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Examination of Changes of Oropharynx Flora Related to Hospitalization

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Abstract

According to changes in the surface of respiratory epithelial cells and host immunity as well as virulence of hospital acquired pathogens, oropharyngeal colonization enhance in hospital admitted patients. Patient admission in hospital, due to changes of oropharyngeal flora and colonization of virulent germs such as *Staphylococcus aureus* and gram negative bacilli can be a serious problem for developing respiratory infections and nosocomial septicemia. This investigation was carried out on effects of residency of patients in the hospital by oropharyngeal flora. This was a Quasi-clinical trial and assembled data is based on observation and interview. Oropharyngeal germ samples of 30 admitted patients in dermatology ward of Loghman hospital were cultivated at the first and fifth day of admission. All the colonies were distinguished by microbiologists. Thirty patients at the range of 44± 20 years of age were studied. There have been history of corticosteroid usage in 16 persons (53%) and usage of a cytotoxic drug in 8 persons (27%).There has been α– hemolytic *Streptococci* in 100% of patients, *Neisseria* in 87% , coagulase positive *Staphylococci* in 3%, yeast in 3% and gram negative bacilli in 13% of the patients at the beginning of admission. At the fifth day of admission, α - hemolytic *Streptococci* & *Neisseria* had the same values as they were at the first, but colonization of coagulase positive *Staphylococci* increased by 30% , the increase of the yeast was 23%. According to this study changes of oropharyngeal flora in a 5 days admission were statistically significant for coagulase positive *Staphylococci* and yeast but these changes are not significant for other investigated germs.

Keywords: *Oropharynx flora, Microbial, Hospitalization, Dermatology ward.*

Introduction

The changes in the level of respiratory epithelial cells among the hospitalized patients facilitate the colonization process of oropharynx as well as the changes of superficial carbohydrate plus the changes in host's immunity and also the pathogenicity of clinical bacteria. The main and the most standing of these bacteria are gram negative ones which are early found in the oropharynx of normal and healthy individuals (1), but according to the conducted studies , the abundance of these organisms in hospitalized patients grows in a large proportion (2). The studies on alcoholic people have revealed that about 59% of them normally have negative gram bacteria in their pharynx, which *Klebsiella pneumoniae* is the most prevalent (3). At the beginning of the patients hospitalization (previously healthy people), oral normal flora and pathogens of community-acquired pneumonia are the most predominant, but in patients with advanced diseases who are hospitalized for more than 5 days , gram negative bacilli and S. aureus widely colonize in upper respiratory tracts and oropharynx (1,4). Therefore, hospitalization causes the colonization process of pathogenic bacteria existing in the patients' oropharynx regardless of using broad spectrum antibiotics, which in its turn, an important factor for being affected by clinical respiratory infections, and recognition of these bacteria and the way in which microbial flora changes in different times of an illness can give a general view on the etiology of such infections (5, 6). In this study, referring to the department of dermatology, Loghman Hakim hospital, the culture of pharyngeal samples was done at the first and fifth day of hospitalization .The changes of pharyngeal flora related to hospitalization were revealed.

Materials and Methods

The method of this study was a quasi-clinical trial clinical examination before and after the patients' hospitalization. To study the changes of aerobic flora, samples of pharynx were taken from 30 patients hospitalized in dermatology ward of Loghman Hakim hospital in the first hours of the subjects' arrival and 5 days after their hospitalization. To culture the samples, two culture media, i.e. blood agar for gram negative and gram positive, and E.M.B agar for gram negative bacteria, were applied. After fertilizing the samples using sterile cotton soap, the cultural media were transferred to the department of microbiology, School of Public Health, they were held in an incubator at 37 degree c for 48 hours. Having finished the incubation period, cultured colonies were subjected to be recognized using enzymatic & biochemical examinations. Since applying antibiotics was considered as an altering factor because of its severe impact on pharyngeal flora, and referring to them as exclusion criteria, the mentioned patients were

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chosen from department of dermatology to minimize the probable intake of antibiotics. However, all the patients who had received antibiotics for any reason were left out of this study.

Results

In this research, 30 patients (20 males, 10 females) with the mean age of 44 ± 20 (in the range of 14 to 80) were evaluated. Among these subjects, 11 (37%) were workers or housewives, 9 (30%) self – employees, 8 (27%) unemployed, and 2 (7%) were students of high schools. Regarding education 12 (40%) were illiterate, 2 (7%) with degrees higher than diploma (higher educational degrees), and 16 (53%) had diploma. Past medical history: 24 (80%) peoples received immunosuppressive drugs in general; 16 (53%) were on corticosteroids, 8 (27%) peoples on other cytotoxic drugs. From the point of being affected by background diseases it was revealed that 5 (17%) were diabetic, 2 (7%) had cancer, and 8 (27%) had lesions in their oral cavity. The state of changes of pharyngeal flora in the patients , the distribution according which the patients were hospitalized , and results in the first hours before and five days after hospitalization , is shown in Table I. At the beginning of hospitalization, *Neisseriae* was found in 26(87%) of patients, alfa hemolytic *Streptococcus* in all patients 30 (100%), while beta hemolytic *Streptococcus* was only found in 2 (7%). It was the same until the fifth day of hospitalization. In 19 cases (63%), the flora observed on the 5th day differed from those observed in the first day , in 12 people there was one additional organism (mostly gram negative bacilli , *S. aureus*, and fermentative fungus) and in 7 people a general change of flora was observed. Among 9 cases (30%) having *S. aureus* in their pharynx, 6(20%) had *S. aureus* replaced instead of coagulase negative *Staphylococcus*. In 6 people fermentative fungus had been added to their previous flora, on the 5th day, while one had this organism in his/ her pharynx from the beginning. The above changes, were not statistically meaningful, with the exception for coagulas positive *Staphylococcus* ($P<0.008$) and for fungus ($P<0.03$). Oropharynx flora is shown in table II. If the variation of flora is examined, we can divide this combination into two groups: first, including 3 kinds of bacteria, second, flora including 4 or more bacteria. At the beginning of hospitalization, 15(50%) had 3 kinds of bacteria in their oropharynx and it was the same number for those having four or more bacteria. On the 5th day of hospitalization, flora having 3 bacteria was observed in 6 (20%). Those having flora with bacteria were 24 (80%). Generally, the distribution of flora was more than first day. It was not any correlation between the subyccts, age, sex and education level and the firstflora.

Table 1: The distribution of the patient's hospitalization in the dermatology word based on oropharynged flora before and five days after their hospitalization in Loghman Hakim Hospital, 2000

Organism	The first day of hospitalization	The 5th day of hospitalization
Neisseriaceae	26	26
Alfa hemolitic Strep.	30(100%)	30(100%)
Beta hemolitic Strep.	2(7%)	2(7%)
coagulase positive Staph.	1(3%)	9(30%)
coagulase negative Staph.	19(63%)	16(53%)
E.coli	3(10%)	6(20%)
Klebsiella	0(0%)	3(10%)
Pseudomonas	1(3%)	1(3%)
Diphteroids	18(60%)	15(50%)
Fungus	1(3%)	7(23%)
Pneumococcus	5(17%)	4(13%)

Table 2: The comparison of *pharyngeal* flora on the first day of and the 5th day after hospitalization found in the patients hospitalized.

Flora on the 1st day	Number	Flora on the 5th day	Number
Neisseriaceae+ *Sterp* α hemolytic+ Diphteroids	7(23%)	Neisseriaceae+ *Sterp.* α + Diphteroids	1(3%)
		Neisseriaceae+ Sterp. α + Diphteroids+ coagulase negative *Staph.*	3(10%)
		Neisseriaceae+ *Sterp.* α +Diphteroids+ coagulase positive *Staph.*	1(3%)
		Neisseriaceae+ *Sterp.* α + Diphteroids+ *E.coli*	1(3%)
		Neissseriaceae+ *Sterp. α* + *E.coli* + *Klebsiella*	1(3%)
Neisseriaceae+ *Sterp.* α + Diphteroids+ coagulase negative *Staph.*	5(17%)	Neisseriaceae+ *Sterp.* α + Diphteroids+ coagulase negative *Staph.*	2(7%)
		Neisseriaceae + *Sterp.* α + coagulase positive *Staph.*+ Fungus	2(7%)
		Neisseriaceae+ *Sterp. α* + *Pneumococcus*	1(3%)
Neisseriaceae+ *Sterp*. α + coagulase negative *Staph*. +Pneumococcus	3(10%)	Neisseriaceae+ *Sterp.* α + coagulase negative *Staph.*+ *Pneumococcus*	1(3%)
		Neisseriaceae+ *Sterp.* α + coagulase positive *Staph.*	1(3%)
		Neisseriaceae+ *Sterp.* α + coagulase negative *Staph.*	1(3%)
Neisseriaceae+ *Sterp.* α + coagulase negative *Staph.*	2(7%)	Neisseriaceae+ *Sterp.* α + coagulase negative *Staph*.+ Fungus	1(3%)
		Neisseriaceae+ *Sterp.* α –coagulase negative *Staph.*+ *Klebsiella*	1(3%)
Nesseriaceae+ *Sterp.* α + *Pneumococcus*	2(7%)	Neisseriaceae+ *Sterp. α* – coagulase negative *staph.*+ Fungus	1(3%)
		Neisseriaceae+ *Sterp.* α+ Pneumococcus	1(3%)
Neisseriaceae+*Sterp.* α+ coagulase negative Staph.+Fungus	1(3%)	Neisseriaceae+ *Sterp.* α- + coagulase negative *Staph.*+Fungus	1(3%)
Neisseriaceae+ Sterp. α+ coagulase negative *Staph*.+ Diphteroids	1(3%)	Neisseriaceae+ *Sterp.* α- + coagulase negative *Staph.*+ Diphteroids+*E.coli*	1(3%)
Neisseriaceae+*Sterp.* α + *Pseudomonas*	1(3%)	Neisseriaceae+ *Sterp.* α+ coagulase positive *Staph.* + *Pseudomonas*	1(3%)
Neisseriaceae+ Sterp. α+ Sterp.β+ coagulase negative Staph.	1(3%)	Neisseriaceae+ *Sterp. α*+ *Sterp.β*+ coagulase negative *Staph.*	1(3%)
Neisseriaceae+ Sterp. α +Sterp.β+ coagulase negative Staph. + Diphteroids	1(3%)	Neisseriaceae+ *Sterp.* α +*Sterp.*β+*Staph.* coagulase negative *Staph.* + Diphteroids	1(3%)
Neisseriaceae+ *Sterp.* α+ coagulase positive *Staph.*	1(3%)	Neisseriaceae+ *Sterp.* α+ coagulase positive *Staph.* +Fungus	1(3%)
Neisseriaceae+ *Sterp.* α +*Staph.* coagulase negative *Staph.*+ *E.coli*	1(3%)	Neisseriaceae+ *Sterp.* α + coagulase negative+ *E.coli*	1(3%)
Sterp. α + coagulase negative *Staph*.+ Diphteroids	1(3%)	*Sterp.* α + coagulase Positive *Staph.*+ Diphteroids	1(3%)
Sterp. α + coagulase negative *Staph*.+ Diphteroids + *E.coli*	2(7%)	*Sterp.* α + coagulase Positive *Staph.*+ Diphteroids+ *E.coli*+ *Klebsiella*	1(3%)
Sterp. α + coagulase negative *Staph*.+ Diphteroids	1(3%)		
Sterp. α + coagulase negative *Staph.* + Diphteroids + *E.coli*	2(7%)	*Sterp. α* + *Staph.* coagulase Negative *Staph.* + *E.coli*	1(3%)
Sterp. α + coagulase negative *Staph.* + Diphteroids	1(3%)	*Sterp*. α + coagulase Positive *Staph.* + Diphteroids + Fungus	1(3%)

Discussion

In our research, the most changes in oropharynx flora have been as for coagulase positive *Staphylococcus* and fungus .The colonization on process of fungus was not examined in previous studies (1, 2, 3, 5, 6). Regarding this fact that 80% of the subjects used immunosuppressive drugs, the statistically significant change of fungus colonization process is considered as an important and valuable finding. The changes of oropharyngeal flora concerning coagulase positive *Staphylococcus* ($p<0.008$) is statistically meaningful. In the indentical studies, there has been such a change related to hospitalization for more than 5days and the colonization process of gram negative bacteria also largely occurred in such cases (1). Finding these bacteria within five days in the hospitalized patients under this study shows us a prevalence of carrier of pharyngeal flora in the dermatology ward in Loghman Hakim hospital. This indicates that the rate of the carrier state of *S. aureus* is high which can potentially result in dangerous and severe clinical infections. Changes of gram negative bacilli flora in this study was not statistically meaningful that is different from findings of another study (6). The reason for this difference is the research method, because in that study, two groups (one under treatment with antibiotics and the other without antibiotics) were examined. Rising of the colonization process of gram negative bacilli was observed in the subjects under treatment using antibiotics while in our study, the patients who had received antibiotics in any way were left out of this study. In this study, 13% of the subjects had a colonization process by gram negative bacilli that is similar to some previous studies (1, 2, 5), but is different from another (3). Perhaps the reason for this difference is the population examined in this study which was affected with cancer and was under chemotherapy. The most prevalent gram negative species during hospitalization has been *E.coli* that is not similar to that of some other studies (1, 2) .The reason for this difference is the sample taken and the population which was examined in both studies. No correlation and relationship was observed between age and sex of the subjects and flora at the beginning of hospitalization that is similar to the findings of leibovitz (5). Rising of various pharyngeal floras in the second culture 5 days later than the subjects' arrival was observed, but examining the rise and fall of numbers of microorganism colonies during the subjects' hospitalization involves using special microbiological techniques which requires further studies in this field. Changes of pharyngeal flora within 5 days of hospitalization related to coagulase positive *Staphylococcus* and for fungus were significant, but the changes related to the other germs were not statistically valuable. In regard to high prevalence of carrier state of *S. aureus* in hospitalized patients, more studies on this title in different wards of hospital is recommended.

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