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Topical application of cinnamon (cinnamomum burmanii) essential oil has the same effectiveness as minoxidil in increasing hair length and diameter size of hair follicles in male white Wistar rats (*rattus norvegicus*)

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ABSTRACT

Introduction: In aging process, the hair experiences thinning and the hair shaft becomes more fragile due to decreased regeneration of hair. Cinnamon essential oil contains cinnamaldehyde compounds which have a vasodilating effect on blood vessels and stimulating IGF-1 can increase fertility and prevent hair loss.

Methods: This study was an experimental study with a post test only control group design carried out in the laboratory animal unit of the pharmacology section of the Udayana University medical faculty. In this study 30 male white rats (Rattus norvegicus) wistar lines were sheared 4cmx4cm which were divided into three groups: negative (aquades) control group (2% minoxidil), treatment group with cinnamon essential oil (concentration 100 %) for 30 days.

Results: The average hair length of aquades (P0) was 5.88 ± 0.36 mm, minoxidil group 2% (P1) 7.4 ± 0.20 mm. , cinnamon essential oil group (P2) 8.32 ± 0.18 mm In the diameter size of hair follicles in the three groups showed the mean diameter size of hair follicles was significantly different (P <0.05). The average results of the group hair follicle diameter (P0) were 79.73 ± 30.68 µm, group (P1) 127.07 ± 38.20 µm and group (P2) 130.91 ± 49.96 µm. The LSD test results on hair length measurements between the three groups showed a very significant difference (P <0.01). Group P0 and P1-1,51 mm, group P0 and P2-2,44 mm group P1 and P2 0,92 mm. The results of LSD hair follicle diameter P0 and P1 -47.34 µm (P <0.05), P0 and P2 -51.18 µm (P <0.01), P1 and P2 -3.84 µm (P> 0 , 05)

Conclusion: The application of topical cinnamon essential oil increases hair length and diameter size of male wistar rat hair follicles as effectively as topical minoxidil 2%.

Keywords: Cinnamon essential oil, Minoxidil 2%, Hair length, Diameter of hair follicles.

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INTRODUCTION

Aging process of the hair occurs from time to time. Hair is thinning and the hair shaft becomes more fragile due to decreased regeneration of hair growth. At the age of 40-50 years there is a change in the hair shaft, hair diameter, hair density, hair elasticity and hair cuticle also becomes more fragile so the hair starts to fall out easily. Hair that experiences a non-androgen aging process over the age of 60 years has a progressive decrease in the number of anagen follicles and hair diameter. Hair follicles in the elderly tend to have decrease in diameter of the hair follicle and the thickness of the hair. Various ways have been done to maintain hair fertility including chemicals such as Minoxidil. Based on a food drug administration (FDA), a topical drug that is safe and effective in dealing with hair loss and baldness, namely Minoxidil has been shown to reduce hair loss. Cinnamon (Cinnamomum burmanii) since immemorial has been used by the people as drugs.[1] As an herbal ingredient, cinnamaldehyde is the main compound in Cinnamon which could prevent hair loss. In this study, the use of essential oils derived from cinnamon bark with the content of Cinnamaldehyde compound 67.94%, Eugenol 7.86%, 1.8-Cineole 1.45%, Cinnamyl Acetate 4.55%, Linalool 2,15 %. Cinnamaldehyde content in cinnamon essential oil can prevent hair loss. Based on the description above, the researcher was interested in conducting research on the effect of topical cinnamon essential oil on male white rats in Wistar strain (Rattus Norvegicus) in increasing hair length and diameter size of hair follicles compared to 2% topical minoxidil.

METHODS

This study was an experimental study with a post test only control group design carried out in

the laboratory animal unit of the pharmacology department of the Udayana University. In this study, 30 male white wistar rats (Rattus Norvegicus) were shaved 4cmx4cm which were divided into three groups: negative (aquades), control group (2% minoxidil), and treatment group which received cinnamon essential oil (concentration 100 %) for 30 days.

All research data were analyzed using SPSS 16.0. Test of the normality of the data was conducted using the Shapirro-Wilk test, because the data was <30 samples of each research group. Data distribution was declared normal if p> 0.05. The data homogeneity was evaluated using Levene test, the variant of the data is declared homogeneous if p> 0.05. Comparative test was conducted using parametric test One Way Anova because the data was normally distributed and homogeneous in more than 2 groups. In the One Way Anova test, with p <0.05, further testing (Post Hoc Test) was conducted using the Least significant Difference-Test to compared the three treatment groups.

RESULTS

In this study, topical cinnamon essential oil administration was proved to significantly increase hair length and diameter size of hair follicles. However, the results of LSD showed no significant results between the 2% minoxidil group and cinnamon essential oil.

Table 1. Comparison of mean hair length between treatment groups

Kelompok subyek	n	Rerata ukuran panjang rambut (mm)	SB	F	P value
P0	10	5,88	0,35	203,502	0,000
P1	10	7,43	0,20		
P2	10	8,25	0,22		

Table 2. Analysis of the comparison of hair length between the two groups

Kelompok	Beda Rerata panjang rambut (mm)	p	Interpretasi
P0 dan P1	-1,44	0,00	*Highly significant*
P0 dan P2	-2,37	0,00	*Highly significant*
P1 dan P2	-0,82	0,00	*Highly significant*

The results of the one way Anova test group P0 was 79.73 ± 30.68 µm, group P1 was 127.07 ± 38.20 µm and group P2 was 130.91 ± 49.96 µm. With p <0.01.

The results of the further comparative test between groups (LSD) of Group P0 and P1-1,51 mm, group P0 and P2 -2,44 mm group P1 and P2 0,92 mm showed the results of highly significant differences (p <0,01) between the three group.

One way ANOVA test of the diameter size of hair follicles was significantly different in the three groups (P <0.05), the average diameter size of the control group (P0) was 70.73 ± 30.68 µm, the Minoxidil (P1) group was 127.07 ± 38.20 µm and the cinnamon essential oil (P2) group is 130.91 ± 49.96 µm.

From the results of the further comparison test between groups (LSD) P0 and P1 -47.34 µm (P <0.05), P0 and P2 -51.18 µm (P <0.01), P1 and P2 -3.84 µm (P> 0.05). It was found that there were significant differences between the mean difference in diameter size of group treated with essential oils with the mean difference in the aquades group (P <0.01) with an average difference of 51.18 µm. However, it did not show a significant difference when compared with Minoxidil 2%.

DISCUSSION

In this study, rats aged 17-18 months were used because they were regarded as the same age as humans aged 45-50 years so that they were in line with the anti-aging concept.[1]

As the aging process progresses, the hair loses the ability to regenerate. Hair stems will become white, dry, thin and experience a decrease in the size of the hair follicle.[3,4] The hair growth cycle is also found to slow down the telogen phase hair cycle (rest) more than the anagen phase (growth) so that there is a lot of hair loss.[8] Based on a safe and effective topical drug drug administration (FDA) treatment for hair loss and baldness, minoxidil has been shown to reduce hair loss.

In this study, essential oil preparations from cinnamon bark were examined in the analytical laboratory of Udayana University with the active content of Cinnamaldehyde 67.94%, Eugenol 7.86%, 1.8-Cineole 1.45%, Cinnamyl Acetate 4.55 %, Linalool 2.15%. Cinnamon essential oil was applied topically with a dose of 0.2cc twice a day for 30 days, then the hair length and hair diameter were measured in the 4x4cm area. Data can be seen in **Table 1** and **Table 4**). According to one way

Table 3. Comparison of mean diameter of hair follicles between treatment groups

Kelompok subyek	n	Rerata ukuran diameter folikel rambut (µm)	SB	F	P
P0	10	79,73	30,68	4,977	0,014
P1	10	127,07	38,20		
P2	10	130,91	49,96		

Table 4. Comparative results of two groups on the variable diameter of hair follicles

Kelompok	Beda Rerata diameter folikel rambut (µm)	p	Interpretasi
P0 dan P1	-47,34	0,014	*significant*
P0 dan P2	-51,18	0,009	*Highly Significant*
P1 dan P2	-9,70	0,833	*Not Significant*

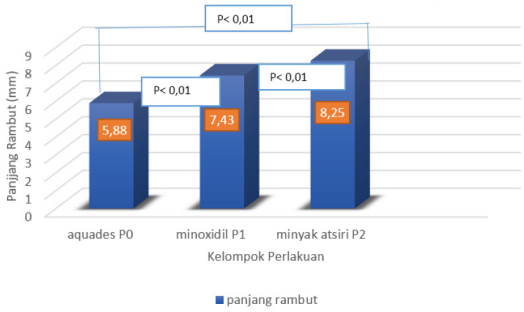

Figure 1. Comparison of mean hair length for aquades, minoxidil 2% and cinnamon essential oil group.

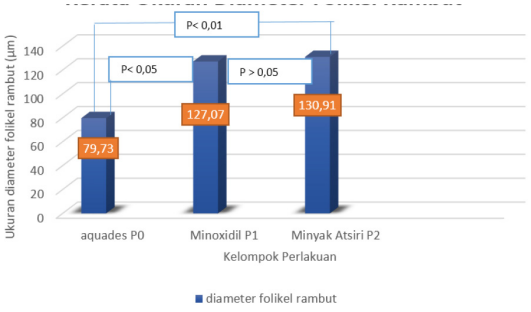

Figure 2. Average diameter size of hair follicles in aquades, 2% minoxidil and cinnamon essential oil

Anova test, topical administration of cinnamon oil has been shown to significantly increase hair length and diameter size of hair follicles. The content of Cinnamaldehyde in cinnamon essential oil can prevent excessive hair loss in people with advanced age because Cinnamaldehyde increase vasodilation of blood vessels causing an increase in blood flow, nutrition and oxygen to the hair roots, accelerating hair growth. Cinnamaldehyde can also stimulate IGF-1 metabolism in the papilla of hair follicles so that it can extend the anagen phase. Anagen phase is very important in maintaining hair fertility so that the hair rest period can be shortened and the hair becomes less hairy. However, in the follow-up statistical test using LSD, it was found that the diameter size of hair follicles was not significantly different from the administration of topical minoxidil 2%.

CONCLUSION

The topical aplication of cinnamon essential oil increase hair length and hair follicle diameter in male white Wistar rats and regarded as effective as 2% topical minoxidil.

REFERENCES

1. Buffoli, B., Rinaldi, F., Labanca, M., Sorbellini, E., Trink, A., Guanziroli,E., Rezzani, R.,Rodella, L.F..The Human Hair: From Anatomy to Physiology. International Journal of Dermatology. 2013. Accessed : 15 November 2015.Availablefrom: URL: http//www.researchgate.net/publication/259488385
2. Takahashi,T., Mamada, A., Breakspear,S., Itou, T., Tanji,N. Age Dependent Changes in Damage Process of Hair Cuticle. *Cosmetic Dermatology Journal 2015*;14(1): 2-8.
3. Trueb, RM. Oxidative Stress in Aging of Hair .*International Journal of Trichology 2009*; 1(1): 6-14.
4. Matsumura, H., Mohri, Y., Bihn, N.T., Morinaga, H., Fukuda, M., Ito, M., Kurata,S., Hoeijmakers, J.,Nishimura, E.K. Hair follicle aging is driven by transepidermal elimination of stem cells via COL17A1 proteolysis. *Journal of Advanced Scientific Research 2016*;351(6273)
5. Varothai, S., Bergfield, W.F. Androgenetic Alopecia: An Evidence-Based Treatment Update. *American Journal Clinical Dermatology 2014*;15(3): 217-230.

6. Towaha, J. Indriati, G. Multifungsi Tanaman Kayu Manis (Cinnamomum). *Warta Penelitian dan Pengembangan Tanaman Industri 2008*;14(2)
7. Sengupta, P. The Laboratory Rat: Relating Its Age With Human's. International Journal of Preventive Medicine 2013;4(6): 624-630.
8. Neste, D.V., Tobin, D.J. Hair Cycle and Hair Pigmentation: Dynamic Interactions and Changes Assosiated With Aging. Micron 2004; 35 (3). P: 193-200.