*Iranian J Publ Health, 2005, Vol. 34, No. 2, pp.68-69*

**Short communication**

# Effect of Cryptococcal Capsular Compounds on Blood Coagulation in Animal Models

***AR Salehie-Nodeh, N Ashkanizadeh, MR Nikooie-Mogaddam, A Mirshafieii**

[1]*Dept. of Pathobiology, School of Public Health, Tehran University of Medical Sciences, Iran*

**(Received 13 Dec 2004; revised 2 Mar 2004; accepted 5 Jun 2005)**

## Abstract

Glucoronoxylomannan (GXM) is the most important compound of polysaccharide capsule in *Cryptococcus neoformans* that causes infection in its recognition as a foreign agent by immune system. Because of its similarity with some naural compounds such as heparin and hyaloronic acid, this study was undertaken to determine the effect of polysaccharide compounds on blood coagulative process and renal performance in two groups of laboratory animals including Guinea *pig* and rat via interaperitoneal injection of cuture filtrate *Cryptococcus neoformans's* var. *gattii*. The results of coagulation tests (PT, PTT, CT and BT) and the renal histopathological changes compared with control group. Insignificant difference between related tests in control and test groups were observed, therefore results of this research proposed capsular compounds have no effect on blood coagulative process and renal performance in persons who involved in cryptococcosis.

**Keywords:** *Glucoronoxylomannan (GXM)*, Cryptococcus neoformans*, Blood Coagulation, Iran*

## Introduction

*Cryptococcus neoformans* is an encapsulated yeast that causes chronic, subacute or acute pulmonary and systemic infections. A large proportion of human infection occurs in immunocompromised people but organism also can cause disease in normal individuals (1).

Capsular polysaccharide of this organism comprises of glucoronoxylomannan (GXM) 80-88%, galactoxylomannan (GalXM) 10-12% and mano-proteins ($MP_1$-$MP_2$) 1-2%. Serologically, these three-types of antigens have various effects on human immune system (2, 3). GXM also has some structural similarities with heparin, hyaloronic acid and kondroeithins.

## Materials and Methods

The present study was undertaken to determine the effect of GXM on blood coagulation in experimental models. Culture filtrate of *C. neoformans* Var.*gattii* injected intraperitonealy in two groups of animals. The animals in this study were 16 female rats of Dawley sprague stack weight approximately 220± 20 grams and about 10 months old (E1 group) and 10 *Guinea pigs* of white and short hair stack weight approximately 550±20 grams and about 10 months old (E2 group). Two groups of rats (n= 8) and *Guinea pigs* (n= 5), also were used as control in this study (N1 & N2 groups). Then 7.5 ml and 20 ml of *C. neoformans solution* of culture filtrates were injected intraperitonealy to E1 and E2 groups, respectively. These injections were continued every other day for 3 weeks and ultimately the two above mentioned groups received 36 and 38 mg/kg culture filtrate of *C. neoformans*, respectively. Finally, coagulative tests (PT, PTT, CT and BT) were


***Corresponding author:** Tel: +98 2166462268, Fax: +98 2166462267, E-mail: arsen51@yahoo.com

done to determine the effect of cryptococcol capsular compounds on blood coagulation process (Table 1 & 2).
Histopathological examination of kidney tissue also was done for detection of renal impairment by *C. neoformans* in animal models.

## Results and Discussion

This study showed that *C. neoformans* has no significant effect on blood coagulative tests and there was not any renal damage by administration of *C. neoformans* in experimental models. Recently immunosuppressive activity of heparin has been reported (4). Similarities between of GXM and heparin, suggestive that cryptococcal capsular compound may present as immunosupresive agent and further studies will be needed regarding different effects of this compound on immune system. The therapeutic effect of GXM could be considered in future.

**Table 1:** Results of coagulation tests in rat animal model

| Coagulant test | Mean | | Standard deviation | | Significant level *P* <0.05 |
|---|---|---|---|---|---|
| | Test | Control | Test | Control | |
| PT | 16 | 16.1 | 1.4 | 0.9 | NS* |
| PTT | 22.9 | 23.7 | 3.2 | 6.6 | NS |
| CT | 58 | 51 | 10.2 | 8.2 | NS |
| BT | 60 | 85 | 11.4 | 25.8 | NS |

* NS=Non significant

**Table 2:** Results of coagulation tests in Guinea pig animal model

| Coagulant test | Mean | | Standard deviation | | Significant level P <0.05 |
|---|---|---|---|---|---|
| | Test | Control | Test | Control | |
| PT | 34.5 | 32 | 2.8 | 1.8 | NT* |
| PTT | 27.3 | 22.6 | 3.1 | 2.7 | NT |
| CT | 66 | 51 | 31.1 | 62.8 | NT |
| BT | 39 | 18 | 20.1 | 4.1 | NT |

*NS=Non significant

## Acknowledgments

The authors wish to thank the following colleagues for their collaboration in this research: Dr Rasavi and Miss Ekhtiari, Dept. of Pathobiology, School of Public Health, Tehran University of Medical Sciences. Dr Shaivard, School of Pharmacology, Islamic Azad University, Iran

## References

1. Rippon JW (1982). Medical Mycology, *Pathogenic fungi and the pathogenic actinomycetes*. 2nd ed. Saunders Philadelphia.
2. Chermiak R, Sundstrom, JB (1994). Polysaccharide antigens of the capsule of *Cryptococcus neoformans*. *Infect Immun,* 62: 1507-12.
3. Dong, ZM, Murphy JW (1995). Effects of the two varieties of *Cryptococcus neoformans* cells and culture filtrate antigens on neutrophil locomotion. *Infect Immun*, 63: 2632-44.
4. Richardson Malcoln D, Warnock David W (2003). *Fungal infection: Diagnosis and management*. 3rd ed. Blackwell. Massachusetts.