Milk Lactoferrin : A Novel Antifungal Drugs with Remarkable Azole Potentiation Activity Against *Candida albicans*

Maureen Miracle Stella[1], Sem Samuel Surja[2], Zita Arieselia[3]

[1]Doctor of Medicine Profession Student, School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia
[2]Department of Parasitology, School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia
[3]Department of Pharmacology and Pharmacy, School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia

UNIVERSITAS KATOLIK INDONESIA ATMA JAYA

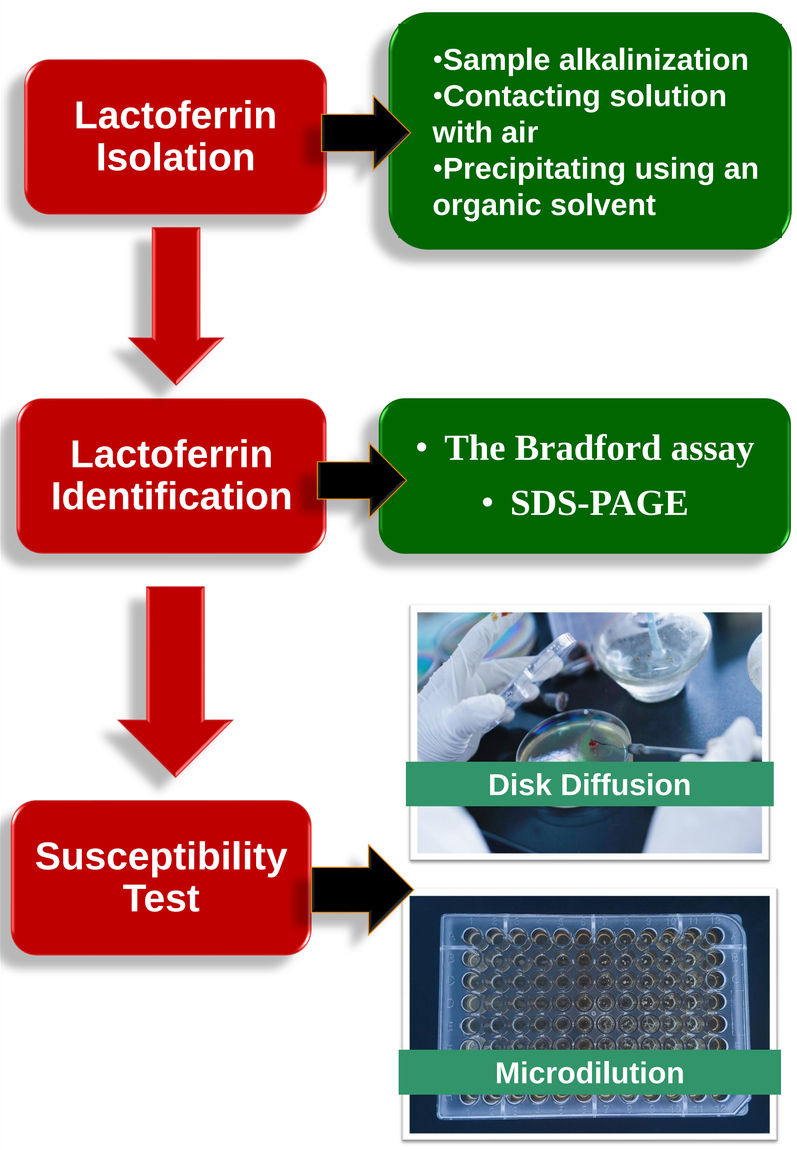
Introduction

The incidence of invasive fungal infection such as candidiasis is increasing in immunocompromised hosts that leads to considerable morbidity and mortality. In addition, due to antifungal resistance, a novel, effective, potential, and safe antifungal drugs is needed.

Aim

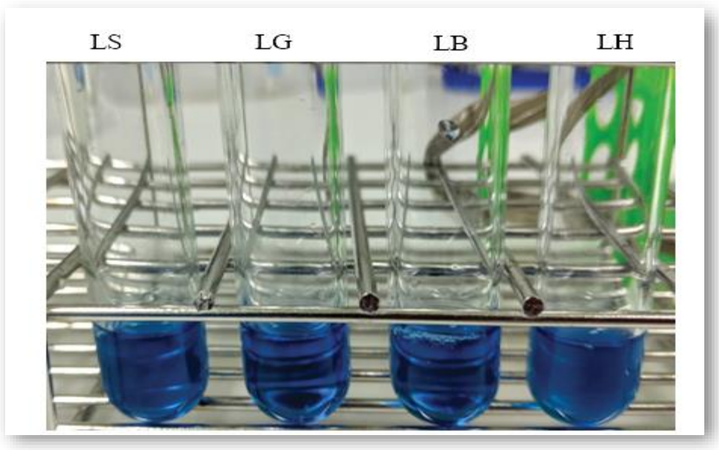
The aim of this study was assessment of antifungal activity and fluconazole potentiation effect of the lactoferrin isolated from human (LH), bovine (LB), goat (LG), and formula milk (LF) against *Candida albicans ATCC 90028*.

Methods

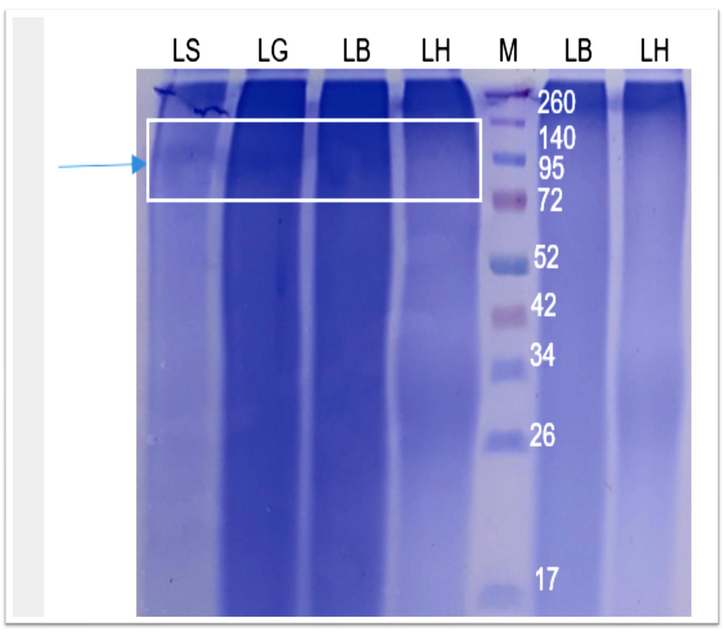


Results

Isolated lactoferrin appeared as a red paste.



The Bradford test gave positive results indicated by a blue color change in all samples.



Based on SDS-PAGE analysis, there is a faint band between the 72 and 95 kDa marker (M) bands, which indicate the molecular weight of proteins in all samples.

Table 1. Candida albicans ATCC 90028 inhibition zone

	I (mm)	II (mm)	III (mm)	Mean (mm)	Note
FLZ	28	-	-	28	
Aquadest	0	0	0	0	
LH	30	28	32	30	
FLZ + LH	43	42	40	41.67	Additive
LB	33	33	30	32	
FLZ + LB	47	45	46	46	Additive
LG	21	18	22	20.33	
FLZ + LG	42	39	39	40	Additive
LS	25	27	23	25	
FLZ + LS	37	38	35	36.67	Additive

FLZ: fluconazole; LH: human lactoferrin; LB: bovine lactoferrin; LG: goat lactoferrin; LS a: formula milk lactoferrin

Table 2. Candida albicans ATCC 90028 inhibitory concentration

Lactoferrin		MIC	FIC
Human	FLZ	0.5 µg/mL	2.5
	LH	0.78125%	
Bovine	FLZ	0.5 µg/mL	2.5
	LB	0.78125%	
Goat	FLZ	0.5 µg/mL	1.5
	LG	0.78125%	
Formula	FLZ	0.5 µg/mL	1.5
	LS	0.78125%	

MIC: minimum inhibitory concentration; FIC: fractional inhibitory concentration; FLZ: fluconazole; LH: human lactoferrin; LB: bovine lactoferrin; LG: goat lactoferrin; LS : formula milk lactoferrin

Conclusions

Human, bovine, goat, and formula milk lactoferrin showed potential antifungal activity and could increase the efficiency of current antifungal. These lactoferrins could become a useful natural bioactive agents that have antifungal activity against *Candida albicans* and could be used as a novel, effective, potential, and safe antifungal drugs especially in immunocompromised hosts.

References

Pappas PG, Kauffman CA, Andes DR, Clancy CJ, Marr KA, Ostrosky-Zeichner L, et al. Clin Infect Dis. 2015;62(4):e1–50.
Sudoyo AW, Setiyohadi B, Alwi I, Simadibrata M, Setiadi S. Interna Publishing. 2014. 1973-1983 p.
Bouza E, Muñoz P. Int J Antimicrob Agents. 2008;32(SUPPL. 2):87–91.
Wijana IP, Santoso H, Swastika IM, Paediatrica Indonesiana. Children. 2009;49(2):97–103.
Cuenca-Estrella M R-TJ. Expert Review of Anti-infective. Therapy. 2010;8:267–76.
Whaley SG, Berkow EL, Rybak JM, Nishimoto AT, Barker KS, Rogers PD. Front Microbiol. 2017;7(JAN):1–12.
Wang B, Timilsena Y, Blanch E, Adhikari BCritical Reviews in Food Science and Nutrition.
2017;59(4):580-596.
Lactoferrin in human milk : its role in iron absorption and protection against enteric infection in the newborn infant. 1980;417–21.
Andersson Y, Lindquist S, Lagerqvist C, Hernell O. Early Hum Dev. 2000;59(2):95–105.

Acknowledgements

The authors are grateful to pediatrician dr. Irene Rusli, also, Parasitology, Microbiology, and Biochemistry laboratory assistant for assisting this research. This research was financially supported by School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia.

21st ICHS Symposium on Infections in the Immunocompromised Host