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The microbial diversity of the surface of wet wipes that have become trash: a mini review

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INTRODUCTION & AIM

In recent decades, people have increasingly used wet wipes (Ramya & Amutha, 2021) and medical masks (Prata et al., 2021) in everyday life and in the medical field. Today, the problem of environmental pollution with wet wipes and medical masks is acute, especially considering that they are one of the sources of microplastics in the environment (Ó Briain et al., 2020). To solve this problem, the use of biotechnological approach - bioremediation with destructive microorganisms should be considered as an eco-friendly way.

Therefore, **the aim** of this study was to analyze the data of literary sources regarding the variety of species of microorganisms that were isolated from the surface/biofilm of the material of wet wipes and medical masks, and the potential possibilities of their use as biodestructors in the biotechnological process of disposal and utilization of these wastes.

METHOD

A set of methods of scientific knowledge - analysis, abstraction, induction and deduction - was used to achieve the goal and set tasks of the research.

RESULTS & DISCUSSION

The role of biofilm on the surface of artificial materials in their biodegradation

Today, it is generally accepted that the formation of biofilm, the direct and indirect effect of biofilm microorganisms on materials is a necessary condition for their biodegradation. At the same time, the microbial diversity of biofilm organisms on the surface of structural materials is represented by bacteria, fungi, algae, and archaea.

In this publication, we summarize published data on the surface microbial diversity of wet wipes and medical masks, particularly those that have become litter.

Microbial diversity of the material surface of wet wipes and medical masks

Information on the microbial diversity of the surface of wet wipes and medical masks is summarized in Table 1.

Table 1

Bacterial diversity of the surface of wet wipes and medical masks

Note: * - according to TRBA 466 "Einstufung von Prokaryonten (Bacteria und Archaea) in Risikogruppen", 2015.

Hygiene product	A species of bacteria	Risk group*
Wet wipes	*Escherichia coli*	2
	Vibrio alginolyticus	2
	Vibrio parahaemolyticus	2
	Vibrio cholerae	2
	Vibrio vulnificus	2
	Staphylococcus haemolyticus	2
	Staphylococcus hominis	2
	Staphylococcus warneri	2
	Pseudomonas fluorescens	1

Table 1 *Cont.*

Hygiene product	A species of bacteria	Risk group*
Medical masks	*Acinetobacter* sp.	1-2 (depends on the specific species)
	Bacillus thuringiensis	1
	Bacillus cereus	2
	Enhydrobacter sp.	1
	Lysinibacillus sp.	1
	Pantoea sp.	1-2 (depends on the specific species)
	Paracoccus sp.	1 (except for *Paracoccus yeei*, which belongs to risk group 2)
	Roseomonas sp.	1-2 (depends on the specific species)
	Staphylococcus epidermidis	2
	Staphylococcus aureus	2
	Staphylococcus warneri	1
	Staphylococcus caprae	2
	Solibacillus sp.	1
	Streptococcus sp.	1-2 (depends on the specific species)
	Pseudomonas aeruginosa	2
	Proteus mirabilis	2
	Staphylococcus sciuri	1
	Staphylococcus arlettae	1

CONCLUSION

Thus, the question of the microbial diversity of the surface of wet wipes, medical masks, which have become garbage, is only beginning to be investigated. At the same time, attention is focused on pathogenic indicator microorganisms as a potential danger to human health. The identified representatives of the microbial diversity of hygiene products are involved in the cycles of Carbon, Nitrogen, Phosphorus, and Sulfur, but most of them belong to risk group 2 and cannot be considered as bioremediation agents.

Among bacteria that belong to risk group 1 and should be considered as potential biotechnological agents to solve the problem of disposal of wet wipes and medical masks, *Pseudomonas fluorescens* deserves attention. Further research should be aimed at deepening knowledge about the microbial diversity of hygiene products, not only with regard to pathogenic microorganisms, but also anaerobic sulfate-reducing bacteria as active biodegraders of materials with significant biotechnological potential of bioremediators.

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