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The relationship between ABO blood group typing with tinea corporis and or tinea cruris in Tanjung Gusta Prison, Medan-Indonesia



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ABSTRACT

Introduction: Tinea corporis and tinea cruris are skin infections caused by dermatophyte fungus and may be characterized by the serpiginous plaque with scales along the edges of an active erythematous lesion accompanied by central healing in the center of the lesion. Blood type is thought to play a role in the incidence of tinea corporis and tinea cruris disease and can affect the disease becomes chronic. This study aims to determine the relationship between ABO blood group typing with tinea corporis and or tinea cruris.

Methods: Study design using cross-sectional analytic study which involved 68 patients who suspected tinea corporis and or tinea cruris. We did 10% potassium hydroxide examination of skin scrapping, cultured of dermatophyte, collected blood sampling and checked for ABO blood group typing to all subjects. Chi-square analysis is used to evaluate the relationship between tinea corporis and cruris with ABO blood type.

Results: In this research, most of the sexes were male (45,6%),

most of the ages were 26-35 years old (38,2%), the highest level of education were junior high school and college (25% and 25%), the highest duration of disease was chronic (72,1%), the highest result of 10% potassium hydroxide examination was negative (52.9%), most of fungal culture result was no dermatophyte fungus growth (73.5%), and the highest incidence of tinea corporis and or tinea cruris belonged to blood group A (27.9%). Statistically, there was significant relationship between blood group with tinea corporis and or tinea cruris ($p = 0.000$), there was significant relationship between blood group with tinea corporis and or tinea cruris based on 10% potassium hydroxide examination ($p = 0.000$), and cultured of dermatophyte ($p = 0.000$), but there was no significant relationship between blood type with duration of disease ($p = 0.634$).

Conclusion: There was significant relationship between blood group with tinea corporis and or tinea cruris.

Keywords: tinea corporis, tinea cruris, ABO blood typing, dermatophytosis

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INTRODUCTION

Tinea corporis and tinea cruris are skin infections caused by dermatophyte fungus. Tinea corporis is a dermatophytosis of glabrous skin except palms, soles, and the groin and tinea cruris is a dermatophytosis of the groin, genitalia, pubic area, and perineal or perianal skin. Most of tinea corporis and tinea cruris is caused by *Trichophyton rubrum*.^{1,2}

Tinea corporis may be transmitted directly from infected humans or animals, via fomites, or it may occur via autoinoculation from reservoirs of dermatophyte colonization on skin. The classic presentation of tinea corporis and tinea cruris is serpiginous plaque with scale along the edges of an active erythematous lesion accompanied by central healing in the center of the lesion.¹⁻³

The role of ABO blood groups in the carriage rate of dermatophytosis was studied recently.

Studies involving cell wall of dermatophytes have demonstrated that *Trichophyton mentagrophytes*, *Trichophyton rubrum*, and *Epidermophyton floccosum* have glycoproteins that are antigenically similar to human erythrocyte isoantigen A. Individuals that have these erythrocytic antigens would be more susceptible to development of generalized dermatophytosis and resistant to the treatment than the individuals devoided of these antigens.¹⁻⁴ The study to investigate the relationship between blood group and tinea incidence to evaluate the presence of certain susceptibility of blood group to skin fungal infection becomes important to be evaluated.

METHODS

This study conducted from March 2017 until January 2018. This was a cross-sectional observational analytic study involving 68 patient who suspected

Table 1 Subjects characteristic

Charateristic		Frequency	Percentage
Age	17-25 years old	16	23.5 %
	26-35 years old	26	38.2 %
	36-45 years old	8	11.8 %
	46-55 years old	15	22.1 %
	56-65 years old	3	4.4 %
Gender	Male	37	54.4 %
	Female	31	45.6 %
Level of education	Not school	5	7.4 %
	Elementary school	13	19.1 %
	Junior Highschool	17	25.0 %
	Senior Highschool	16	23.5 %
	University	17	25.0 %
Blood Typing	A	19	27.9 %
	B	15	22.1 %
	O	17	25.0 %
	AB	17	25.0 %
Duration of disease	acute (< 6 weeks)	19	27.9 %
	chronic (≥ 6 weeks)	49	72.1 %
10%Potassium Hydroxide	Negative	36	52.9 %
	Positive	32	47.1 %
Culture of dermatophyte	Negative	53	73.5 %
	<i>T.mentagrophytes</i>	6	10.3 %
	<i>T.rubrum</i>	8	14.7 %
	<i>T.violaceum</i>	1	1.5 %

Table 2 Relationship between ABO blood group system and tinea corporis and or tinea cruris

Blood Type	Groups				p-value
	tinea corporis and or tinea cruris		Non-tinea corporis and or tinea cruris		
A	17	53.1%	2	5.6%	0.000
B	2	6.3%	13	36.1%	
O	5	15.6%	12	33.3%	
AB	8	25.0%	9	25.0%	
Total	32	100%	36	100%	

Table 3 Relationship between ABO blood group system and tinea corporis and or tinea cruris based on 10% potassium hydroxide examination.

Blood Type	10% potassium hydroxide examination				p-value
	Negative		Positive		
A	2	5.6%	17	53.1%	0.000
B	13	36.1%	2	6.3%	
O	12	33.3%	5	15.6%	
AB	9	25.0%	8	25.0%	
Total	36	100%	32	100%	

tinea corporis and or tinea cruris in Tanjung Gusta prison, Medan, North Sumatera, Indonesia, who were 17-65 years old. Each subject who have signed informed consent were included in this study. Exclusion criteria were having a history of HIV/AIDS, diabetes mellitus, malignancies, bleeding disorders, have a history of chemotherapy, receiving organ transplants, pregnancy and lactating. Ethical clearance was given by Health Research Ethical Committee, Faculty of Medicine, University of Sumatera Utara. All subjects who suspected tinea corporis and or tinea cruris were diagnosed by clinical and mycological examinations. We collected blood sampling with fingerprick methods and checked for ABO blood group typing to all subjects.

The results were statistically analyzed by chi-square test. This test was used to determine relationships and *p* values less than 0.05 were considered significant results.

RESULTS

Penelitian ini menggunakan 68 subjek penelitian yang didapat dari penjara Tanjung Gusta, Medan-Indoneisa. Karakteristik subjek dapat dilihat pada [Table 1](#).

Most subjects involved in this study, were man, 26-35 years old, junior high school and college, duration of disease were chronic, the highest result of 10% potassium hydroxide examination was negative, most of fungal culture result was no dermatophyte fungus growth and the highest incidence of tinea corporis and or tinea cruris belonged to blood group A (table 1). Relationship between tinea and blood group are shown in [Table 2](#).

Based on [Table 2](#), it is found that blood type A is the most often found in tinea corporis group and or tinea cruris groups, which is 17 people (53.1%), followed by blood type AB as many as 8 people (25%), blood group O as many as 5 people (15.6%), and B group of 2 people (6.3%). There was significant relationship between blood group with tinea corporis and or tinea cruris ($p=0.000$). Relationship between tinea and KOH 10% examination are shown in [Table 3](#).

Based on [Table 3](#), this study found that the highest blood group in tinea corporis and or tinea cruris based on 10% KOH examination is blood type A, which is 17 people (53.1%), followed by blood group AB of 25%, blood type O, that is 5 people (15.6%), and blood type B, that is 2 people (6.3%). There was significant relationship between blood group with tinea corporis and or tinea cruris based on 10% potassium hydroxide examination ($p=0.000$).

Table 4. Relationship between ABO blood group system and tinea corporis and or tinea cruris based on cultured of dermatophyte

Blood Type	Cultured of dermatophyte								p-value
	Negative		<i>T. mentagrophytes</i>		<i>T. rubrum</i>		<i>T. violaceum</i>		
A	6	12%	7	100%	5	50%	1	100%	0.000
B	15	30%	0	0%	0	0%	0	0%	
O	16	32%	0	0%	1	10%	0	0%	
AB	13	26%	0	0%	4	40%	0	0%	
Total	50	100%	7	100%	10	100%	1	100%	

Table 5. Relationship between ABO blood group system and duration of disease

Blood Type	duration of disease				p-value
	Acute (< 6 weeks)		Chronic (≥ 6 weeks)		
A	4	21.1%	15	30.6%	0.634
B	6	18.4%	9	18.4%	
O	5	24.5%	12	24.5%	
AB	4	26.5%	13	26.5%	
Total	19	100%	49	100%	

Based on Table 4, it was found out that the most blood group in the tinea corporis group and or tinea cruris based on the culture of the fungus are blood type A wherein infected *T. mentagrophytes* is 7 people (100%), *T. rubrum* as many as 5 people (50%) and *T. violaceum* as much as 1 person (100%). There was a significant relationship between dermatophyte culture and blood type ($p=0.000$)

Based on Table 5, obtained the result that the largest blood group on groups diagnosed with tinea corporis and or tinea cruris based on chronic duration (≥ 6 weeks) is blood type A, as many as 15 people (30.6%), followed by blood type AB, as many as 13 people (26.5%), blood type O, as many as 12 people (24.5%), and blood type B as many as 9 people (18.4%) but there was no significant correlation between blood type and duration of the disease ($p=0.634$).

DISCUSSION

Susceptibility to infection with dermatophytosis varies from person to person. Person with endocrinological disorders, malignant disease, hereditary palmoplantar keratoderma of Unna Thost variety is more susceptible than others. A

personal and family history of atopy has been found to be almost three times more common in chronically dermatophyte infected patients compared to non-atopic persons. The role of blood groups in association with particular kinds of infections is known, especially for infections caused by dermatophytosis, Gram-negative bacteria and *Coccidioides immitis*.^{5,6}

In this study, there was significant relationship between blood group with tinea corporis and or tinea cruris ($p= 0.000$). The highest incidence of tinea corporis and or tinea cruris belonged to blood group A (27.9%). This result is same with a study conducted by Balajee et al. who found that the incidence of dermatophytosis was higher in patients with blood type A and O, which 50% had blood type A and 45.4% had blood type O.⁶ The other research conducted by Nielsen et al. also found a higher incidence in individuals with blood type A.⁷

In this study, there was significant relationship between blood group with tinea corporis and or tinea cruris based on 10% potassium hydroxide examination ($p = 0.000$) and cultured of dermatophyte ($p = 0.000$). This is consistent with a study conducted by Alkhafajii et al. who found that there was a significant relationship between blood type and the dermatophyte species ($p < 0.001$). In this study researchers found that blood groups A and O are more susceptible to dermatophytosis infections caused by *T. mentagrophytes*, *T. tonsurans* and *E. floccosum*.⁸ This is consistent with studies conducted by Young and Roth, who found an antigenic similarity between cell wall glycoproteins of *T. rubrum*, *T. mentagrophytes* and *E. floccosum* with erythrocyte isoantigen A1 and A2 in humans which can cause cross-reactions that would change individuals belonging to blood type A is more susceptible to dermatophytosis infection.⁴ However, different results were found in another study conducted by Neering, where researchers could not find any relationship between ABO blood group and dermatophyte infection.⁹ Similarly, in a study conducted by Moreno et al. although the investigators found higher numbers in the blood group A, there is no strong statistical evidence suggest that individuals with blood type A are more susceptible to dermatophytosis.¹⁰

In this study, there was no significant relationship between blood type with duration of disease ($p = 0,634$). In another study conducted by Zaini et al. showed that blood group A had the most chronic dermatophytosis (26.6%), followed by blood group AB (29.4%), blood group O (18.3%), and the least chronic dermatophytosis was blood group B (14.7%).⁵ But in this study, researchers only looked at the distribution of blood group frequency based

on the duration of the disease but did not analyze the relationship between blood type and the duration of the disease further. In a study conducted by Young and Roth found that the presence of antigenic similarity between the glycoprotein cell wall of *T. rubrum*, *T. mentagrophytes* and *E. floccosum* and isoantigen erythrocytes A1 and A2 can develop lesions become chronic and characterized by the presence of hyperpigmentation lesions with fine scales.⁴ In chronic dermatophytosis, hyperpigmentation lesions accompanied by itching may expand widely over other body areas so it can decrease the patient's quality of life. In chronic dermatophytosis, the lesion is also more difficult and longer treated with a high recurrence rate, this may increase the cost of treatment and decrease patient adherence to treatment.⁹

CONCLUSION

There was significant relationship between blood group with tinea corporis and or tinea cruris. Further study needed to determine the pathogenesis of tinea corporis and or tinea cruris and whether blood group typing influenced on it.

CONFLICT OF INTEREST

Author has no conflict of interest regarding all element on this research

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