Abstract

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ASSESSMENT OF THE RISK OF SKIN LESIONS ASSOCIATED WITH DEMODEX MITES IN STUDENTS WITH ACNE VULGARIS

The study of comorbid pathologies that influence the severity of the disease and impair the effectiveness of treatment is carried out to optimize the treatment of the main disease.

Materials and methods. The total of 132 medical students was divided into two groups: the 1st group: 56 students who didn`t have acne elements, the 2nd group: 76 students with mild acne vulgaris. At the baseline and after 12 months epithelial tape-test was performed to define Demodex mites presence. The theory of chances was used to assess the impact of acne on the occurrence of Demodex mites.

Results. The presence of Demodex mites was observed in 3.57% of students in the 1st group and in 21.05% of students in the 2nd group on repeated tape-test. The probability value (P) among students of the 1st group was $P_1 = 0.037$; among students of the 2nd group – $P_2 = 0.266$. The odds (O) indicator in the 1st group of students without acne elements was $O_1 = 0.04$, in the 2nd group diagnosed with acne – $O_2 = 0.21$. The odds ratio (OR) value in the case/control groups was 7.20. Confidence intervals (95% CI) – (1.582, 32.765): the lower limit of the confidence interval $(2.019, +\infty)$; the upper limit of the confidence interval $(-\infty, 25680)$. Significance test p-value was 0.00533.

Conclusion. Acne vulgaris is one of aggravating factor that increases the risk of Demodex mites.

Keywords: odds, odds ratio, acne, acne vulgaris, Demodex.

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Резюме

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ОЦІНКА РИЗИКУ УРАЖЕННЯ ШКІРИ КЛІЩАМИ РОДУ ДЕМОДЕКС СЕРЕД СТУДЕНТІВ З ВУГРОВОЮ ХВОРОБОЮ

Фактором ризику, що сприяють підвищенню вірогідності виникнення ураження кліщами роду Demodex, може виступати наявність вугрових вугрів або інші хронічні дерматози. Застосування теорії шансів є доцільним для обчислення ризиків виникнення кліщового ураження серед пацієнтів з вугровою хворобою.

Матеріали та методи. У дослідження було включено 132 студенти медичного інституту, що були розділені на дві групи: 1 гру-

па – 56 студентів, які не мали елементів прищів, 2 група – 76 студентів із легкою формою вугрової хвороби. Визначення наявності кліщів роду Demodex, із застосуванням епітеліального скотч-тесту, проводили двічі: на моменті включення у дослідження та через 12 місяців. Для оцінки впливу вугрової хвороби на появу кліщів роду Demodex було використано метод теорії шансів.

Результати. При проведенні другого скотч-тесту через 12 місяців встановлено наявність кліщів роду Demodex у 3,57 % студентів 1-ї групи та 21,05 % студентів 2-ї групи. Значення ймовірності (Р) серед студентів 1-ї групи було $P_1 = 0, 037$; студентів 2-ї групи $P_2 = 0,266$. Показник коефіцієнта шансу (О) у 1-й групі студентів склав $O_1 = 0,04$, у 2-й групі $O_2 = 0,21$. Значення коефіцієнта відношення шансів (OR) у групах (випадок/контроль) дорівнювало 7,20. Довірчий інтервал складав (95 % CI) – (1,582, 32,765): нижня межа довірчого інтервалу (2.019, + ∞); верхня межа довірчого інтервалу (-∞, 25680). Значення тесту значущості р = 0,00533.

Висновок. Вугрова хвороба є одним із обтяжуючих факторів, що збільшує ризик виникнення кліщів Demodex.

Ключові слова: шанси, відношення шансів, вугрі, вугрова хвороба, демодекс, акне.

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Introduction

One of the priorities of modern medicine is preventive medicine, so the study of the influence of any factors that may adversely affect the health of the patient or the prognosis of his treatment, is appropriate and reasonable. The study of comorbid pathologies that influence the severity of the disease and impair the effectiveness of treatment is carried out to optimize the treatment of the main disease. According to a study by modern author S. Fromstein, the Demodex mite is one of human`s ectoparasite affecting mainly the sebaceous glands and the base of the lashes [1]. Some authors study the comorbidity of Demodex mites with rosacea and eye diseases, and prove the association between them. The association between acne vulgaris and Demodex mites has not been sufficiently studied [2], so assessing the risk of Demodex mites from acne is an important topic for new research.

The theory of chances is one of tools to exam the risk of skin lesions by Demodex mite in patients with acne vulgaris.

Objective: to assess the risk of Demodex mite occurrence among students with acne compared to people without acne using chance theory.

Materials and methods

Total of 268 medical students with acne vulgaris were included in the study to specify comorbidity with Demodicosis. 180 medical students were found with positive comorbidity.

To assess the risk of infestation of the Demodex mites 56 students without acne elements (the 1st group) and 76 students with mild acne vulgaris (the 2nd group) were enrolled in study. The groups were matched by sex and age. Demodex mites were examined twice: at baseline and 12 months after. To perform epithelial tape-test, adhesive tape in size 2x2 cm 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 were the number of more than 5 adults, imaginal or nymph specimens according to A.M. Klingman [3].

A number of indicators was calculated to assess the risk of demodex skin lesions. Probability (P) – a measure of the possibility of demodex lesions in the presence of acne and in its absence. Acne is a so-called favourable factor for the occurrence of Demodex mites. The probability is determined by the ratio of the number of favourable events to the total number of possible events. It was based on the statement that the sum of the probabilities of events that form a complete group is always equal to one (1). If a complete group is formed by only two events, then such events are called opposite (dichotomous index) [4]. To conduct this study, 2

categories were identified on the nominal scale "Detected" and "Not detected" of the Demodex mites in the epithelial scotch test. It follows that the probability value is always less than or equal to one [5].

Odds (O) – is a statistical parameter that is determined by the ratio of the probability that a skin lesion of the Demodex mites will occur to the probability that the lesion will not occur. The calculation was performed according to a standard formula:

$$O = \frac{P}{1-P}$$

Interpretation of the of the chance value: 1) O = 1(or close to 1.0), indicates that the odds of exposure among case-group are the same as the odds among control-group. It means that the onset of a new condition is not related to an existing disease; 2) O > 1, indicates that the odds among case-group are greater than the odds among control-group [6]. It means, that the existing disease in case-group might be a risk factor for the new disease; 3) O < 1, indicates that the odds among case-group are lower than the odds among control-group. The existing case in case-group might be a protective factor against the disease than the probability that the event will occur is less than the probability that the event will not occur.

Odds ratio (OR) was determined by the ratio of the odds of the 1st group (case) of students to the odds of students of the 2nd group (control) [7]. The odds ratio shows how many times higher the incidence among students with a risk factor (the presence of acne) is in relation to the incidence among students without a risk factor – acne elements on the skin. The calculation was performed according to a standard formula:

$$OR = \frac{O2}{O1}$$

Interpretation of the of the odds ratio value: 1.0 – this indicates that the risk of disease in groups does not depend on the presence of a risk factor; if the ratio is greater than 1.0, this suggests to assess the risk as higher in the group exposed to the factor, if the value is less than 1.0, this indicates a lower risk in the group with the impact factor and may indicate the presence of a "protective" factor.

Statistically significant difference between groups (case/control) indicates P value < 0.05, if P

value > 0.05 it`s not statistically significant difference between groups [8, 9].

Confidence intervals are used because a study recruits only a small sample of the overall population so by having an upper and lower confidence limit, we can infer that the true population effect lies between these two points [10, 11]. The 95% confidence interval (95% CI) is the most common to determine the reliable range of values in the study.

Results

A repeated tape-test showed the presence of Demodex mites in 2 (3.57%) students of the 1st group and in 16 (21.05%) students of the 2nd group.

The probability value (P) of the Demodex mite occurrence among students of the 1st group was $P_1 = 0.037$; among the students of the 2nd group $P_2 = 0.266$. The data obtained show that the probability of the Demodex mites' occurrence is much higher among students of group 2, who were diagnosed with mild acne.

The odds (O) indicator in the 1st group of students without acne elements was $O_1 = 0.04$, in the 2nd group with a diagnosis of acne $O_2 = 0.21$.

The odds ratio (OR) value in the study groups (case/control) was 7.20.

Confidence intervals (95% CI), within which the given reliable probability were: confidence interval – (1.582, 32.765); the lower limit of the confidence interval (2.019, + ∞); the upper limit of confidence interval (-∞, 25680).

Significance test p value was 0.00533, which indicated the reliability of the obtained data.

Discussion

Association between the presence of acne vulgaris and the occurrence of Demodex mites is confirmed by a number of studies showing an increased risk of Demodex mites among patients with acne compared with the control group. The obtained value of the odds ratio OR – 7.20 in the presence of mild acne among students was significantly higher than in students without acne elements, and approached the rate of patients with rosacea OR – 7.57 in studies by other authors [12]. At the same time, the results of the study Zhao,Y. E show that patients with acne only had a risk of developing demodex OR – 2.80. One of the reasons for the discrepancy may be different sensitivity of used detection methods.

Conclusions

Acne vulgaris elements suggest increased risk for associated comorbidities such as Demodex

mites compared to the control group. It is important to timely diagnosis acne vulgaris and prescribe treatment regimens for prevention of Demodex mites.

Conflict of interest

The authors declare no conflict of interest.

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