

Comparison Amount of Air Microbial Pollution in the Hospitals of two Different Towns in Gilan Province, Iran

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ABSTRACT

Nosocomial infections are known as infections which are acquired during patients hospitalization in hospitals. It has long history and causes to increase both therapy costs and problems of patient treatments. This study is for comparison of air microbial pollution in hospitals of towns (A) and (B) in Iran. This study is a descriptive-analytic type. Blood Agar culture was used for determining of microbial pollution. Statistic tests (central & scattering criterions) have been used for data analysis. Findings show that the most epidemical pathogen in view of air pollution in different parts of hospitals is non-urease Staphylococcus. It seems that because of using UV radiation, proper air ventilation and many facilities, air pollution in town (B) hospitals is less than town (A).

Key words: Nosocomial infections, air pollution, hospital, microbial

INTRODUCTION

Acquired hospital infection is one of basic problems in treatment and health care, it has been existed since the beginning of hospitals establishment. Unfortunately in spite of science of medicine improvement and many facilities, the amounts of these infections are increasing day by day. Hospital environment is the place for therapy of patients so it shouldn't be center of infection, but nowadays it exists and hospital personnel and all other people are worried about it. The history of nosocomial infections goes back to 18th century when hospitals were established for the first time in Europe. At that time hospitals were the place to take care of very ill patients and as these places had very primary and simple facilities, infections such as typhus and typhoid were very epidemic, therefore; such hospitals were titled as "plague houses". So that, "Florence Naitingle" for the first time in 19th century set regulations for health in " Military hospitals" that decreased death rate from about 50 percent to 2.2 percent.

Later, in the same century, "Zemelveice", the Hungarian physician, found out in obstetrics ward of a hospital in Vienna that hands of doctor, contaminated while doing autopsy on patients in a place located near child birth room, and visiting patients with such hands was a main factor to cause birth fever and death of these patients. In 1874, "Zemelveice" could decrease such infections to the lowest level by creating different methods of

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disinfecting and washing doctors hands before visiting patients. Today, resistant microorganisms and all kinds of antibiotics are available in hospitals and the most important ones are; Staphylococcus, E.Coli, Enterococcus, Enterobacter, Acientobacter, Candida, Cryptococcosis, Aspergillus, Citomegalo virus, Variocellazosster and Toxoplasma.

Nosocomial infections are those infections that afflict hospitalized patients during their stay in hospitals, and its signs appear at the time of hospitalization or after releasing from hospital. Nosocomial infections are not specifically for patients and can be epidemic in visitors, hospital workers and staffs. The risk of being afflicted by nosocomial infections is not the same in all patients. Acquired resistance of patients to infection has been identified as the most important factor. The kind of infection depends on the place of hospital and type of hospitalized patients. For instance, in psychiatric wards, intestinal infections and in surgery ward, wound infections are epidemic. In some cases, medicinal therapy too can make patients quite sensitive to be afflicted to nosocomial infections. In addition to above mentioned factors, some factors such as nutrition, age, intensity of background illness, duration of hospitalization, disappearance of skin and mucous membrane resistance will increase the possibility of being affected by nosocomial infections. Most nosocomial infections are endemic and sometimes epidemic, and patients receive microorganisms as exogenous from medical staffs and environment. Generally, nosocomial infections' sources can be divided in two parts:

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(1) Animate sources: such as visitors, hospital personnel or insects

(2) Inanimate sources: such as air flowings, dust and secretory respiratory drops

METHODOLOGY

The present research was performed in Gilan province; Iran, in 2007-2008. In order to determine the pollution of hospital atmosphere, Blood Agar culture was used. This culture is nutritive and all kinds of bacteria and fungus are able to grow and increase in it. This research was done in hospitals of two towns (A) and (B). In town (B), hospitals were for training of students of medical sciences department. In each hospital, different wards of surgery, orthopaedics, obstetrics and internal were studied. For sampling of bacterias spread in air, many plates containing Blood Agar culture was put there on different surfaces but with the same height as cited parts. Plates door were kept opened in different times of 5, 10, 20 minutes, in order to have direct contact with air after the necessary time, plates door were closed and after mentioning full specification and incubation, the colonies formed in the culture were examined. Since totally 17 wards of hospitals of these two towns were studied, the amount of used plates in this study was 272 pc.

RESULTS

The results of comparative study of air pollution in different hospitals of these two towns are as follow: In hospital No.1 of town (A), in internal ward, non-urease Staphylococcus and Pneumococcus bacterias and in obstetrics ward, non-urease Staphylococcus and urease Staphylococcus and Pneumococcus were found. In hospital no.2 of town (A) in obstetrics ward, non-urease Staphylococcus and Pneumococcus and in internal ward, non-urease Staphylococcus, urease Staphylococcus, and E. coli pneumococcus and in surgery ward, urease Staphylococcus, Pneumococcus, Klebsiella were found. In hospital no.2 of town (A) in surgery ward, non-urease Staphylococcus, Pneumococcus, Klebsiella and in surgery and obstetrics wards, non-urease Staphylococcus, urease Staphylococcus,

Pneumococcus and E. coli and in orthopaedic ward, non-urease Staphylococcus, urease Staphylococcus, Klebsiella pneumococcus and Serratia were found. In hospital no.1 of town (B) in surgery ward, non-urease Staphylococcus, urease Staphylococcus, Klebsiella pneumococcus, Enterobacteriaceae and in surgery ward, non-urease Staphylococcus, pneumococcus and E.coli were found. In hospital no.2 of town (B) in surgery ward, non-urease Staphylococcus, Pneumococcus, urease Staphylococcus and E. coli and in internal ward, urease Staphylococcus and Pneumococcus, in orthopaedic ward, urease Staphylococcus, Pneumococcus, Enterobacter, Klebsiella and Serratia and in obstetrics ward, non-urease Staphylococcus and Pneumococcus were found.

It is necessary to state that the number of grown colonies in each plate of each ward had direct relation with the time when the plate door was opened. The number of colonies in plate where the door was opened for 20 minutes is more than the amount of colonies where the door was opened only for 5 minutes, so the variety of colonies in this plate will differ from each other.

Table 1: comparison of microbial air pollution in different wards of town (A) and (B)

Amount/Type of microbe	No. Of colony	%age
non-urease Staphylococcus	779	69
Pneumococcus	285	25
Urease Staphylococcus	28	2.5
E. coli	19	1.6
Klebsiella	15	1.3
Serratia	6	0.5
Enterobacter	2	0.1

Table 2: Comparison of microbial air pollution in obstetrics ward of towns (A) and (B)

Type of microbe/ Amount	Urease Staphylococcus		Pneumococcus	
	No.	%age	No.	%age
Hospital B	41	73.2	15	26.8
Hospital A	31	51.4	25	44.6

Table 3: Comparison of microbial air pollution in women surgery ward of towns (A) and (B).

Type of microbe amount hospital	Pneumococcus		Urease Staphylococcus		Pneumooccus		Klebsiella		Serratia		Enterobacter	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
B	71	64.4	6	5.6	18	16.8	7	6.5	3	2.8	2	1.9
A	42	61.8	7	10.3	13	19.1	3	4.4	3	4.4	-	-

Table 4: Comparison of microbial air pollution in women surgery ward of town (A) and (B)

Type of microbe	Nonurease Staphylococcus		Urease Staphylococcus		Pneumococcus		E coli	
	No.	%	No.	%	No.	%	No.	%
Amount Hospital								
B	177	67.3	1	0.4	80	30.4	5	1.9
A	145	72.9	11	5.5	34	17.1	9	4.5

Table 5: comparison of microbial air pollution in men surgery ward of town (A) and (B)

Type of microbe	Nonurease Staphylococcus		Urease Staphylococcus		Pneumococcus		E coli	
	No.	%	No.	%	No.	%	No.	%
Amount Hospital								
B	86	71.1	30	24.8	-	-	5	4.1
A	103	72	35	24.5	-	3.5	-	-

DISCUSSION

Regarding obtained figures and studies which have been done on microbial air pollution in these two towns hospitals, the most epidemic pathogen in view of air pollution in different wards of hospital is non-urease Staphylococcus. But Pneumococcus too play important role in causing microbial air pollution and also nosocomial infections. It seems that the microbial air pollution in town (B) hospitals is less than town (A) hospitals due to execution of educational system in these hospitals and regular use of UV rays and suitable ventilation system and having more facilities. Of course, this difference is not very considerable, and should be taken into consideration. Although air pollution can be one of the most important factors to cause nosocomial infections, but unfortunately no study has been done in these hospitals on this issue previously. The most important reasons leading to pollution of hospital atmosphere by all kinds of microorganisms are as follow:

1. Non-attention to microbial air pollution and having no suitable ventilation system

2. Non-observance of health principles by personnel or having no awareness on this basis
3. Having no infection control-team in hospitals
4. Lack of research articles in this field
5. Unsuitable building structure of hospitals

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