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Detection of Incidence of the fungus *Crypytococcus* Infections among Immunocopromised Patients in Al-Najaf Governorate /Iraq

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ABSTRACT

Background: Cryptococcosis is caused by main two species namely *Cryptococcus neoformans* and *Cryptococcus gattii* . Most disseminated cryptococcus infections are with world-wide distribution and mostly involving immunocompromised persons. ***The aim****: of the study is to determine the incidence of fungal infection, given its incidence, severity, virulence factors, and mortality rate. The fungus is opportunistic in people with weakened immune systems and can also weaken the immune system.* ***Methods****: Serum samples were collected from immunocompromised patients, for a total of 102 samples. The patients were diagnosed routinely, but the results obtained using the VITEK system were used to determine the prevalence of the most common fungi.* ***Results****: The results showed that a certain proportion of patients had this fungus in their blood, based on serum samples. This proportion is not small and poses a risk to patients' overall health, especially those with weakened immune systems, given the fungus's opportunistic nature. It poses a significant danger to people with chronic diseases such as AIDS and other infections that weaken the immune system, creating opportunities for these fungi, particularly Cryptococcus. The remaining results included other fungi or yeasts, bacteria, and samples that could not be identified using VITEK techniques.* ***Recommendations:*** *Conduct more research on this fungus and learn more about it, including its virulence factors, how it causes infection, and the serious issues associated with it. Identify its genes and develop additional diagnostic techniques and methods for detecting routes of infection. Develop a vaccine or medication if possible, as it is extremely dangerous. Follow measures to strengthen the immune system to reduce the risk of opportunistic infection when immunity is weakened.* ***Conclusion:*** *The fungus is opportunistic and affects people with weakened immune systems. It takes advantage of weakened immunity, enters the bloodstream, and may then infect the organs. This makes it very dangerous, as it is more difficult to treat and can spread to other organs, such as the brain and glands, making it hard to treat and eliminate.*

Keywords: Cryptococcosis, Fungal Infection, Immunocompromised.

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INTRODUCTION

Cryptococcosis is caused by main two species, namely *Cryptococcus neoformans* and *Cryptococcus gattii* [1]. Most disseminated cryptococcus infections are with world-wide distribution and mostly involving immunocompromised persons [2]. The most common predisposing factors to disseminated cryptococcal infection are human immunodeficiency virus [1], long-lasting leukemia and lymphoma, long-term biological immunosuppressant therapy or corticoid, and diabetes and cirrhosis of the liver [3]. The

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fungus *Cryptococcus* is mostly found in soil and birds feces [4].

Mainly acquired through inhalation but mostly taking plac upon reactivation after a retro of latency, "cryptococcosis" has protean appearances, with "cryptococcal meningitis" being the most common severe exhibition. "Lung cryptococcosis" is underdiagnosed and often subclinical. Disseminated cryptococcosis can involve any organ of the body, thus, a thorough clinical assessment required, even in individuals, who appear asymptomatic[5,6].

There have been no prosecutions of alliance and maintenance treatment in cryptococcal meningitis within the past two periods. Two early educations established 400 mg daily fluconazole for consolidation therapy [7,8]. After the fungus is inhaled, it lives in the lungs and tries to evade the immune system and the body's response to it in these organs. The bronchi and other parts of the respiratory system—the airways—are covered with a layer of immune cells. This is where clashes and immune reactions occur, which can stimulate the rest of the immune system and trigger an immune battle. However, CD8 cells and other immune cells gradually withdraw from the defense, and the fungus then takes hold and grows in these organs. In addition, the lungs contain immune defenses that help maintain immune balance, as well as the characteristics specific to these organs. In this part of the body, the fungus has three types of dangerous virulence factors that allow it to evade the immune system, take hold, then invade and multiply within the respiratory system. These include adapting to the body's systems, evading the immune system, and subtle virulence factors. The fungus uses all three of these strategies. The pathogenic fungus has these mechanisms, or characteristics and virulence factors, which make it a dangerous pathogen that is difficult to overcome, whether by the immune system or by antifungal drugs [9,10].

METHODS

Serum samples were collected from immunocompromised patients, for a total of 102 samples. The patients were diagnosed routinely, but the results obtained using the VITEK system were used to determine the prevalence of the most common fungi.

Identification of spp. by VITEK technique

The isolates were cultured from (24-48) hours on SDA agar and then used according to the VITEK2 technology. The VITEK 2 Compact is a fully automated microbial identification system that uses barcode cards to ensure complete traceability and reduced transcription errors. Preparation time and the final result can be obtained during 18 hours [11,12].

RESULTS

The results showed that a certain proportion of patients had this fungus in their blood, based on serum samples. This proportion is not small and poses a risk to patients' overall health, especially those with weakened immune systems, given the fungus's opportunistic nature. It poses a significant danger to people with chronic diseases such as AIDS and other infections that weaken the immune system, creating opportunities for these fungi particularly Cryptococcus. The remaining results included other fungi or yeasts, bacteria, and samples that could not be identified using VITEK technology.

Table 1. The incidence of Cryptococcus fungal infections and other microbial infections among immunocompromised individuals.

All serum specimens	Cryptococcus spp.		Other yeasts and bacteria		Unknown	
Total: 102	No.	%	No.	%	No.	%
	4	3.92	66	64.7	32	31.37

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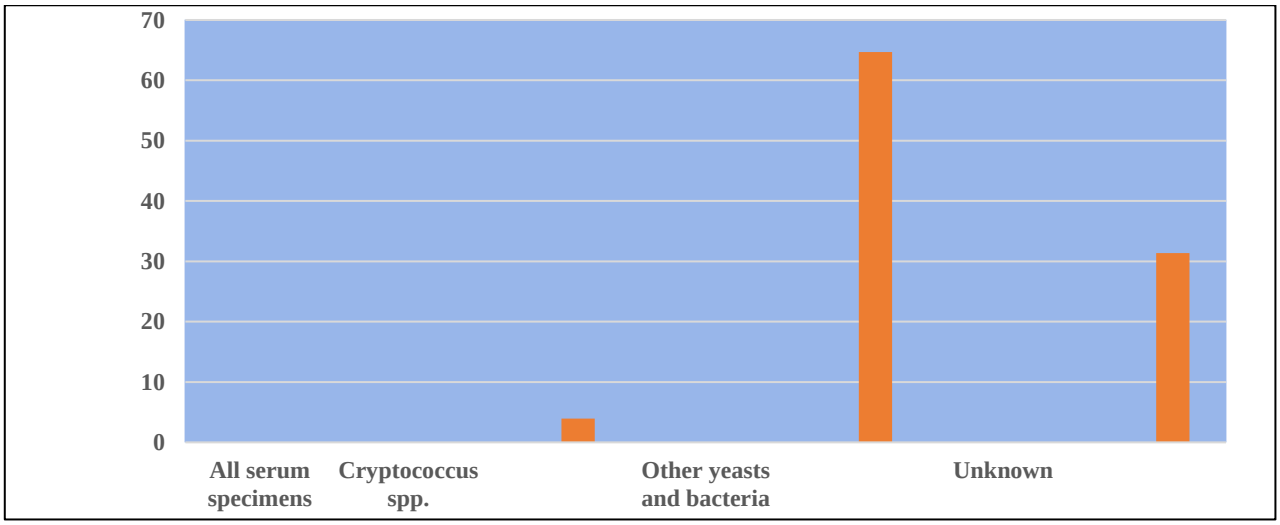


Figure (1) shows the infection rate of Cryptococcus compared with other microbes among immunocompromised individuals.

Location:
Physician:
Lab ID: 7820226
Isolate Number: 1

Organism Quantity:
Selected Organism : Cryptococcus laurentii

Source:
Collected:

Comments:	

Identification Information	**Analysis Time:**	17.77 hours	**Status:**	Final
Selected Organism	**Bionumber:**	**Cryptococcus laurentii** 6166777065377771		
ID Analysis Messages				

Biochemical Details

3	LysA	-	4	lMLTa	+	5	LeuA	+	7	ARG	+	10	ERYa	-	12	GLYLa	-
13	TyrA	-	14	BNAG	+	15	ARBa	+	18	AMYa	-	19	dGALa	+	20	GENa	+
21	dGLUa	+	23	LACa	+	24	MAdGa	+	26	dCELa	+	27	GGT	+	28	dMALa	+
29	dRAFa	+	30	NAGA1	+	32	dMNEa	+	33	dMELa	-	34	dMLZa	-	38	lSBEa	-
39	lRHAa	-	40	XLTa	+	42	dSORa	+	44	SACa	+	45	URE	-	46	AGLU	+
47	dTURa	+	48	dTREa	+	49	NO3a	-	51	lARAa	+	52	dGATa	+	53	ESC	+
54	lGLTa	+	55	dXYLa	+	56	LATa	+	58	ACEa	+	59	CITa	+	60	GRTas	(+)
61	lPROa	+	62	2KGa	+	63	NAGa	+	64	dGNTa	+						

Figure (2) The accurate diagnosis of the fungus Cryptococcus using VITEK technology.

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Location: Physician:
Lab ID: 7820221 Isolate Number: 1

Organism Quantity:
Selected Organism : Unidentified Organism

Source: ** **Collected:**

Comments:	

Identification Information	**Analysis Time:**	17.82 hours	**Status:** Final
Selected Organism	**Bionumber:**	**Unidentified Organism** 610277706535371	
ID Analysis Messages			

Biochemical Details

3	LysA	-	4	lMLTa	+	5	LeuA	+	7	ARG	+	10	ERYa	-	12	GLYLa	-
13	TyrA	-	14	BNAG	-	15	ARBa	-	18	AMYa	-	19	dGALa	+	20	GENa	-
21	dGLUa	+	23	LACa	+	24	MAdGa	+	26	dCELa	+	27	GGT	+	28	dMALa	+
29	dRAFa	+	30	NAGA1	+	32	dMNEa	+	33	dMELa	-	34	dMLZa	-	38	lSBEa	-
39	lRHAa	-	40	XLTa	+	42	dSORa	+	44	SACa	+	45	URE	-	46	AGLU	+
47	dTURa	+	48	dTREa	+	49	NO3a	-	51	lARAa	+	52	dGATa	+	53	ESC	-
54	lGLTa	+	55	dXYLa	-	56	LATa	+	58	ACEa	+	59	CITa	+	60	GRTas	(-)
61	lPROa	+	62	2KGa	+	63	NAGa	+	64	dGNTa	(+)						

Figure (3) The diagnosis of undefined microbes using VITEK technology.

DISCUSSION

The results showed that a proportion of patients had the fungus in their blood serum. This conclusion was based on the results obtained using the VITEK technique. The opportunistic nature of this fungus, its danger, and its virulence factors are confirmed by our results, which are consistent with [1,3]. Its transmission, and the reasons for its virulence and danger namely, its spread from the environment or from infected individuals to other people pose a risk to public health. Its ability to take advantage of weakened immunity and interact with immune cells can trigger a major battle, after which it may breach the immune defenses, proliferate, and invade the body's cells through the bloodstream. This is consistent with [4].The danger posed by this fungus lies in its ability to spread from one organ to another, particularly to the brain and lungs. Previous studies conducted before ours have demonstrated that its entry into the bloodstream poses a risk to these two major organs and can impair their functions. This is consistent with[5].

CONCLUSION

The fungus is opportunistic and affects people with weakened immune systems. It takes advantage of weakened immunity, enters the bloodstream, and may then infect the organs.

This makes it very dangerous, as it is more difficult to treat and can spread to other organs, such as the brain and glands, making it hard to treat and eliminate.

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