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8TH MICROBIOME R&D & BUSINESS COLLABORATION CONGRESS: ASIA

Evaluation of the Antiperspirant and Antibacterial Deodorant: An Integrated Approach to Sweat and Malodor Control on Axillary Skin

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Poster ID# 26

Introduction

The combination of sweat gland production and microbiome in axillary skin plays significant roles in producing malodor[1]. The *Staphylococcus* and *Corynebacterium* genus are associated with the transformation of odorless sweat into volatile short-medium chain fatty acid compounds[2]. The study aims to evaluate antiperspirant and deodorant (APDEO) containing aluminum and antibacterial substances to reduce sweat production and control the malodor bacteria's activities, hence reviewing the correlation between malodor, sweat, and odor-causing bacteria.

Materials and Methods

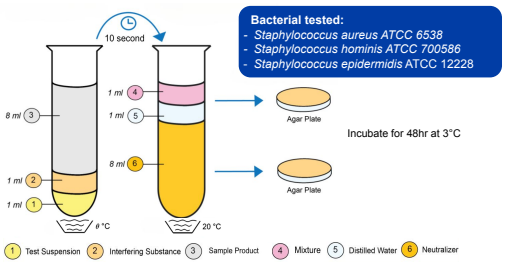
Microdilution Assay

Bacterial Inoculum and Active Preparation
- Antibacterial active: CPC
- Bacterial tested: *Staphylococcus aureus* ATCC 6538 and *Cutibacterium acnes* ATCC 11827

Inoculate, Incubate and Measure
- Incubate for 48h at 37°C
- OD600 was measured by microplate reader

The lowest concentration showing clear suspension was determined as MIC

Antibacterial Susceptibility Testing (Kill Test)



Swab Test



Swab the armpit surface at 0hr (before and after apdeo application), 4hr and 8hr

Transfer into NaCl solution → Pour plate 1 ml sample suspension in Tryptic Soy Media → Incubate for 48h at 37°C

Sweat Level Production Study

This study included 25 male participants aged between 22 and 33 years old. The sweat samples were obtained by placing a breast pad in the armpit of participants during their gym workouts. The quantity of sweat post-use of APDEO compared to the baseline.

Body Odor Evaluation

A dermatologist assessed the body odor of 25 male volunteers (22-33 y.o) through sniff tests using a rating scale. Examining the body odor data before and after 14 days the use of APDEO to evaluate the reduction in malodor.

Results & Discussion

The APDEO emulsion contained aluminum chlorohydrate as antiperspirant and cetylpyridinium chloride (CPC) as mild antibacterial agent that has mode of action interact with cell surfaces and disintegrate the bacterial membrane[3]. The MIC of CPC against *Staphylococcal* and *Corynebacterium* genus were 0.0004% and 0.1% (g/ml) which has a powerful effect on inhibiting malodor-causing bacteria.

By the quantitative suspension test, cultured *Staphylococcus hominis*, *Staphylococcus aureus*, and *Staphylococcus epidermidis* were effectively killed at 99.999% in 10s.

Table 1. APDEO Kill Precentage on *S. aureus, S. hominis, S. epidermidis*

Product Test	Batch number	Contact time	Bacterial tested	Input Load (CFU/ml)	Output Load (CFU/ml)	Log reduction	Kill percentage
APDEO	HJ25	10s	*S. aureus*	1.56E+07	1.40E+01	6.046	99,9999%
			S. hominis	2.82E+07	2.00E+02	5.149	99,9993%
			S. epidermidis	8.85E+07	3.50E+02	5.402	99,9996%

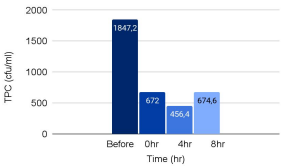


Figure 1. Bacterial reduction (cfu/ml) after using APDEO 4 and 8 hours

In vivo bacterial assessment on axillary skin by the swab test showed significant bacterial reduction (-75.29%, $p<0.05$) after using APDEO for 4 and 8 hours compared to before application.

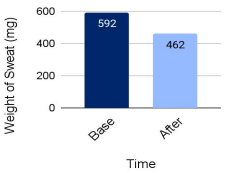


Figure 2. Sweat reduction (mg) after using APDEO 72 hours

Additionally, in vivo gravimetric assessment to measure sweat level production showed that APDEO significantly reduced sweat production (-21.90%, $p<0.05$).

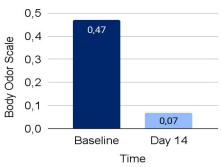


Figure 3. Body odor reduction after using APDEO 14 days

The efficacy of malodor reduction caused by bacteria activity is measured based on a sniff test, which found that malodor was reduced (-85.71%, ns) after 14 days.

Conclusion

The APDEO which contains antiperspirant and antibacterial has successfully shows the correlation between reduction in bacterial numbers with the reduction of produced sweat and body odor.

Acknowledgement

Thank you to the Research and Development Department of PT Paragon Technology and Innovation which has assisted in providing raw materials, facilities and funds for formulations and testing of the antiperspirant deodorant for carrying out this research.

References

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