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Epidemiology Of Acne Vulgaris And Its Comorbidity With Demodicosis And Functional Gallbladder Disorder.

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ABSTRACT

Acne is one of the most common chronic dermatoses that occurs in adolescence and manifests itself in various degrees of severity. The aim is to study the epidemiology of acne vulgaris among students aged 19-29 years and its comorbidity with demodex and hepatobiliary dysfunction. The survey results demonstrate that 74% of respondents rated their condition as acne, while at the same time, during an objective examination - 82%. Epithelial adhesive tape test showed presence of Demodex mites in 67% of the student cohort with acne (mild degree - 64%, moderate - 79%). Hypokinetic disorder of the gallbladder motor function was found in 44% of students with acne (42% - mild degree, 54% - moderate). The data obtained during the study demonstrate high prevalence of acne vulgaris in Ukraine and its comorbidity with demodecosis and hepatobiliary dysfunction.
Keywords: acne, Demodex, acne vulgaris epidemiology, functional gallbladder disorder, adhesive tape test, sonography

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INTRODUCTION

Acne (acne vulgaris) is a chronic multifactorial disease of the pilosebaceous apparatus of sebaceous gland, appearing as comedones, papules, pustules, and nodules. According to the American Academy of Dermatology (AAD), about 50 millions of Americans suffer from acne vulgaris of different severity. Prevalence of acne vulgaris is 85% in people aged 12 to 24. In 2010, there has been recorded 650 millions of cases of the disease; therefore, acne vulgaris ranked eighth among the most frequently occurring diseases [1,2].

Pathogenesis of acne vulgaris is not completely studied for now. The most common theories include increase in sebum excretion and variation in its chemical composition, parafollicular keratosis, hypersensitivity of sebaceous gland receptors to androgens and Propionbacterium acnes. Demodex mite is one of the initiating agents for acne vulgaris. The pathogenicity of the mite is caused by the increase of sebaceous gland functions with further variations in sebum composition and microbiocenosis and enhanced microbial colonization as a result of qualitative abnormalities of lipid composition of sebum [3]. In the age group 11 to 25, occurrence of Demodex mites reaches 90 %. Meta-analysis conducted by Ya-e Zhao [4,5] in 2012, has proven the association between acne vulgaris and the skin affection by Demodex. Prevalence of hepatobiliary dysfunction in population aged 20 to 80 was estimated as 30 % [6]. Considering a high rate of self-treatment of acne vulgaris, availability of over-the-counter medicines, and absence of multicenter randomized studies in Ukraine, statistics on acne vulgaris are not reliable.

The objective is studying the prevalence of acne vulgaris and its comorbidity with demodicosis and functional disorders of hepatobiliary system among the students aged 19 to 29.

MATERIALS AND METHODS

Total of 324 students aged 19 to 29 studying at Sumy State University, Medical Institute were included in the study; male/female ratio was 236/88.

The study was conducted with the use of anonymous specialized questionnaire that contained questions about the presence and localization of lesions, family history, and information on visiting a doctor and treatment [7].

For evaluation of the acne vulgaris severity, objective examination was performed independently of the subjective questionnaire results by analyzing a number of lesions according to Global Acne Grading System (GAGS) [8]. A scale 0 to 4 was used for grading: no lesions – 0 points, comedones – 1 point, papules – 2 points, pustules – 3 points, nodules – 4 points. Every area had its fixed factor: forehead – 2, right cheek – 2, left cheek – 2, nose – 1, chin – 1, upper back and/or chest – 3. Local score was calculated by multiplying the obtained scores by each area factor. The local scores were added to obtain the total score. According to the results, acne severity was graded as mild (1 – 18 points), moderate (19 – 30 points), severe (31 – 38 points), very severe (> 38 points). To found Demodex mites, epithelial adhesive tape test was used. This test was performed for all students who participated in the study regardless of whether the acne elements were present. Adhesive tape in size 2x2 cm was used for the test; it was placed on skin area pretreated with 0.05 % chlorhexidine bigluconate for 2 – 3 minutes. Demodex mite specimen was counted by using the Karl Zeiss light microscope with 80-fold magnification in 4 fields of view immediately after the material was obtained. The criteria for mite activity according to A.M. Klingman [9] were the number of more than 5 adults, imaginal or nymph specimens.

For assessing the state of the gallbladder function, all students have undergone abdominal ultrasound investigation. Ultrasound was performed on SonoScape S6Pro ultrasound machine with the use of 3 – 5 MHz Ultrasound Probe Transducer C354. Patients have to be examined in fasting state on an empty stomach and 40 minutes after fatty meal. To determine the functional disorder type, measurement of the gallbladder size and volume with calculating of gallbladder ejection fraction (EF) was performed by using the following formula:

$$EF = (1 – RV/FV) \times 100,$$

RV – residual volume of the GB; FV – fasting volume of the GB [10].

Ejection fraction values from 40 to 65 % was used as normal range according to Rome III criteria [11].

Study was conducted in compliance with international and national legislation on ethics in accordance with the Law of Ukraine No. 690 dated September 23, 2009 "On Approval of Procedure for Conducting Clinical Trials of Medicinal Products and Expert Evaluation of Materials Pertinent to Clinical Trials and Model Regulations of the Ethics Committees". Patients of all groups have signed informed consent forms for participation in the study in accordance with World Medical Association's Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects".

Statistical analysis was performed by using Windows 10 - Office Professional Plus software in accordance with Microsoft licensing agreement (Agreement ID: V0731528) with the use of parametric and non-parametric methods of variation statistics.

RESULTS

Anonymous survey has shown that 74 % of the total number of students had acne elements. During self-assessment, 204/324 students (85 %) considered their condition as mild degree, 36/324 students (15 %) – as moderate degree.

According to questionnaire results, 55/324 respondents (20.5 %) have acne on upper back, and 42/324 respondents (15.7 %) have acne on chest. Positive family history for acne vulgaris was found in 84/324 (31.3 %) students (parents) and in 98/324 (36.6 %) students (brothers/sisters). 63/324 students (23.5 %) noted to have complications of acne vulgaris appearing as post-acne pigmentation, and 54/324students (20.1 %) – as post-acne scarring.

The data concerning self-treatment and visiting a doctor show a high rate of using self-treatment of acne vulgaris among students (55 %), wherein only 38 % of students visited a dermatologist.

Dermatologist examination of this cohort of students demonstrated acne vulgaris of different severity in 82 % cases: mild – 212/324 students (79.1 %), moderate – 52/324 students (19.4 %), and severe – 4/324 students (1.5 %) (Fig.1).

Figure 1. Mild acne vulgaris: mild degree of inflammation and hyperemia(Fig.1.1.). Moderate acne vulgaris: obvious inflammation and hyperemia, moderate dermal edema(Fig.1.2.). Severe acne vulgaris: obvious inflammation, nodules, postacne scars(Fig.1.3.).

Epithelial adhesive tape test revealed positive Demodex mite results in 180/268 students (67,1% of total acne cohort): mild acne vulgaris – 136/212 students (64.1 %), moderate acne vulgaris – 41/52 students (78.8 %), and severe acne vulgaris – 3/4 students (75 %).

Functional gallbladder dysfunction (ejection fraction < 40 %) was found out with ultrasound in 118 students (44 %) of acne cohort (Fig.2): in 88/212 students with mild acne vulgaris (41,5 %), in 28/52 students – with moderate acne vulgaris (53,8 %), and in 2/4 students – with severe acne vulgaris (50 %).

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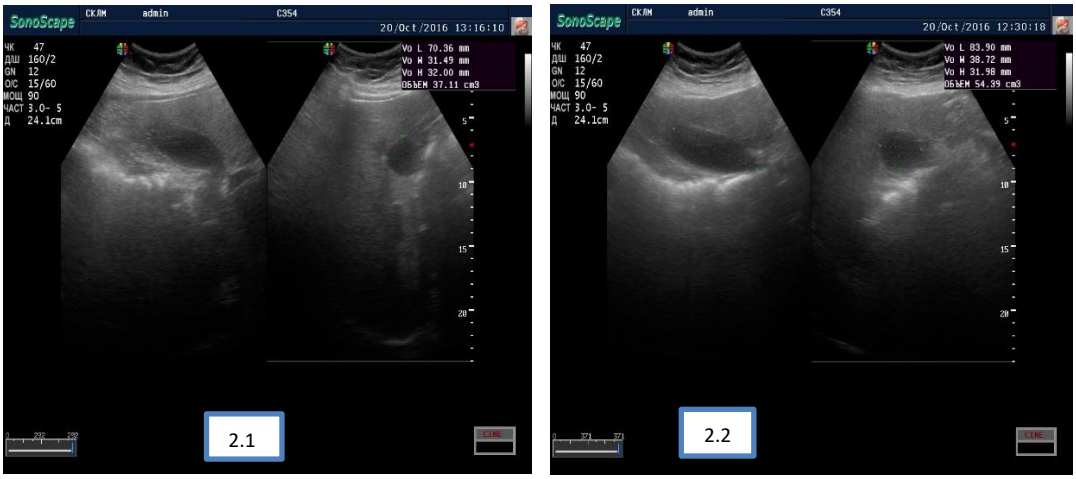

Figure 2. Ultrasound images of the gallbladder before (Fig.2.1.) and 40 minutes after(Fig2.2.) fatty meal. The gallbladder sizes and volume values calculated from the ultrasound images (ejection fraction 37%).

DISCUSSION

It is intricate to determine the real epidemiology of acne vulgaris in Ukraine: people with acne elements do not consider as necessary to visit dermatologist. The study revealed the discrepancy in evaluation of disease severity between the patients and doctors: 8 % of the respondents do not consider their condition to be acne vulgaris. None of the students surveyed regard his or her condition as a severe acne vulgaris. Only 40 % of the students visited a dermatologist, and 55 % of the respondents confirmed their attempted self-treatment of acne vulgaris.

According to the clinical protocol of primary and secondary (specialized) medical care ordered by the Ministry of Health of Ukraine in 2016, diagnostic standards for acne vulgaris include blood count, urinalysis, biochemical blood test (total bilirubin, triglycerides, aspartate aminotransferase, alanine aminotransferase, cholesterol, alkaline phosphatase, creatinine, glucose), scraping for Demodex, and specialists consultations (gastroenterologist, endocrinologist, gynecologist, psychotherapist). According to N.V. Kusaya et al., considering the young age of patients with acne vulgaris, changes in biochemical blood tests are minimal [12]. Abdominal ultrasound investigation, including functional testing, is not among the list of required examinations. However, our results suggest a large number of cases of gallbladder dysfunction, even in the absence of clinical sings. One of the possible pathogenetic substantiations for coexistence of hepatobiliary disorders with acne vulgaris is insufficient bile acid production as a result of decreased gallbladder function.
Acne vulgaris management has to be based on all pathogenic factors, including the skin affection by Demodex, functional gallbladder disorder as factors that influence quantitative and qualitative composition of sebum.

CONCLUSION

The results suggest prevalence of acne vulgaris among student cohort aged 19 to 29 is 80 % with predominantly mild degree of severity. Comorbidity of acne vulgaris with Demodex mites occurs in 70 % of the cases. Combination of acne vulgaris with functional gallbladder disorder was found in 44 % of the cases; with the increasing of frequency of gallbladder dysfunction up to 54 % in moderate acne vulgaris.

REFERENSES

[1] Bickers DR, Goodman C, Faulkner E, Lim HW, Margolis D, Weinstock MA et al. The burden of skin diseases: 2004 a joint project of the American Academy of Dermatology Association and the Society for Investigative Dermatology. Journal of the American Academy of Dermatology 2006; 55:490-500.

[2] Bolliger IW, Dellavalle RP, Hay RJ, Johns NE, Williams HC et al. The Global Burden of Skin Disease in 2010: An Analysis of the Prevalence and Impact of Skin Conditions. The Journal of investigative dermatology 2013, 134 (6), 1527–34.

[3] Gallyamova YU. A., Grevtseva A. S., Kubanov A. A. Demodekoz. Lechashchiy vrach [Internet] 19.11.2014[cite 2019 Mar 21]; 11(14).

[4] Guo N., Zhao, Y.E., Xun, M., Xu, J.R., Wang, M., Wang, D.L., 2011a. Sociodemographic characteristics and risk factor analysis of Demodex infestation. J. Zhejiang Univ.-Sci. B (Biomed. & Biotechnol.), 12(12): 998–1007. DOI: 10.1631/jzus. B1100079.

[5] Hu L., Wu L., Zhao, Y. et al. A meta-analysis of association between acne ulgaris and Demodex infestation. J. Zhejiang Univ. Sci. B (2012) 13: 192. DOI: 10.1631/jzus. B1100285.

[6] Opryshko V.V., Savin A.A., Topchiy Ye.A., Filippov A.V. Sonograficheskiye i gendernyye osobennosti zabolevaniya gepatobiliarnoy sistemy po dannym ul'trazvukovykh issledovaniy. Materialy II mezhdunar. nauch.-prakt. konf: Meditsina, biologiya i khimiya. 2016 dekabr' Moskva. Moskva, Izd. «MTSNO», № 2(2), s. 43-9[in Russian].

[7] Tur-kistani A, Zari S. Acne Vulgaris in Jeddah Medical Students: Prevalence, Severity, Self-Report, and Treatment Practices. Journal of Cosmetics, Dermatological Sciences and Applications 2017(7), 67-76. DOI: 10.4236/jcdsa.2017.710077.

[8] Malathi M., Thappa D.M. Agache's Measuring the Skin. Cham, Switzerland: Springer; 2017.1582 p.

[9] Melekhovets' O.K., Rad'ko A.S., Smiyanov V.A., Kharchenko T.O. Sums'kyy derzh. un-t., patentovlasnyk. Sposib diahnostyky demodekozu z vykorystannyam kleykoyi strichky. Patent Ukrayiny № 111590 vid 2016 Lyst 10 [in Ukrainian].

[10] Donen A., Kantor R. Fatty meal ultrasonography in chronic acalculous cholecystitis. Journal of surgical case reports 2014,11 rju120. 19 Nov. 2014, DOI: 10.1093/jscr/rju120

[11] Abid Irshad, Susan J. Ackerman, Kenneth Spicer, Nathanial Baker, Amy Campbell, Munazza Anis, Mehwish Shazly. Ultrasound Evaluation of Gallbladder Dyskinesia: Comparison of Scintigraphy and Dynamic 3D and 4D Ultrasound Techniques. American Journal of Roentgenology. 2011;197. DOI: 10.2214/AJR.10.5391.

[12] Belovol A. N., Beregovaya A.A., Kondrashova V. G., Tkachenko S. G. Deviatsii zhirovogo obmena pri ugrevoy bolezni. Dermatologíya ta venerologíya. 2011(3). s. 7-11[in Russian].