

Effects of Commercial Topical Shampoos on Skin Surface Sebum in Normal Canine Skin

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Abstract : Various commercial shampoos were frequently prescribed for dermatologic therapy in small animal practice. Skin surface sebum affected by the shampoos, however, was not evaluated routinely. In order to evaluate the skin surface sebum for the exact prescription of shampoos methods to measure skin surface sebum of shampoos are needed. This study was undertaken to evaluate the skin surface sebum effect of shampoo on canine skin using sebometry. Five healthy dogs were applied with 3 commercial shampoos: Sebocalm, Sebolytics, and Benzoyl peroxide. Sebocalm had a great effect on skin surface sebum and normal saline also affected the skin sebum. Sebolytics and benzoyl peroxide had a moderate effect of skin sebum. The lowest effect was shown in detergent. Therefore, Sebumeter was considered a good and convenient apparatus for skin sebum measurement in order to evaluate the effect of shampoos on skin sebum: None of the products tested had any negative effect on the skin barrier function.

Key words : Sebumeter, skin surface sebum, shampoos, dog

Introduction

The diagnosis of skin lesions and diseases has always been based almost exclusively on morphologic analysis by dermatologist. With respect to other fields of medicine, dermatology has made little use of instruments that provide objective and reproducible morphologic descriptions⁴.

Possible applications of instrument to measure the skin sebum include the study of sebaceous gland physiology and the influence of environmental factors such as temperature, humidity, UV radiation on skin surface sebum². An important field of investigation is quantifying the effects of medications such as retinoids and of topical preparations on skin surface lipids.

In veterinary dermatology various topical agents was used for treatment of skin diseases as ancillary therapy. However, there are limitations for evaluation of their effect on skin surface and lacks of instruments.

The purpose of this study was to quantify the difference in skin surface sebum after the application of shampoos on canine skin with saline and detergents using sebumeter.

Materials and Methods

Experimental animals

Five clinically normal mixed breed dogs, aged between 2 to 4 years, 1 male and 4 female were included in this study. We performed the general physical and dermatological examination, and the absence of frank disease was estab-

lished. The dogs were kept in the room in which measurements were made for at least an hour before readings were taken. No particular precautions were taken to prevent sweating, although frank sweating was not observed in any of the dogs.

Measurement of sebum

A Sebumeter (Sebumeter SM 810, CK electronic, Germany) was used to measure the sebum of skin surface. The meter consisted of a plastic film cassette and the actual measuring unit. A matted plastic tape is wound up in the plastic film cassette. Each measurement starts with a zero calibration step. With the zero cycle finished, the plastic film cassette was taken out of the instrument and its head was placed on the investigated skin area. The head was then reinserted into the instrument and the transparency of the film was measured. The indicated value corresponded to the sebum amount on the skin surface in micrograms per square centimeter.

Three shampoos were tested, which were Sebocalm, Sebolytic (Virbac, France), Peroxyderm (Chasoot, Swiss) and diluted as a 1:10 aqueous solution with distilled water. One negative control site consisted of saline only and one positive control site consisted of detergent (antibacterial hand soap, Kirkland signature TM, USA).

The hairs in abdomen were clipped with No. 10 clipper (Oyster, USA) prior to baseline data collection. Each test area was divided into 15x15 mm test zones separated by Medical Bandage tape, to avoid lateral spread of the material. Fifty microliters of each test substance was applied in the center of each area. The material was spread on the area studied to produce a uniform film. The emulsion was

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allowed to stay for 7 minutes. Measurement was made in T_0 , $T_0 + 7$, $T_0 + 17$, and $T_0 + 77$.

Statistical analysis

The significant difference between the mean values for each group was evaluated using Students paired *t*-test. A probability of 95 per cent or more was regarded as significant.

Results

Fig 1 compares the mean results of the skin sebum of the benzoyl peroxide, saline and detergent. Skin surface sebum after application of benzoyl peroxide was significantly lower than that of saline at 7 minutes ($p < 0.05$), and significantly higher than that of detergent at 7 and 17 minutes ($p < 0.01$, $p < 0.05$). The skin surface sebum after application of Benzoyl peroxide was: (mean \pm SE) 2.40 ± 0.24 , 65.20 ± 11.70 , 65.80 ± 18.91 , 3.20 ± 0.58 $\mu\text{g}/\text{cm}^2$ at T_0 , T_7 , T_{17} and T_{77} , respectively.

The mean skin surface sebum for Sebolytics was 2.80 ± 0.20 , 39.20 ± 13.30 , 44.20 ± 29.80 , 2.40 ± 0.24 $\mu\text{g}/\text{cm}^2$ at T_0 , T_7 , T_{17} and T_{77} , respectively (Fig 2). The significance was observed at 7 minutes comparing with the saline ($p < 0.01$) and detergent ($p < 0.05$).

In Sebocalm mean skin surface sebum reached 2.80 ± 0.20 , 39.20 ± 13.30 , 44.20 ± 29.80 , 2.40 ± 0.24 , 4.20 ± 0.58 at 7, 17, 77 minute after application, respectively (Fig 3). The significant increase was found at 7 minutes ($p < 0.01$) and at 17 minutes ($p < 0.05$) than those of detergent.

Discussion

In dog the surface lipids are mainly of epidermal origin and from maturing corneocytes, which contain about six times the amount of intracellular lipid as keratinocytes in the stratum basale, whereas those of humans are mainly of sebaceous gland⁷.

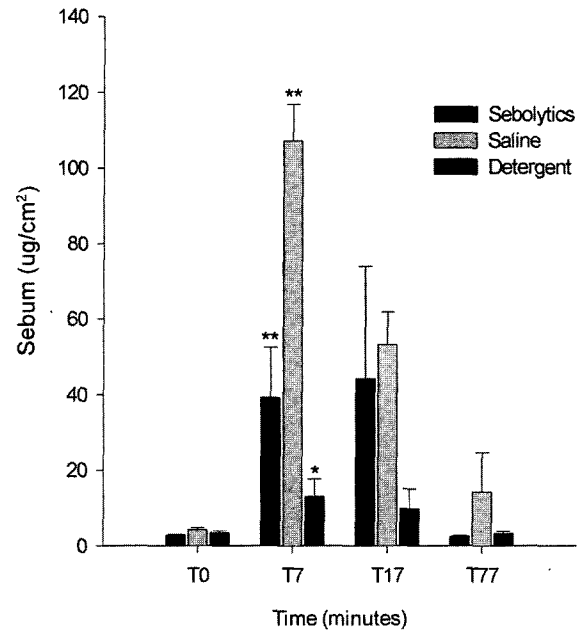


Fig 2. Skin surface sebum after application of sebolytics, saline and detergent by Sebumeter (Sebum SM 810) in canine skin.

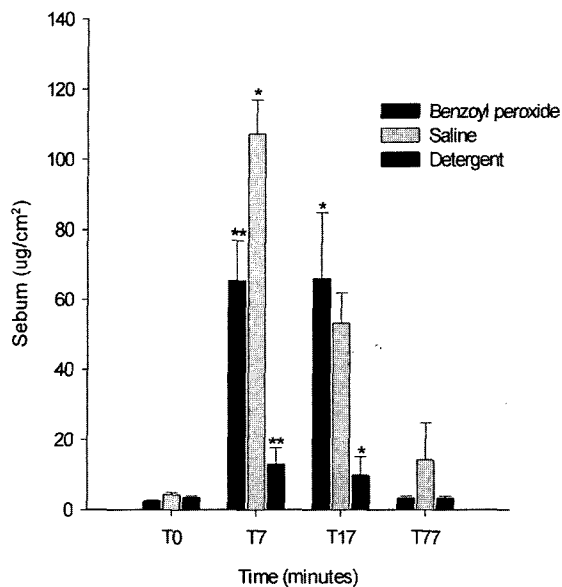


Fig 1. Skin surface sebum after application of benzoyl peroxide, saline and detergent by Sebumeter (Sebum SM 810) in canine skin.

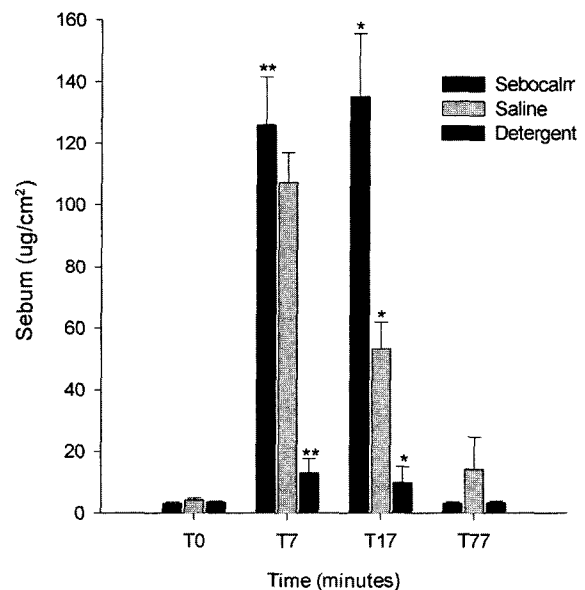


Fig 3. Skin surface sebum after application of sebocalm, saline and detergent by Sebumeter (Sebum SM 810) in canine skin.

The sebum amount present at the skin surface can be measured non-invasively using one of several methods based on solvent extraction, cigarette paper pads, photometric assessment, bentonite clay and lipid-sensitive tapes⁵. Sebumeter SM 810 is a more recently developed and commercially available photometric instrument. And it has accuracy, reproducibility, commercial availability, and easy handling. Now the Sebumeter is used in much research in human medicine¹. As a rule, accuracy of the methods is adversely affected by skin temperature, degree of hydration and surface roughness⁵.

In this study Sebocalm has a good effect on skin surface sebum, whereas detergent has the least effect on skin sebum. Therefore, it was suggested that if skin surface lipid was high detergent was a good candidates for topical therapy. Also, Sebocalm can be used for low skin lipid state. Benzoyl peroxide and Sebolytics has also moderate effect on skin surface lipids, which were lower than saline and higher than detergent.

The effect of repeated application of a moisturizer on the forearms was analyzed by Serup *et al*⁶. The increase in stratum corneum hydration noted from the second day of treatment up to 7 days after cessation of treatment was never accompanied by an increase in skin surface lipids as measured with the Sebumeter 12 hours after product application. As no emulsion oil is detected on the skin surface, the oily substances are believed to penetrate the stratum corneum, where they can interact with the intercellular substances. Similar conclusions were drawn by Vilaplana *et al*⁸. In this study after 77 minutes the skin surface sebum of Sebocalm, Sebolytics and Benzoyl peroxide was reached to base line. This means that these agents were absorbed into the epidermis. These results were consistent with clinical implication about the skin contact time i.e. 15 minutes. Further research was needed to evaluate the effect of moisturizer, oil-in-water

emulsion for treatment of dry skin in canine patient using Sebumeter.

Conclusion

In present study we measured the skin surface lipid using Sebumeter. Sebocalm had a great effect on skin surface sebum and normal saline also affected the skin sebum. Sebolytics and benzoyl peroxide had a moderate effect of skin sebum. The lowest effect was shown in detergent. Therefore, Sebumeter was considered a good and convenient apparatus for skin sebum measurement in order to evaluate the effect of shampoos on skin sebum.

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개에서 피부 치료용 샴푸가 표피유분에 미치는 영향

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요약 : 표피유분측정기를 이용하여 정상적인 개 피부에 상용샴푸를 적용한 후 유분을 측정하였다. Sebocalm이 표피유분에 가장 많은 영향을 미쳤으며 Sebolytics와 Benzoyl peroxide는 중등도의 영향을 주었다. 물비누의 영향이 가장 낮았다. 따라서 Sebumeter는 표피유분측정에 간단하고 편리한 측정기로 샴푸이외의 피부적용 약물의 표피유분에 미치는 영향을 조사하는데 유용할 것으로 판단된다.

주요어 : Sebumeter, 표피유분, 샴푸, 개