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**ASSOCIATION OF SULFATE AND SULFATE-FREE SHAMPOOS
WITH THE SKIN AND HAIR CONDITION**

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Relevance. Shampoo is one of the most popular washing products worldwide. But most pharmaceutical companies use a cheap Sodium Laureth Sulfate (SLES) component in shampoos. Since sulfates are strong chemical compounds, they not only remove dirt by splitting it, but also act on the protective fatty layer of the scalp. This causes an increase in sebum production and, as a result, oily scalp. They also negatively affect the dryness of the hair, penetrating deep into the hair and weakening its structure.

Aim: to study the association of the composition of sulfate and sulfate-free shampoos with the condition of the scalp and hair among the BSMU students.

Materials and methods. Examination and interview of the students were carried out on the basis of Belarusian State Medical University. During the research, a survey was conducted using the questionnaire method of 210 students of BSMU. The composition of their shampoos was determined and it was revealed that 130 (61,9 %) shampoos contained SLES and 80 (38,1%) were sulfate-free. Statistical analysis was performed according to standard procedures. Odds ratios (ORs) were calculated with a 95% confidence interval (CI). The 95% CI did not cross 1. Fisher's exact test results were considered statistically significant at $p < 0.05$. Chi-squared criterion (χ^2) was considered statistically significant in the range from 5 to 10. The strength of the association was assessed using the Cramer test (V).

Results and their discussion. An analysis of a survey of students using sulfate shampoos revealed that 65,38% of students complained of oily scalp, 19,23% – of dry and brittle hair, 3,85% – of dandruff. Among students using sulfate-free shampoos, 43,75% complained of oily scalp, 50% – of dry and brittle hair. The frequency of hair washing was determined. Among the group with an oily scalp, 33,3% washed their hair every day, 50% – once every two days, 12,5% – once every three days, 4,2% – once every four days. Among students with dry and brittle hair, 20% washed their hair every day, 33,3% – once every two days, 46,7% – once every three days. Students complaining of dandruff washed their hair once every four days. Statistical analysis was performed to determine the association between scalp oiliness and the content of sulfates in shampoo. Fisher's coefficient was 0.00456, which means the sample was representative. The strength of the association was relatively strong (Cramer's V = 0.453). In the group with sulfates, the risk of oily scalp was 8 times higher than in the group without sulfates (OR = 8.015, $\chi^2 = 8.636$). The direct link between dry hair and sulfate shampoos was not revealed (Fisher's criterion = 0.281, $\chi^2 = 1.7$). To assess the connection between dandruff and the content of sulfates, the sample was not representative (significance level $p > 0.05$, no dandruff data for the control group). Due to the fact that the condition of the scalp and hair may depend on the frequency of shampoo use, we statistically assessed the effect of the amount of hair washing and the state of hair health. It was found that an oily scalp does not depend on the frequency of shampooing ($\chi^2 = 6.237$, $p = 0.101$). Also, there was no connection between dry and brittle hair and the frequency of shampooing ($\chi^2 = \text{Nan}$, $p = 0.1$).

Conclusion. Hair health problems are observed in many students. 88.14% of the surveyed students had complaints of problematic scalp. 31% of all students complained of dry and brittle hair. The oiliness of the scalp was noted in 57.14%. And 11.86% had no complaints of the condition of the scalp. Only 2.3% of the respondents had complaints of dandruff. Statistically, oily scalp was associated with SLES content in shampoos. The risk of oily scalp was 8 times higher when using sulfate shampoos. However, the frequency of shampoo use was not statistically significant. There was no connection between dry hair and dandruff and the composition of shampoos, nor between the frequency of use.