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RESEARCH ARTICLE

Distribution of Both Fungi and Bacteria Detected from the Nasal and Oral Cavity (Statistical Survey in Kirkuk)

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Abstract

The study was carried out at the period from 1st march 2018 to 31st june 2018 in order to determine the relationship of the allergic fungi with the worker in services and restaurant also university student and study the occurrence of fungi and bacteria detected from nasal and oral cavity among University Students , Restaurant workers and services workers with mean age (47.40±22.14) subjects from different areas of Kirkuk City(107) isolates of bacteria and fungi isolated from the nasal cavity in the same time(45) isolates of bacteria and fungi isolated from the oral cavity the isolates represented by : *A. niger, A. flavus, A. fumigatus, A. nidulans, A. terreus, A. japonicas, A. japonicas, Alternaria spp, C. albicans, C. parapsilosis, Penicillium* spp, *Rhizopus* spp, *S.pyogen, S.aureus* .The statistical analysis, existence of significant differences at the level of probability ($P< 0.05$) between the type of isolates the high frequency isolation represented by, *A.niger, and S.aureus* in the oral and nasal cavity which appeared with high occurrence . The subjects in this study were divided into five age groups. On the other hand the statistical analysis of the existence significant differences ($P< 0.05$) between the fungal and bacterial isolation infection and age for all age groups, it had been found that the age group 26-35 years was the most influential of these infections, compared with the other age groups.

Keywords: *Fungi, Bacteria, Nasal and oral cavity.*

Introduction

Normal nasal and oral flora organisms which includes bacteria, and fungi, the most important organism belong to the genus *Aspergillus* and Candida [1]. Human infections caused by *Candida albicans* and *Aspergillus fumigatus* and other related species range from the more common nasal and oral thrush to fatal, systemic super infections in patients who are afflicted with other diseases [2].

Fungal infection by species may be consider from up to one-third of the nasal and oral cavity of normal individuals and are considered inhabitants of the normal flora of oral and gastrointestinal tract [3]. *C. albicans* and *A. fumigatus* the main fungi associated with human nasal and oral mycoses and is the most fungi have virulence factors during infections especially in the students in the school and university [4].

The abilities of *A. fumigatus* and *C. albicans* to transform from blastopores to the hyphal phase specially in the restaurant workers and building workers found in most of them form germ tubes regarding *C. albicans* , while *A.fumigatus* mark the onset of hyphal growth of *Aspergillus* [5].

The most main factors in the fungal infections in the crowded university students and workers advent of the human immunodeficiency the immunosuppressive therapy and increasing incidence of diabetes, may be consider the global scenarios that have resulted in the fungal infections in the workers and students[6].

This spectrum of fungal infections has paved way for the increased incidence of nasal infections, and oral candidiasis (OC) [7].

The present study aimed to isolation and identification of fungi from nasal and oral cavity in University Students and Restaurant workers and services workers.

Methods

Samples collection: Swap samples were collected from 290 patients ages ranged between (<10 >56 years old) in order to detect infection with asthma and aspergillosis, during the period of 1st march 2018 to 31st june 2018 from nasal and oral cavity in University Students and Restaurant workers and Services workers and divided it according to smoker and nonsmoker.

The samples were examined directly under the microscope using 10% KOH solution and culturing on the SDA agar and examined for after 7 days [8, 9, 10, 11]. The isolates were identified according to [3, 4, 12].

Statistical Analysis

Results were subjected to statistical analysis. The significant differences are determined in rate of probability 5% as the statistical analysis includes one way analysis of variance (ANOVA). Also significant differences are examined between means using test of less significant difference LSD [13].

Results and Discussion

The current study investigates the both fungi and bacteria detected from nasal and oral cavity among University Students , Restaurant workers and services workers with mean age (47.40±22.14) subjects from different areas of kirkuk City Table (1) have shown Mean difference of Age and Distribution of both fungi and bacteria detected from nasal and oral cavity., the statistical analysis of results and a significant difference at the level of probability (P< 0.005) .

Table 1: **Distribution of both fungi and bacteria detected from nasal and oral cavity**

Type of isolate	Total NO.	%	Total +	%	Total Positive				t-test
					Nasal	%	oral	%	
University Students	70	24.1	38	25	25	23.3	13	28.8	2.89
Restaurant workers	100	34.4	50	32.8	33	30.8	17	37.7	22.14
services workers	120	41.3	64	42.1	49	45.7	15	33.3	11.47
total	290	100	152	100	107	100	45	100	20.13

P .value significant < 0.005

Distribution of both fungi and bacteria detected from the nasal and oral cavity according to the type of isolates there's different isolates of bacteria and fungi isolated during the study 107 isolates of bacteria and fungi isolated from the nasal cavity in the same time 45 isolates of bacteria and fungi isolated from the oral cavity the isolates represented by : *A. niger, A. flavus, A. fumigatus, A. nidulans, A.terreus, A. japonicas, A. japonicas, Alternaria spp, C. albicans, C. parapsilosis, Penicillium* spp, *Rhizopus* spp, *S. pyogen, S.aureus.*as show in table 2 and Figure 1.

Table 2: Distribution of both fungi and bacteria detected from the nasal and oral cavity according to the type of isolates

Organism isolate	nasal	%	mouth	%	Total	%
A. niger	17	15.8	8	17.7	25	**16.4**
A. flavus	12	11.2	5	11.1	17	**11.1**
A. fumigatus	7	6.5	4	8.8	11	**7.2**
A. nidulans	6	5.6	4	8.8	10	**6.57**
A.terreus	1	0.9	0	0	1	**0.65**
A. japonicas	4	3.7	0	0	4	**2.6**
Alternaria spp	5	4.6	4	8.8	9	**5.9**
C. albicans	14	13.0	8	17.7	22	**14.4**
C.parapsilosis	7	6.5	6	13.3	13	**8.5**
Penicillium spp.	2	1.8	0	0	2	**1.3**
Rhizopus spp	7	6.5	1	2.2	8	**5.2**
S.pyogen	0	0	5	11.1	5	**3.2**
S.aureus	25	23.3	0	0	25	**16.4**
Total	*107*	*100*	45	100	152	**100**

P. value significant <0.05>

The statistical analysis, existence of significant differences at the level of probability ($p< 0.05$) between the type of isolates and this percentage agreed with results of other researchers.

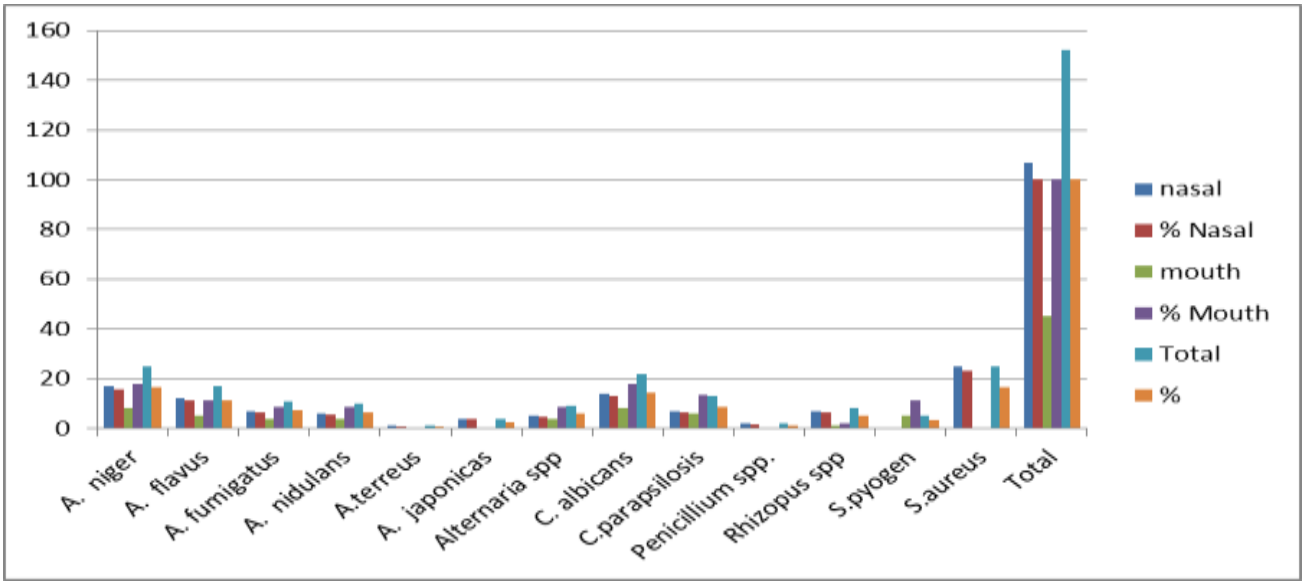

Figure 1: Distribution of both fungi and bacteria detected from the nasal and oral cavity according to the type of isolates

When divided the isolates distribution according to the site of isolation there's only fungi isolated from University Students as summarized in Table 3, The statistical analysis, existence of significant differences at the level of probability ($p< 0.05$) between the type of isolates which represented by *A. flavus, A. niger, A. nidulans, A. terreus, A. japonicus , Alternaria spp., Candida albicans and S.aureus*.

Table 3: Distribution of both fungi and bacteria detected from nasal and oral cavity in University Students

Type of isolate	Total Positive			
	Nasal	%	mouth	%
A. flavus	**5**	**20**	**2**	**15.3**
A.niger	**4**	**16**	**1**	**7.6**
A. nidulans	**6**	**24**	**4**	**30.7**
A.terreus	**1**	**4**	**0**	**0**
A.japonicus	**1**	**4**	**0**	**0**
Alternaria spp.	**1**	**4**	**2**	**15.3**
Candida albicans	**2**	**8**	**4**	**30.7**
S.aureus	**5**	**20**	**0**	**0**
Total	**25**	**100**	**13**	**100**

p. value significant <0.05

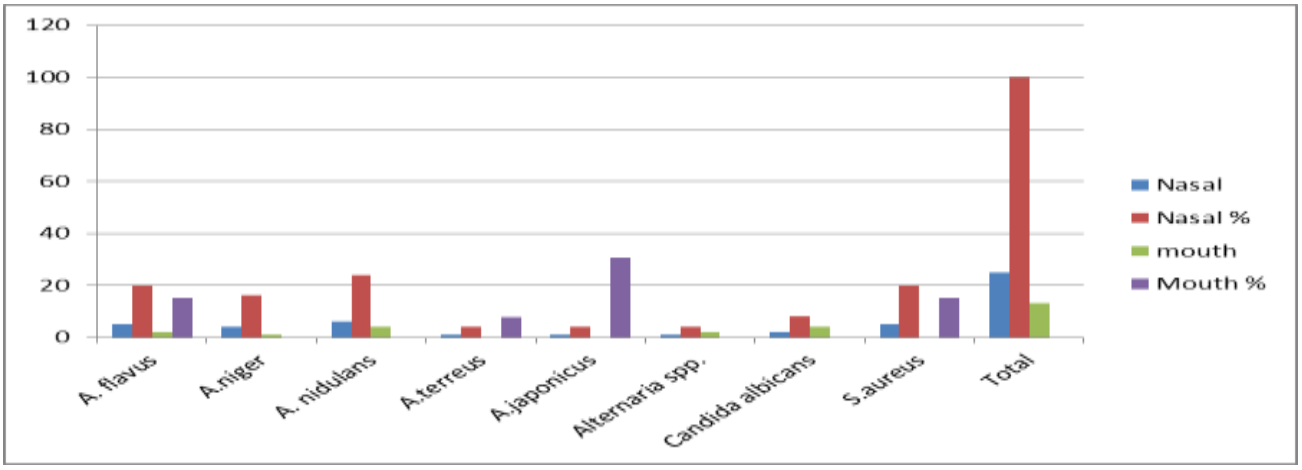

Figure 2: Distribution of both fungi and bacteria detected from nasal and oral cavity in University Students

Distribution of Both Fungi and Bacteria Detected from Nasal and Oral Cavity in Restaurant Workers

When divided the isolates distribution according to the site of isolation there's different type of fungi and bacteria isolated from Restaurant workers as summarized in table 4, and figure 3 The statistical analysis, existence of significant differences at the level of probability ($p< 0.05$) between the type of isolates which represented by *A. flavus, , A. fumigatus A. niger A. Japonicas Candida.albicans C.parapsilosis Rhizopus* spp. *Penicillium* spp. *Alternaria* spp. *S. pyogen and S. aureus* .

Table 4: Distribution of both fungi and bacteria detected from nasal and oral cavity in Restaurant workers

Type of isolate	Total Positive			
	Nasal	%	mouth	%
A. Flavus	2	6.06	1	**5.8**
A.fumigatus	1	3.03	4	**23.5**
A.niger	5	15.1	3	**17.6**
A. japonicas	3	9.0	0	**0**
Candida.albicans	4	12.1	0	**0**
C.parapsilosis	7	21.2	6	**35.2**
Rhizopus spp.	2	6.06	0	**0**
Penicillium spp.	2	6.06	0	**0**
Alternaria spp.	2	6.06	0	**0**
S.pyogen	0	0	3	**17.6**
S.aureus	5	15.1	0	**0**
Total	33	100	17	**100**

P. value significant <0.05

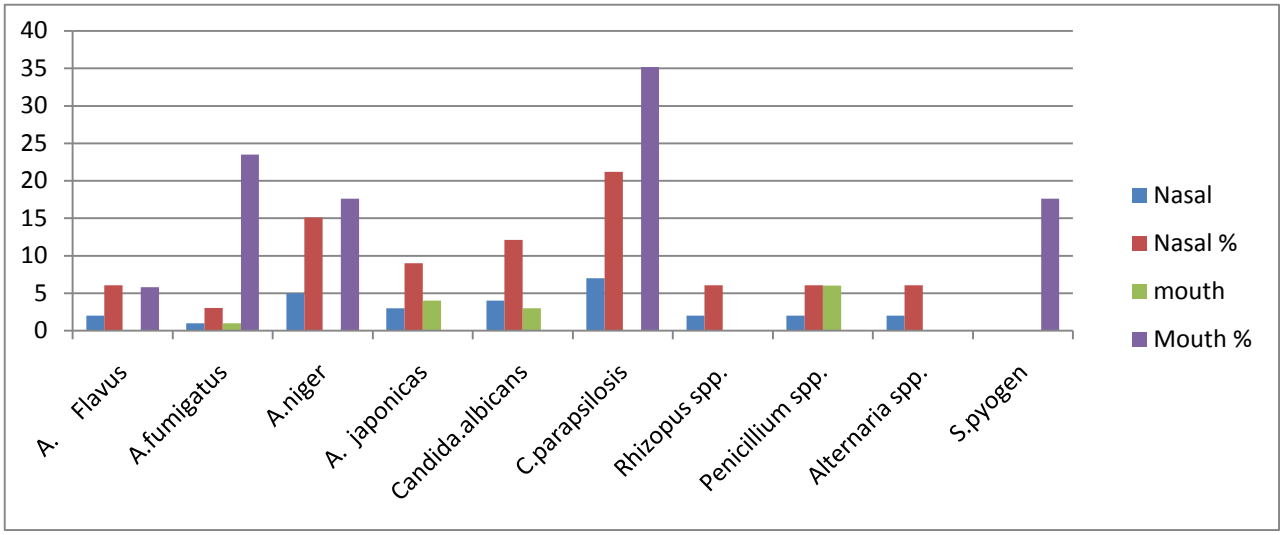

Figure 3: Distribution of both fungi and bacteria detected from nasal and oral cavity in Restaurant workers

The fungi and bacteria isolated from nasal cavity its more than oral cavity in the services worker as summarized in table 5, and Figure 4 The statistical analysis, existence of significant differences at the level of probability ($p< 0.05$) between the type of isolates the high frequency isolation represented by, *A. niger, and S. aureus* in the oral and nasal cavity which appeared with high occurrence.

Table 5: Distribution of both fungi and bacteria detected from nasal and oral cavity in services workers

Type of isolate	Total Positive			
	Nasal	%	mouth	%
A. fumigatus	6	12.2	0	**0**
A. niger	8	16.3	4	**26.6**
A. flavus	5	10.2	2	**13.3**

Alternaria spp	2	4.0	2	**13.3**
Rhizopus sp	5	10.2	1	**6.6**
Candida.albicans	8	16.3	4	**26.6**
S.pyogen	0	0	2	**13.3**
S.aureus	15	30.6	0	**0**
Total	49	100	15	**100**

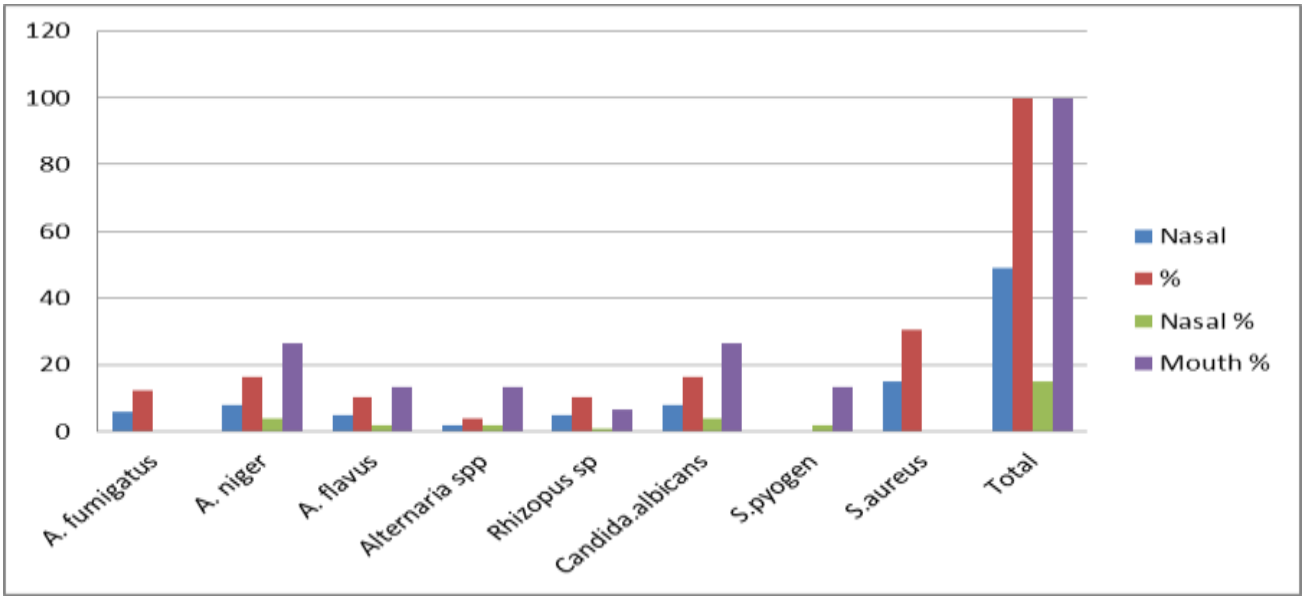

Figure 4: Distribution of both fungi and bacteria detected from nasal and oral cavity in services workers

The subjects in this study were divided into five age groups. On the other hand the statistical analysis of the existence significant differences (p‹ 0.05) between the fungal and bacterial isolation infection and age for all age groups, it had been found that the age group 26-35 years was the most influential of these infections, compared with the other age groups. Table (6).

Table 6: Distribution of both fungi and bacteria detected from nasal and oral cavity according to age

Positive Cases				Age groups (years)
%	M	%	N	
11.1	5	9.3	10	**<10**
20	9	18.69	20	**25-16**
33.3	15	56.0	60	**35-26**
24.4	11	9.3	10	**45-36**
11.1	5	6.5	7	**56-45**
100	45	100	107	**Total**

X^2= 10.182, indexed = 7.815 and a significant difference between age group (p< 0.05)

In total 290 individual included in the study university student, restaurant worker , and services worker , Table 7 and figure 5 show 62% from the total number smoker and 37.9 % were nonsmoker , The statistical analysis, existence of significant differences at the level of probability (p< 0.05) between the Smoker and nonsmoker individual included in the current study.

Table 7: Distribution of both fungi and bacteria detected from nasal and oral cavity according to smokers or nonsmokers

	Total NO	%	Positive NO	%	Negative NO.	%
smoker	**180**	**62.0**	**120**	**78.9**	**60**	**43.4**
Un smoker	**110**	**37.9**	**32**	**21.0**	**78**	**56.5**
Total	**290**	**100**	**152**	**100**	**138**	**100**

P. value significant <0.05

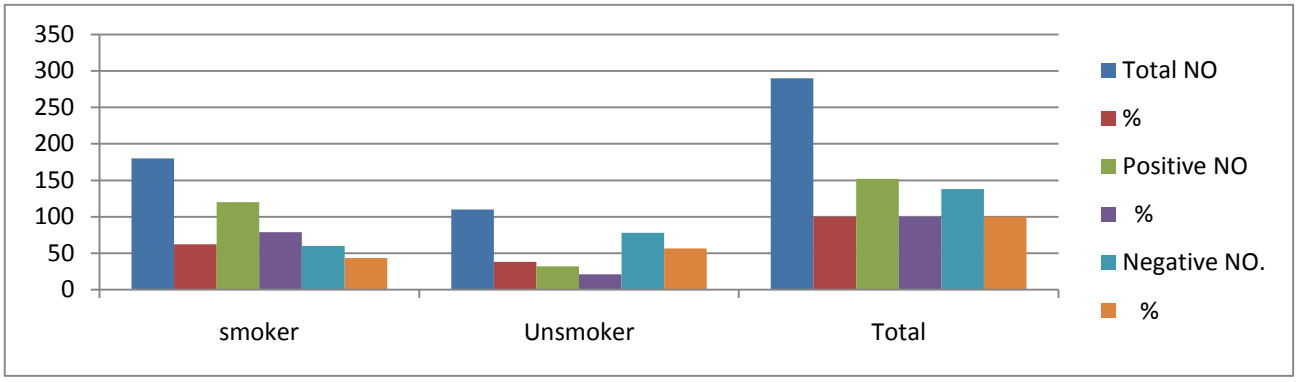

Figure 5: Distribution of both fungi and bacteria detected from nasal and oral cavity according to smokers or nonsmokers

Few reports have been published on the Distribution of both fungi and bacteria detected from the nasal and oral cavity. We assessed the the correlation between fungal and bacterial infection and work or living specially the correlation between fungal and bacterial infection and work or living especially in the restaurant and building worker [16, 17]. We analyzed the prevalence of the given fungal and bacterial species (the percentage) and the proportions in which the palate and were colonised by each microorganism. *Aspergillus* and *S.aureus* were the most frequently detected in subjects with university student [18].

A significantly higher frequency of methicillin-sensitive *Staphylococcus aureus* (*S. aureus* MSSA) was observed in the university student was predominant on the palate. The development of the fungal infection subjects was characterized by a significant increase in the prevalence of pathogenic bacteria [19]. This paper is dedicated to study the relationship between fungal and bacterial infection and the mode of work the oral cavity, which remains sterile throughout prenatal development, becomes a diverse ecosystem colonized by numerous microorganisms during the work in restaurant or building [20].

The resident microbiota in the period work depends mainly on external factors, around university student and worker in the restaurant. These conditions are favorable for the development of a diverse ecosystem based on the interactions between bacteria, fungi and the host environment [21]. The early oral detection occurring within several hours following working in crowded place or smoking is composed of mixed infection bacteria and fungi which are commensals permanently colonising the oral and nasal cavity [22].

Along with other bacteria, they participate in the formation of a "colonization cascade" that determines future indigenous micro biota [23]. Neonates with complete cleft lip and palate (CLP) are characterized by the existence of communication between oral and nasal cavities extending from the upper lip and nasal vestibule to the end of the soft palate. This condition adversely affects natural sucking or even impairs the ability to restaurant food [24].

Moreover oral infection with or facial cleft require specialized care to maintain proper hygiene of the incisive bone, nasal passages, and the oral cavity with special attention paid to preparation for future surgical procedures [13]. Distribution of Bacteria and fungi according to their age The distribution of fungi showed higher infection of *A.niger* in age group ranged >50years while the lower infections were at ages lower than 5 years old. In general, the higher infection was starting from 25 years old of age and above (Table 6). Infection in worker with bacteria and fungi was found to be more prevalent in >30 years old [25].These results are in concomitant with the present study.

The prevalence of the infection was proportional with certain cases i.e. impaired immune state associated with the management of malignancy, organ transplantation, autoimmune and inflammatory conditions; critically in the school and university student [26].

Microscopic and culturing examination show that theirs higher bacterial and fungal contamination in outdoor 87 (63.5%); 18(2.6%); ,as well as recorded the highest percentage in *A.niger*28 (23.6%)followed by *Penicillium spp* 19(6.5%); *A. flavus*14 (3.8%); *Alternaria spp* 5(10.1%);*Microsporium spp*

and *Fusarium spp*10(5.1%); *A. fumigatus* 4(2%) respectively as show the figure (3) shows the image which the fungi isolates during this study isolated from nasal and mouth cavity during the present study .several study according to fungal and bacterial infections showed the frame material in building and in the crowded sit like university campus had more importance on fungal concentrations than moisture damage, the contaminations in the present study, detected the contamination the study with bacteria and fungi may be related to different cause highly moisture, overcrowded and in a poor condition, which all encourage fungi and to grow quickly.

In addition, existence of some nearby plants i.e. Kirkuk Cement Factory, North Gas Company and North Oil Company have added bonus factors to over contaminate the surrounding air.
Consequently, the inhaled air would ease infection of the respiratory system and may affect the body immunity [3, 4]. In terms of the biosafety levels suggested by [6], *A.flavus and A.fumigatus* would be considered the species of most harmful to human health; however, *A.niger, A.terreus, A.tamarii and C.cladosporioides* have also been implicated in a range of pathologies [13] Appropriate measures should therefore be implemented to reduce fungal density in the environments tested with a view to improving air quality and avoiding potential adverse effects [27].

Conclusion

In the present study clear that bacteria and fungi contaminate the nasal and oral cavity especially in the worker indifferent age and the university student.

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