



Evaluation of the Microbial Profile on the Polydioxanone Membrane and the Collagen Membrane Exposed to Multi-Species Subgingival Biofilm: An In Vitro Study

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Aim

Dehiscence in surgeries involving membranes often leads to bacterial contamination, hindering the healing process. This study assessed bacterial colonization on various membrane materials.



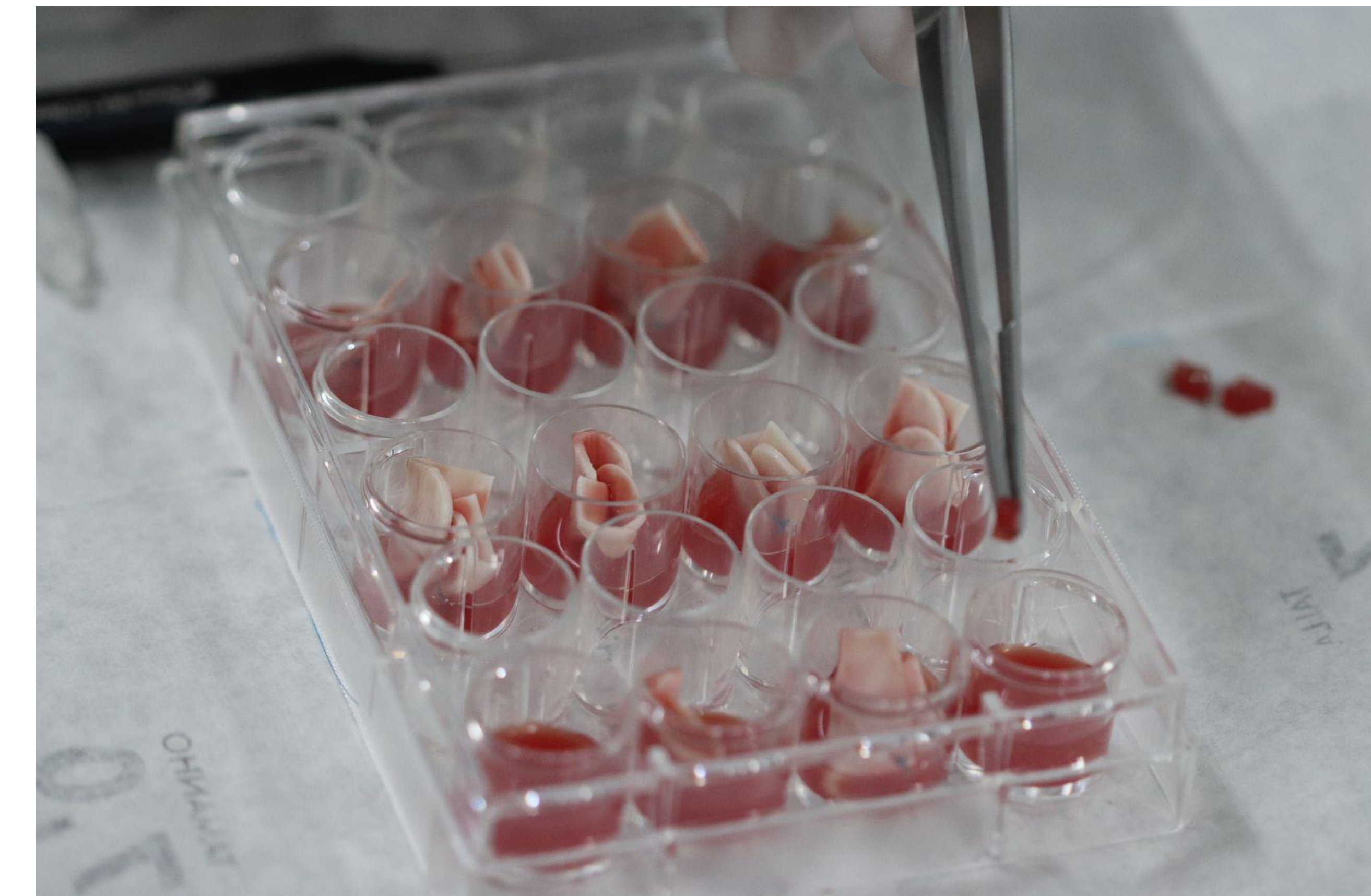
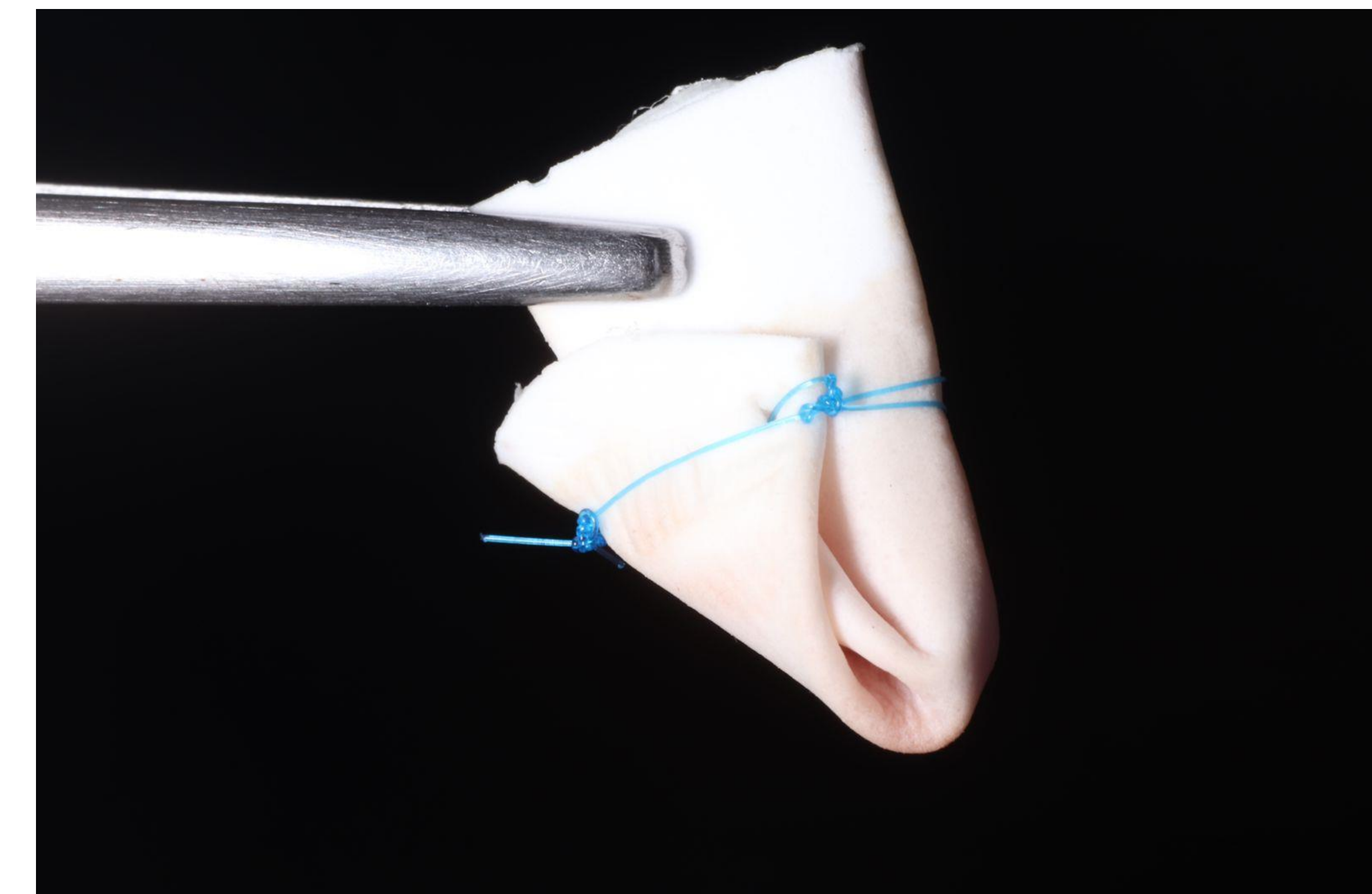
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Method

Polydioxanone (PDO) membranes, with thicknesses of 0.5 mm and 1 mm, and a collagen membrane were examined. Packages containing polystyrene pins were crafted using these membranes, attached to 24-well plates, and exposed to oral bacteria from supra and subgingival biofilm. After a week's anaerobic incubation, biofilm formation was evaluated using the DNA–DNA hybridization test. Statistical analysis employed the Kruskal–Wallis test with Dunn's post hoc test.



Results

The biofilm on the polystyrene pins covered by the 0.5 mm PDO membrane showed a higher count of certain pathogens. The collagen membrane had a greater total biofilm count on its inner surface compared to both PDO membranes. The external collagen membrane face had a higher total biofilm count than the 0.5 mm PDO membrane. Furthermore, the 1 mm PDO membrane exhibited a greater count of specific pathogens than its 0.5 mm counterpart.

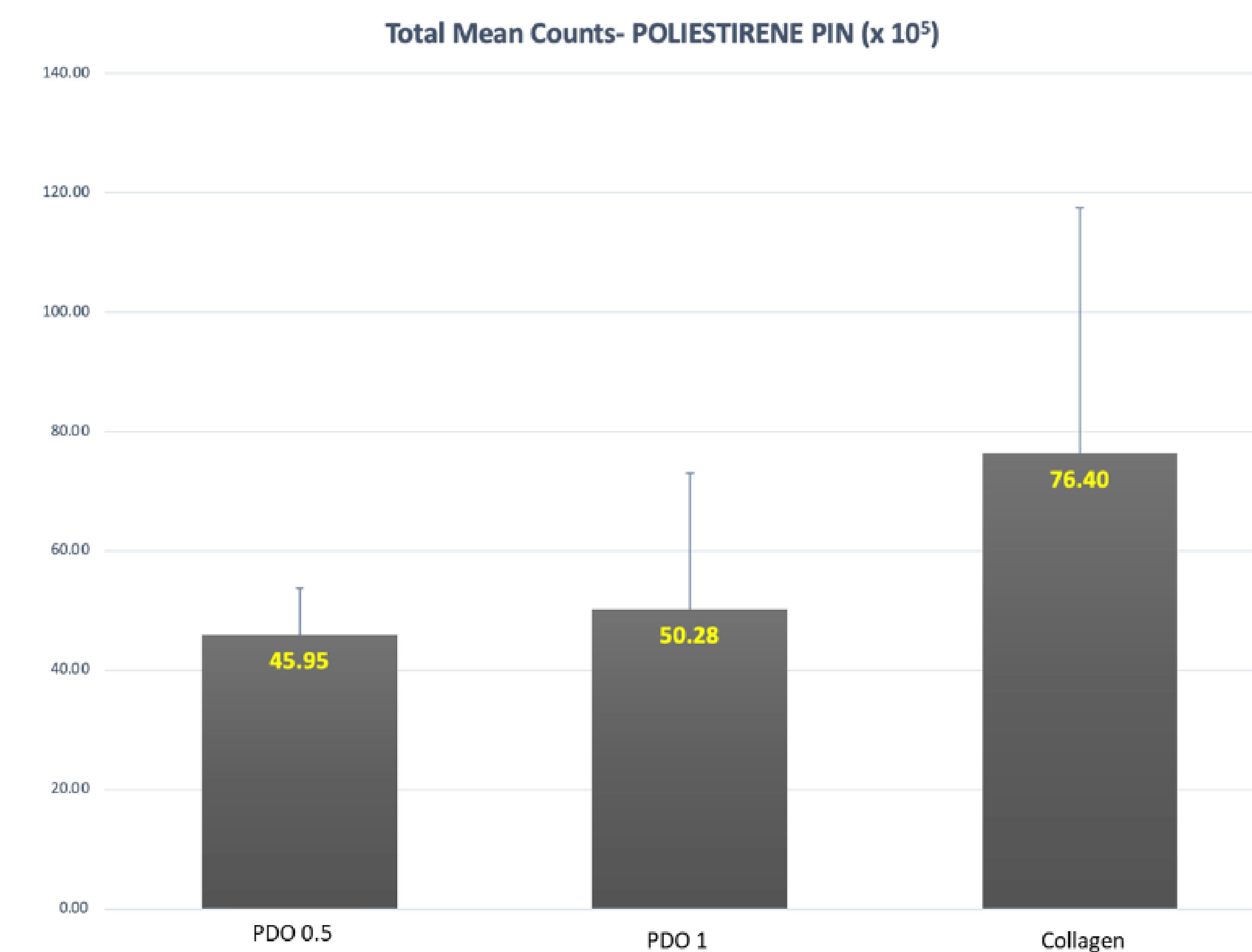


Figure 1. Mean and SD of total count means of the biofilm formed over the polystyrene pins and covered by the evaluated membranes ($p = 0.08$).

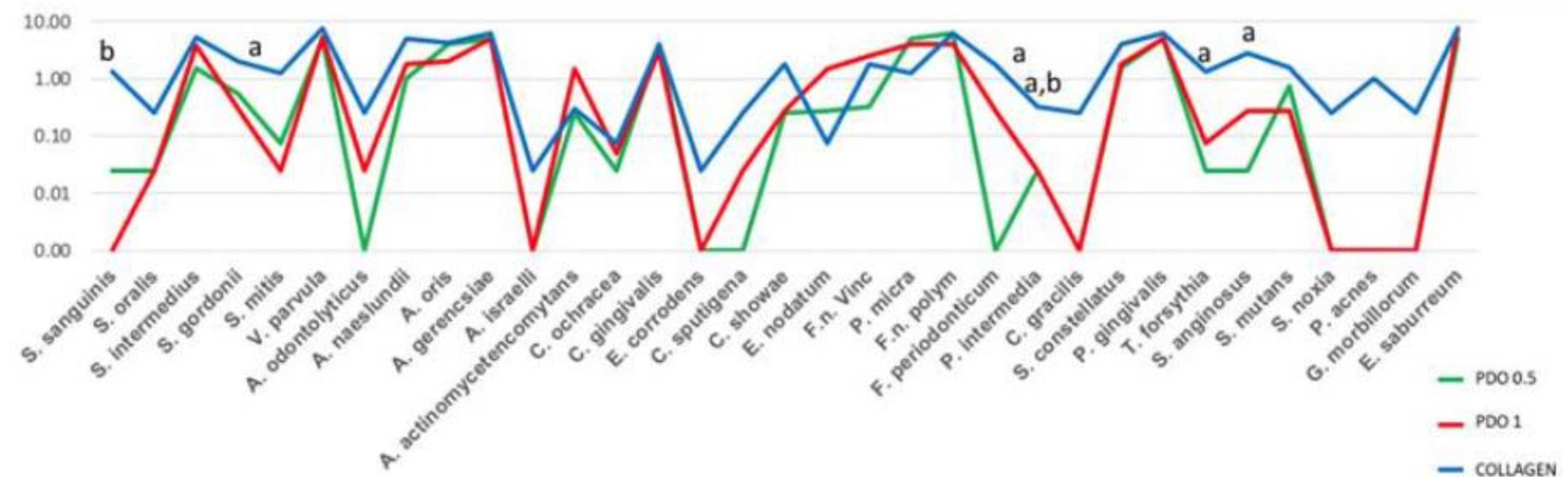


Figure 2. The mean counts of each species formed in the biofilm over the polystyrene pins covered by PDO 0.5, PDO 1.0, and Collagen. The Kruskal–Wallis test and Dunn's ($p \leq 0.05$) test were performed. The letter shows the difference between the membranes as follows: "a" shows the difference between PDO 0.5 and collagen; "b" between PDO 1.0 and collagen, and "c" between PDO 0.5 and PDO 1.0.

Results

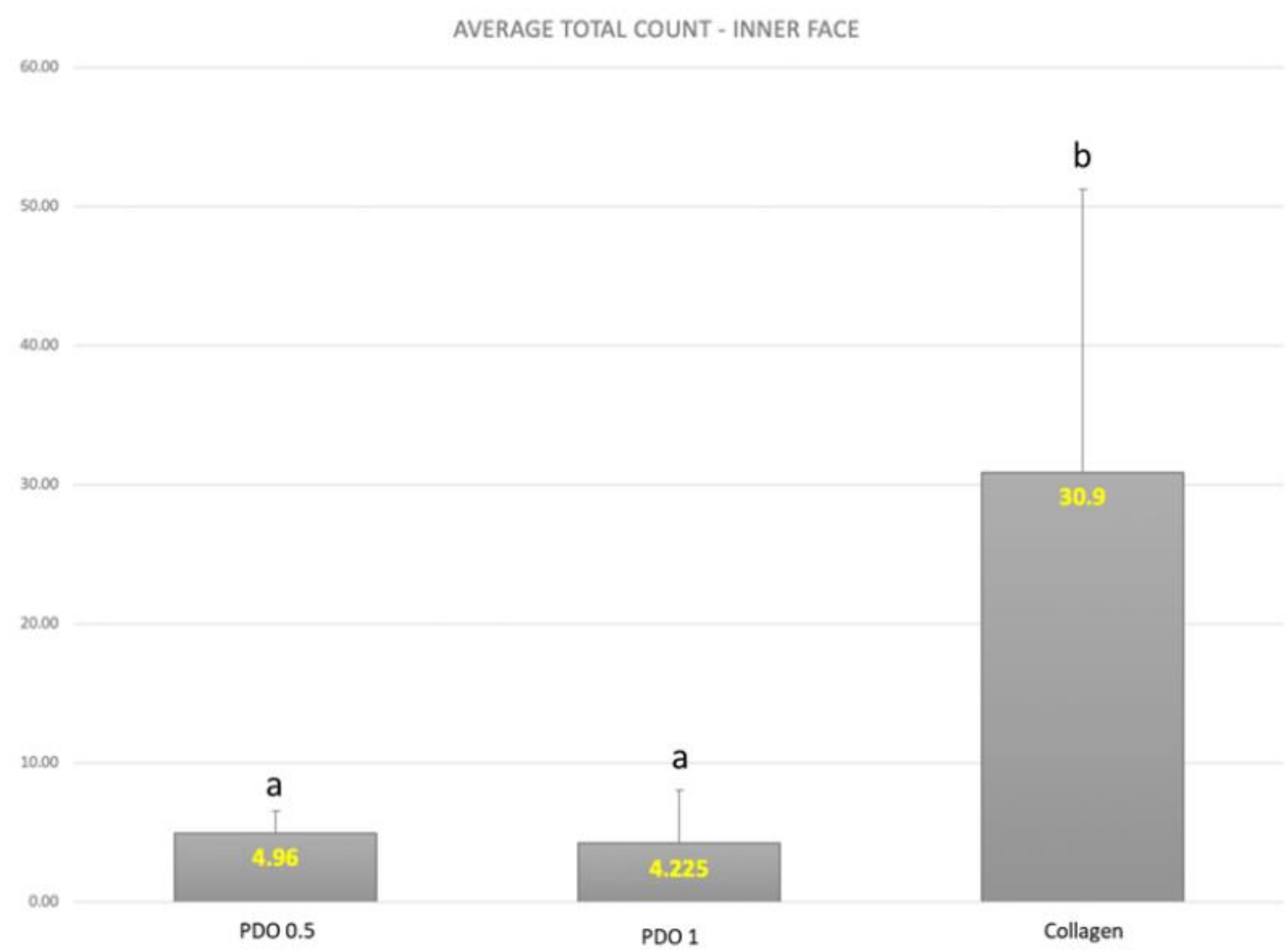


Figure 3. The mean and SD of the total count means of the biofilm formed in the inner part of the polystyrene pins covered by the evaluated membranes. Kruskal–Wallis test ($p \leq 0.05$) Letters show the difference between the membranes: PDO 0.5 = PDO 1.0 < Collagen.

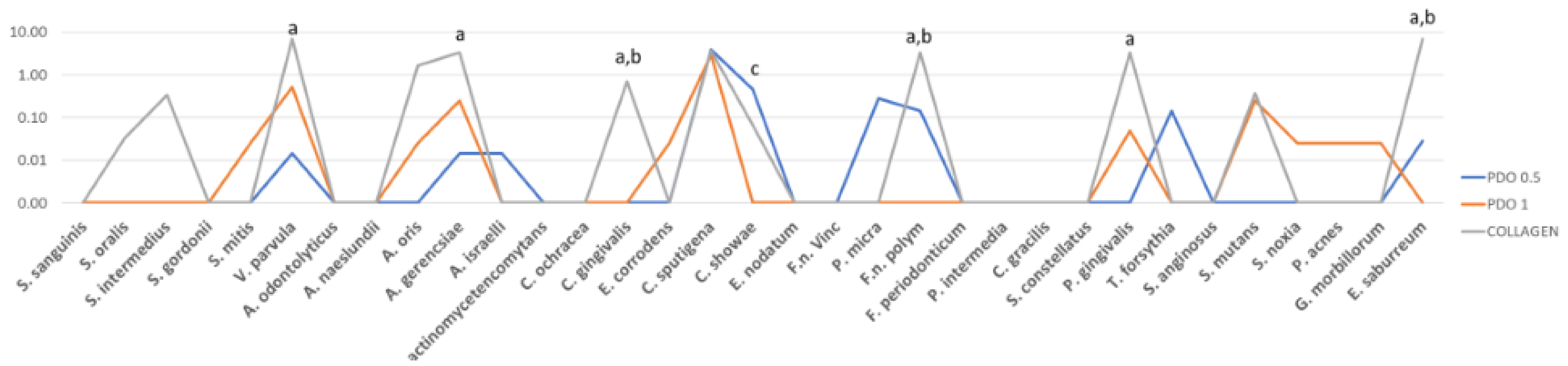


Figure 4. The mean counts of each species formed in the biofilm in the inner face of the PDO 0.5, PDO 1.0, and Collagen. Kruskal–Wallis test and Dunn’s ($p \leq 0.05$) test were performed. The letter shows the difference between the membranes as follows: “a” shows the difference between PDO 0.5 and collagen; “b” between PDO 1.0 and collagen, and “c” between PDO 0.5 and PDO 1.0.

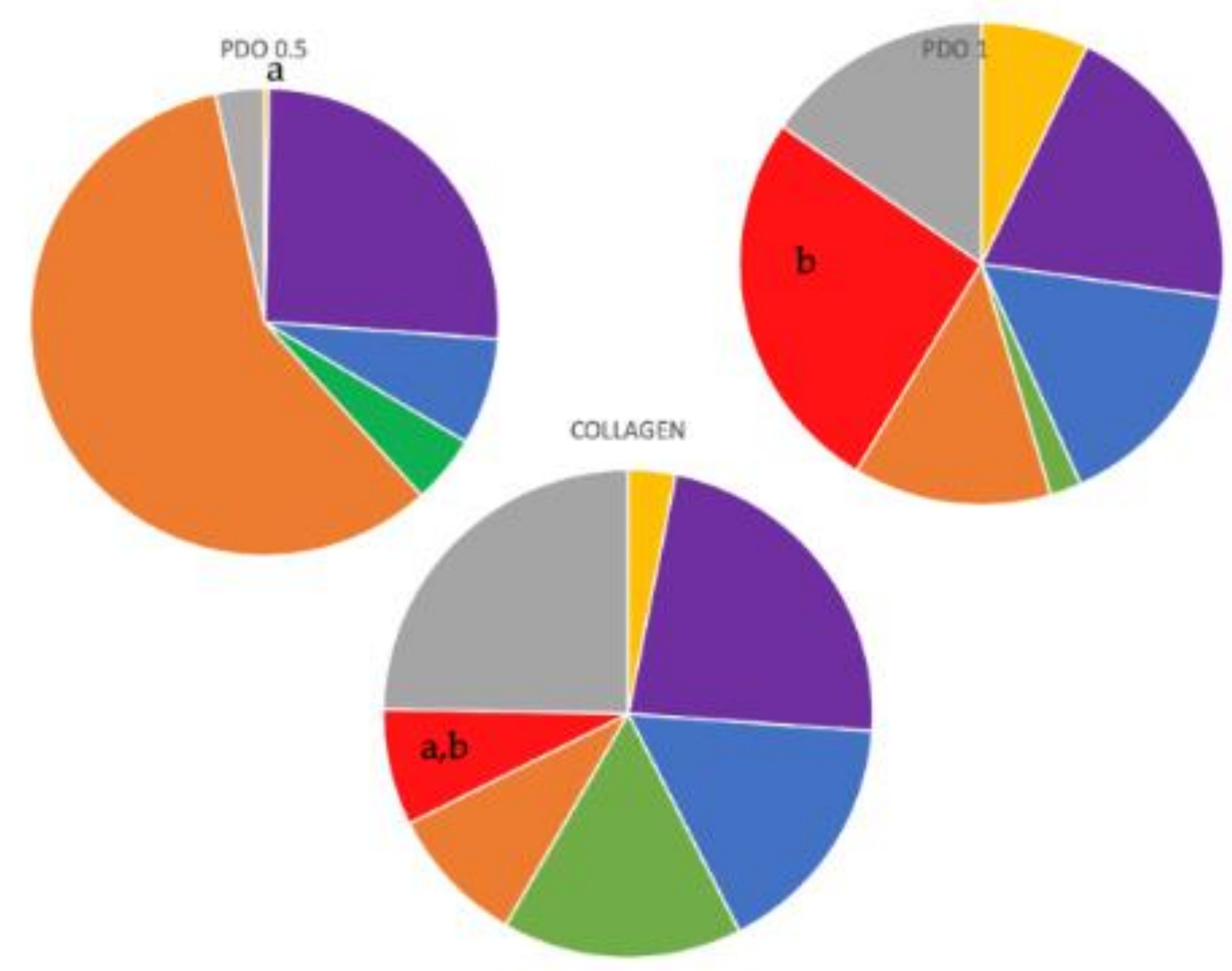


Figure 5. The analysis of microbial complexes of the biofilms formed in the external face of the membranes. The Kruskal–Wallis test and Dunn’s ($p \leq 0.05$) test were performed. The letters show the differences.

Results

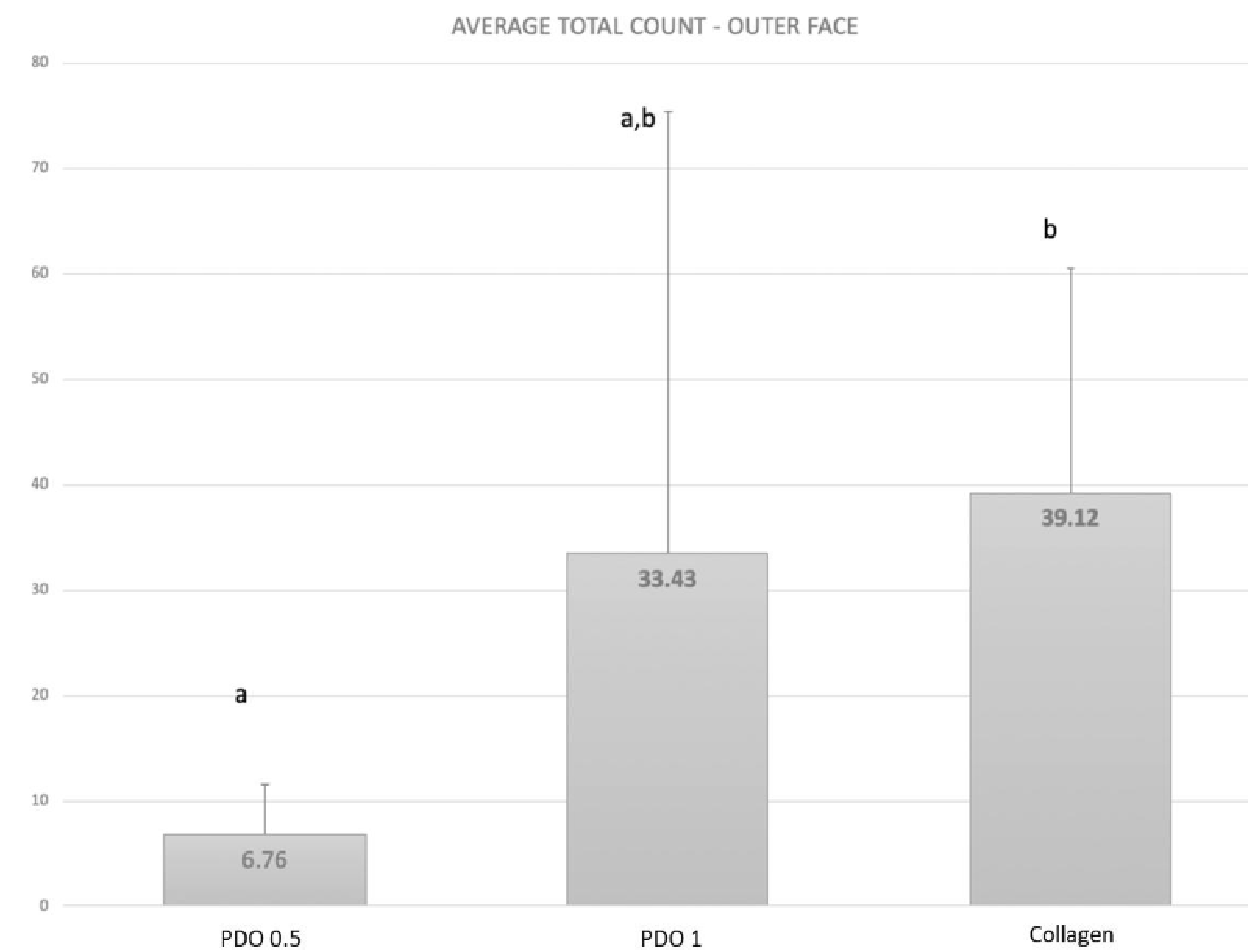


Figure 6. The mean and SD of total count of the biofilm formed in the external part covered by the evaluated membranes. Kruskal-Wallis test ($p \leq 0.05$) Letters show the difference between the membranes as follows: PDO 0,5 < PDO 1.0 = Collagen

Conclusion

In conclusion, the collagen membrane presented more biofilm and pathogens both internally and on its inner surface.

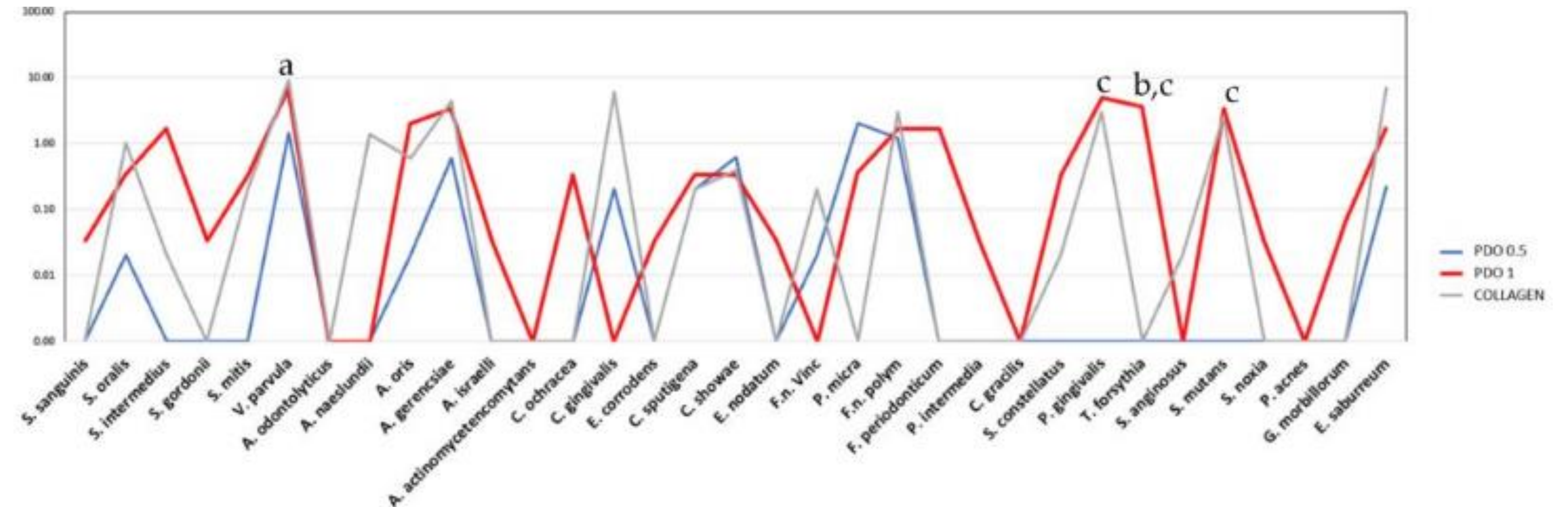


Figure 7. The mean counts of each species formed in the biofilm and formed on the external part of the evaluated membranes PDO 0.5, PDO 1.0, and Collagen. The Kruskal-Wallis test and Dunn's ($p \leq 0.05$) test were performed. The letter shows the difference between the membranes as follows: "a" shows the difference between PDO 0.5 and collagen, "b" between PDO 1.0 and collagen, and "c" between PDO 0.5 and PDO 1.0.