Comparative Study to Compare the Prevalence of *Aspergillus Flavus* in Iraq and Some Neighboring Countries

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Abstract

Aspergillus is a fungus and toxins produced by fungi that negatively affect patients' lives, and recent research has focused on the relationship between different diseases caused by inhaling portions of fungi or fungal spores. There are some complete reports that fully reveal the relationship of Aspergillus fungi by determining the percentage of toxins produced by this type of fungi or their frequency in feed, food, or even clinical specimens, as well as the effect of toxins secreted by fungi on people who have been exposed to these fungi. It was purified from clinical samples, which included sputum, edema, wiping, tissue parts of the lung and other samples such as serum. As an immunological study, in addition to samples of cereals, nuts and homemade cheeses, as well as some other foods and vegetables. In this review, research in scientific research engines was conducted through four science-based data bases using the following keywords (Aspergillus fungi and the toxins they produce) (diseases associated with Aspergillus fungi). Scientific criteria were adopted in this review, and 41 subjects were selected. The results were compared in these articles regarding the presence of mushrooms in Iraqi governorates such as Najaf, Dhi Qar and Basra, as well as the frequency of mushrooms in Iraq and some neighboring countries such as Turkey, Saudi Arabia and Egypt.

And Syria during the period 2009-2018 these results were compared with the WHO reports and the permissible proportions in food and feed. It was found that the highest rate of fungi was in Iraq at approximately 89.5%, while in Syria the frequency of fungi was 86.6% isolated, and in Egypt and Jordan it was 70.67% 77.6%, respectively, while in Saudi Arabia the Arabian Peninsula was 50.56% less frequent. The high rate of fungi frequency in Iraq may be due to black storage of foodstuffs, which has led to a high rate of fungi frequency and an increase in the proportion of foodstuffs or in clinical samples, according to the materials under study.

Keywords: *Aspergillus fungi, a comparative study; clinical; disease toxicity.*

Introduction

Aspergillus is a type of pathogenic fungicide that is spreading all over the world. And in food, feed, stored grains and nuts. It can be found in an environment characterized by humidity and high and medium temperatures[1,2]. *A. flavus* is an opportunistic fungus of humans and animals. It causes diseases in immunocompromised individuals[3,4]. In general, conditions of increased humidity and elevated temperatures for storage grains and legumes increase the occurrence of mushroom toxins.[5,6] *Aspergillus flavus* They are distinguished by their complexity in the form, which is classified into two strains based on the size of the resulting hardness in the figure. Both the L and S strains can produce the most common aflatoxins (B1 and B2). As for the type S, it is characterized by its ability to produce aflatoxin of type G1 and G2, which is not usually produced by A. flavus. The L strain is more aggressive than the S strain, but produces less aflatoxin[7]. *Aspergillus flavus* AF36 is a non-carcinogenic and

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aflatoxin-free strain and is used as an active and essential ingredient in pesticides. [8]. As suggested by [9,10] and [11] Aspirgillus is found outdoors and in other environments, which may affect human health, outside the natural clinical features of Aspergillus. Or there may be *Aspergillus* fungi along with other fungi in the body such as *Alternaria, Bipolaris, Cladosporium, Curvularia, Fusarium, Pseudallescheria, Rhizopus, Saccharomyces, Stemphylium*, and *Trichosporon*. [12,13] . An acute fungal toxicity outbreak was reported in developing countries with frequent outbreaks in Kenya in 2001, 2004-2006, and 2008 [,14,15,16]. In the period 2004-2005, more than 150 deaths were reported amongst the population due to consumption of maize contaminated with A.flavus S strain [17,18]. It was found that aflatoxin was associated with the components of grains and corn in dog food containing up to 600 mg 1 kg of a type of aflatoxin (B) group 34-40. The permissible limits for aflatoxin in feed according to the Food and Drug Administration were 60 mg-kg of aflatoxin B1 in dog food and about 20 ppm in poultry feed [19,20,21]. This study comes as a comparative study of fungi and their recurrence in Iraq and countries in a group of samples that included samples of nuts, cheese and clinical samples, and compared the frequency of recurrence with the rates allowed by the World Health Organization [22-31] .

Materials and Method

The first step was to conduct an electronic research to collect a set of research related to *Aspergillus* fungi. I collected 41 articles on *Aspergillus* fungus, and these articles diversified around the diseases caused by fungi, which ranged from being in food and the cause of skin diseases, in addition to having blood in the blood and supplies of the sick group under study in the above-mentioned materials. The percentage of mushrooms in Iraq was compared first, which included a group of governorates (Kufa, Basra, Qadisiyah, and Babil). The samples included food samples as a first comparison of the percentage of the fungi that occurs according to the above mentioned materials as shown in Table No. 1, and then studied the percentage of the fungus. In the clinical samples of the same governorates above as in Table 2, another comparison of *Aspergillus* fungi was performed as a comparative survey in Iraq and other countries bordering Iraq, which included Saudi Arabia, Turkey, Egypt, the Emirates, Qatar and Syria. Samples that were made compared to the percentage of the presence of fungi contain nuts and grains as in Table No. 3 and comparison of the percentage of fungi in blood samples, sputum, faeces and vagina as in Table No. (4). The percentage of fungi in Iraq and countries was compared as shown in the study and the allowable percentage by the World Health Organization.

Results

Table No. (1) shows the frequency of the *Aspergillus* in different samples of foodstuffs, which include (seeds of leafy plants, milk and local cheese) for some governorates of Iraq, which extended the study period from (2009_2018). While in Dhi Qar Governorate, the frequency of *Aspergillus* fungi in dairy was 65.8% for the year 2015, while thefrequency of local cheese fungi in the same governorate was about 75% for the year 2014 As for canned foods, the frequency of fungi in Al-Qadisiyah Governorate was 56.7% and Babel until 86.6% 2014. For cereals and seeds stored for foliar plants, the frequency of fungi in Karbala Governorate was 9.3% while in Kufa 11.5% for the same year. While in Qadisiyah, the percentage of fungi recurrence in leafy plants, which included lettuce, fennel and fennel in Qadisiyah Governorate in 2017, was 53.3%, while in dried fruit samples of figs and apricots 31% for 2018.

Table [1]: Frequency of *Aspergillus flavus* in some governorates of Iraq

N.	Sample Type	Gonvernorates	Frecuncy Ratio of Fungus%	Year
2	Canned grain	Kufa Qadisiyah	11.5% 56.7%	2009 2015
3	Dairy	Qadisiyah Dhi Qar	74.4% 65.8%	2011 2015
4	Local cheese	Dhi Qar	75%	2014
5	Canned Food	Babylon	33.3-86.6%	2015
6	Seeds of leafy plants	Basrah Qadisiyah	9% 53.37%	2011 2017
7	Dried fruit	Qadisiyah	31%	2018

While the results of Table [2] belong to the biological samples that were included between the samples of blood and sputum where the blood samples were collected from males and females and the recurrence rate of A.flavus was 10.3% for females and 13.8% for males in Najaf for 2010 when the samples were collected for respiratory patients in Qadisiyah Governorate in 2015, males were 18.7% and females were 12.14%. In Thi-Qar, 42.4% of males, while females were 33.4%

Table [2]: Frequency of A.flavus in blood samples and ulcers for males and females during the years 2010-2017 in some governorates of Iraq

Gonvernorates	Samples	Males	Females	Year
Najaf	Blood	13.8%	10.3%	2010
Qadisiyah	Sputum	18.7%	12.14%	2015
Dhi Qar	Sputum	42.6%	33.4%	2017

Table [3] shows the frequency of *A.Flavus* in different food samples between the governorates of Iraq and neighboring countries during[2009-2017]. It was noted that the *A.flavus* in Syria and Saudi Arabia showed a noticeable increase in nuts such as pistachios, walnuts and others, Saudi Arabia with 78.5% in some seeds, while the percentage of recurrence of fungus in Iraq was higher than the rest of the countries where it reached 71.2% in some food for stored stocks and cereals. The rate of recurrence of *A.flavus* in some types of grain stored and feed in Syria increased by 20% in grain while it was about 16% of pulses either in 2013 has increased the frequency of *A.flavus* in Saudi Arabia in the seeds of wheat plant by 56.3% We note from Table 3 that The frequency of the fungus was 86.3% in nuts for 2015 in Syria and 25% in Jordan for the same year. The peanuts of the nuts in the UAE had a share of this fungus infection, with an average recurrence rate of 63.1% in the United Arab Emirates. While the highest frequency of fungi in corn and wheat grains was very high at 97.3% in Turkey in 2015 . In 2017, the frequency of fungus in sunflower seeds increased by 60% in Egypt in 2017. In Iraq and the same year, the percentage of recurrence of *A.flavus* to some seeds of leafy plants was 53.37%. For dairy products, Egypt in 2010 was 86.7%, while in Iraq canned food was 47.8% for the year 2015 and 73.9% for dried food in Lebanon.

Table [3]: Shows the frequency of *A.flavus* between Iraq and some countries:

A.flavus					
N.	Sample	Frecuncy Ratio of Fungus% in Iraq	Frecuncy Ratio of Fungus% in Counteries		Year
			% Countray		
1	Nuts	49.8%	Syria	80% % 86.2	2009 2015
2	Grain	---------	Syria Saudi Turkey	20% 56.3% 97.3%	2009 2013 2015
3	Legumes	---------	Syria Emirates	15-16% 63.1%	2009 2015
4	Seeds	---------	Syria	15-16%	2009
Saudi			2009		

A.flavus					
N.	**Sample**	**Frecuncy Ratio of Fungus% in Iraq**	**Frecuncy Ratio of Fungus% in Counteries**	**Year**	
			% Countray		
Egypt		78.5% 60%		2017	
5	Canned food	71.2% 14.8%	Lebanon	73.6%	2009
Saudi		50%		2015	
Jordan		25%		2015	
6	Dairy	55.8%	Egypt	86.9%	2010
7	Herbs	------	Egypt	2.06-3.46%	2017
8	Leafy plant	53.37%	Jorden	57.3%	2017

Table[4] shows a comparison of some samples showing the frequency of *A.flavus* in some neighboring countries and Arab countries in the study during the academic year 2019, where found the frequency of *A.flavus* in samples vaginal fluids in females up to 49.7%, but in blood samples found the frequency of fungus in Females were 52.1% in Jordan and 49.7% in Yemen. In the blood samples, the frequency of female fungal infection was found to be 24.21% for males, 25% for Iraq, and 1.06% for Egypt for 2016. For samples Ulcer has been found that the *A.flavus* appeared in some respiratory patients recurrence rate of 47.6% for the year 2015 in Egypt rate of recurrence of mushrooms in 2017 rose to 78%.We note from Table (4) that the rate of recurrence of *A.flavus* in skin samples infected with fungal ulceration was 67.7% in the United Arab Emirates. As for the exit samples of some intestinal inflammatory patients in the Kingdom of Saudi Arabia, the rate of recurrence of the *A.flavus* reached 96.5% in 2018.

Table [4]: Shows the comparison of the frequency of A.flavus in some sampls in Iraq and other countries:

A.flavus					
N	**Sample**	**Frecuncy Ratio of Fungus% in Iraq**	**Frecuncy Ratio of Fungus% in Counteries**		**Yaer**
Countray			**%**		
1	Sputum	47.6% 75%	-------	-------	2015 2017
2	Blood	24.2% 1.06%	Egypt	25%	2010 2016
3	Stool	-------	Yemen	31.8%	2015
Saudi		69.5%		2018	
4	Vaginal fluids	------	Jordan	52.1%	2009
Yemen		49.7%		2018	
5	Skin	------	Emirates	67.7%	2018

Conclusions

The purpose of this study is to conduct a survey of the frequency of fungi Asperglus in a group of Iraqi governorates, and to compare the frequency of fungicides in Iraq and the group of countries neighboring Iraq in food and clinical samples. Scientific standards were adopted in this review. The results were compared in these articles regarding the presence of mushrooms in Iraqi governorates such as Najaf, Babil, Dhi Qar and Basra, as well as the frequency of mushrooms in Iraq and some countries such as Turkey, Saudi Arabia and Egypt and Syria during the period 2009-2018 these results were compared with the WHO reports and the permissible proportions in food and feed. It was found that the highest rate of fungi was in Iraq at approximately 89.5%, while in Syria the frequency of fungi was 86.6% isolated, and in Egypt and Jordan it was 70.67% 77.6%, respectively, while in Saudi Arabia the Arabian Peninsula was 50.56% less frequent. The high frequency of fungi in Iraq may be due to black storage of foodstuffs, which has led to a high rate of fungi frequency and an increase in the proportion of foodstuffs or in clinical samples, according to the materials under study.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq.

Conflict of Interest: Non

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