular increased consumption of dairy products for the native population of Kazakhstan does not have any significant effect upon the course of acne. There is such effect, but it is much less significant than for other nutrition components and micronutrients, which is proved by the results of this work. The effect is also significantly weaker for females, which is probably attributed to peculiarities of hormone and immune homeostasis, as well as to other anatomy and physiology signs of sexual dimorphism.

Summarizing this section of the work, several important conclusions may be drawn.

- The risk of acne occurrence is significantly higher (p<0,001) for people with the highest milk and dairy product consumption level (daily, more than three times per day) than for people who consume such products much less often.
- There is a strong reliable correlation between milk and dairy product consumption frequency and the risk of acne occurrence and development.
- Pathogenetic influence of milk and dairy products upon acne is proved. The power of influence is 0.22 (22%) for females and 0.13 (13%) for males.

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