The incidence of nasal *staphylococcus aureus* carriage among women and its relation with hormonal status

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One hundred women admitted to Gynecology Department was included in this study. Relationship between nasal staphylococcus aureus carriage and hormonal status was investigated. Staphylococcus aureus carriage rate was found to be 61%. There was no statistical difference between the mean age of nasal carriers and noncarriers (p>0.05). While, carriage rate of post menopausal women was 57.14%, of premenopausal patients was 61.62% (p>0.05). Nasal carriage rate of women with penicillin therapy within the last three months was not different from that of others (p>0.05). Staphylococcus aureus carriage rates was 80% in women with high, 60.71 % in women with intermediate and 59.70% in women with low karyopyknotic indexes. Carriage rates were not statistically different between women with low, intermediate and high karyopyknotic indexes (p>0.05). [Turk J Med Res 1995; 13(2): 55-58]

Keywords: *Staphylococcus aureus,* Nasal carriage, Hormonal status

Staphylococcus aureus (S.aureus) is one of the possible pathogens in nasopharynx and oropharynx of healthy humans. The presence of normal flora and the overall state of the host affect the ability of microorganisms to adhere. Surviving or growing on host tissue without causing overt harmful effect is called "colonization" (1). The nares are frequent sites of colonization (2). Previous studies have shown that from 10% to 40% of the population carry this organism (2-4). Several factors have been found to increase the rate of colonization of microorganism. *S.aureus adheres* to epithelial nasal cells by possessing lipoteichoic acid adherence complexes (1). Attachment of *S.aureus* to nasal mucosal surface is mediated by the cell wall teichoic acids through their specific binding to fibronectin (5). Interesting interactions have been observed between sex hormones and microorganisms, including bacterial adherence to epithelial cells (2).

The karyopyknotic index (KI) is an important indicator of estrogen level. The KI represents the percentage of cells with pyknotic nucleus on smear and is positively correlated with estrogen activity (2,6).

Received: Jan. 4,1995 **Accepted:** Jan. 27,1995

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In this study we investigated the possible correlation between the rate of nasal *S.aureus* carriage and hormonal status in women by means of KI on smears stained by Papanicolau method and to the best of our knowledge this is the second study performed on this subject.

MATERIALS AND METHODS

This study included 100 women admitted to Ataturk University Department of Gynecology because of menstrual irragularity or infertility. Age, duration of menses and menstrual cycle, methods of contraception, usage of hormonal preparations and antibiotic treatment were recorded. Nasal cultures were taken by application cotton swabs in a circular movement within the distal 1 cm of left and right anterior nares. Swabs were inoculated on blood agar.

Suspected colonies of *S.aureus* were plated on Chapman's agar in order to assess the pathogenity. On the other hand, vaginal smears were obtained and stained by the Papanicalau method (7). At least 200 unselected superficial and intermediate squamous cells were counted. KI indicates the percentage of cells with pyknotic nuclei. KIs were classified as follows:

High KI: 67%-100%,

Intermediate KI: 34%-66%,

Low KI: 0-33%.

Data were analysed with student's t test and comparison of poisson rates method.

Table 1. Nasal *S.aureus* carriage rates of women with low, intermediate and high KIs.

	LowKI N-67		Intermediate KI N=28		High KI N-5	
	n	%	n	%	n	%
Right nasal carriage (n-10)	8	11.94	2	7.14	0	0
Left nasal carriage (n-20)	13	19.40	6	21.42	1	20
Bilateral carriage (n-31)	19	28.35	9	32.14	3	60
Total carriage	40	59.70	17	60.71	4	80

RESULTS

One hundred women with a mean age of 31.2±7.31 years (range, 19-55) were included in this study. We found 61 women to have right, left or bilateral nasal *S.aureus* carriers. Bilateral, right and left nasal carriage rates of *S.aureus* were 31%, 10% and 20% respectively. The mean age of nasal *S.aureus* carriers was 31.2±7.0 (range, 20-48) and 31.1 ±7.9 (range 19-55) of noncarriers (p>0.05). Of patients, 14 were post menopausal and 86 premenopausal patients were nasal S. *aureus* carriers (p>0.05).

Five women had high KI, 28 had intermediate KI and 67 had low KI. In women with high KI, the rates of unilateral and bilateral nasal *S.aureus* carriage were 20% and 60% respectively. Women with intermediate KI had the rate of unilateral nasal *S.aureus* carriage as 28.6% (8/28) and bilateral nasal carriage as 32.1% (9/28). In women with low KI the rate of unilateral and bilateral nasal *S.aureus* carriage were 31.3% (21/67) and 28.4% (19/67) respectively (Table 1, Figure 1). There was no statistically significant difference in the rates of unilateral and bilateral *S.aureus* carriage between the women with low, intermediate and high KIs (p>0.05). The mean value of KI of nasal *S.aureus* carriers was 28.6±15.8 and 31.8±18.2 of noncarriers. No significant difference between these values was detected (p>0.05).

Of 100 patients, 24 had history of treatment with penicillin for different reasons within the last three months. Ten (41.66%) of them were found to be nasal *S.aureus* carriers whereas 76 women had no history of antibiotic treatment and 51 (67.10%) of them were S.aureus carriers, no statistical difference was detected (p>0.05).

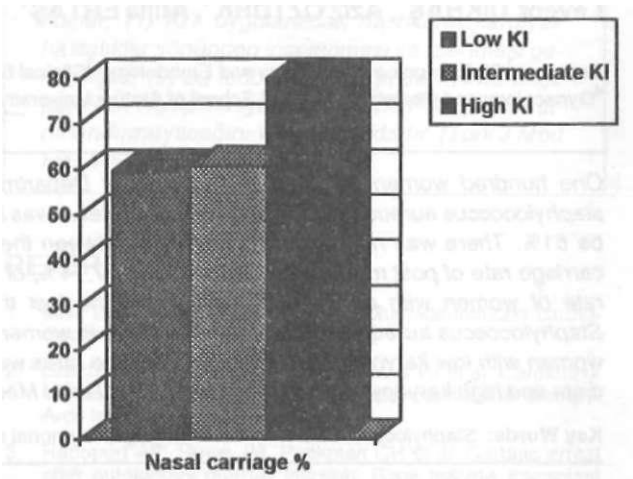

Figure 1. Nasal *S.aureus* carriage rates of women with low, intermediate and high karyopyknotic indexes.

Table 2. Mean age and mean KI values of carriers and noncarriers

	Carriers n-61	Noncarriers n-39	p value
Age	31.24±7.02	31.07±7.9	>0.05
KIs	28.59±15.81	31.81 ±18.21	>0.05

DISCUSSION

The rate of nasal carriage of *S.aureus* has been reported to vary from 10% to 40% in normal population (2-4). In studies in which single nasal cultures are obtained, carriage rates are found to be increased (8). Several factors have been found to increase this rate, including insulin-dependent diabetes mellitus, hemodialysis and peritoneal dialysis treatment, parenteral drug abuse and acquired immunodeficiency syndrome (AIDS) or AIDS related complex (2,3,8-13). Users of cocaine, nasal topical decongestants and steroid sprays have higher rates of nasal *S.aureus* carriage (14). Hospital personnel may be nasal carriers of S.aureus in a higher pencentage than in the general population (4,15).

The results of some previous studies showed that there was no significant difference between sexes in carriage rate (3,16). In our study, bilateral nasal *S.aureus* carriage rate was 31%. This result is similar to that of literature's. We found 61 of 100 women to be right or left or bilateral carriers. If nasal *S.aureus* carriage is determined by a single positive culture, this result is higher than that of previous studies'. We attributed this to the low socio-economic status with low educational level and poor hygine in our region (3,8,9).

In our study there was no statistically significant difference between the mean ages of nasal *S.aureus* carriers and noncarriers. Thus, Lye et al and Winkler et al found the carrier state to be unrelated to age (2,16).

We found 61.62% of premenopausal and 67.14% of post menopausal women to be *S.aureus* carriers (p not significant). In their study, Winkler et al reported no significant difference between them. We attributed this to the resistance of staphylococci to widely used antibiotics (17).

Winkler et ai observed a relationship between nasal *S.aureus* carriage and hormonal status in women. In their study carriage rate was significantly higher for women with high KI than for those with intermediate and low KIs (2). In our study, although not statistically important, the rate of *S.aureus* carriage in women with high KI was higher than that of others. But the rates of the group with intermediate and low KIs were similar. And there was also no statistically significant difference in the mean value of pyknotic cells between the carrier and noncarrier groups.

A high carriage rate as 80% in women with high KI is considerable. In our study, few number of women with high KI may be responsible of our nonsignificant statistical result.

To the best of our knowledge, this is the second study about the relationship between nasal *S.aureus* carriage and hormonal staus. Although recently, some interactions have been observed between sex hormones and microorganisms, including bacterial adherence to epithelial cells, the exact mechanism is unclear (2). Since, nasal carriage rate of *S.aureus* is high in our region, for a reliable result, further studies in large series with different phases of menstrual cycles are needed to evaluate the relationship between nasal carriage and hormonal status.

Kadınlarda nazal *staphylococcus aureus* taşıyıcılık insidansı ve hormonal durumla ilişkisi

Menstrual düzensizlik veya infertilité nedeniyle Jinekoloji Kliniğine staphylococcus aureus taşıyıcılığı ile hormonal durumun ilişkisi araştırıldı. Altmışbir kadının sağ, sol veya bilatéral nazal stafilokok taşıyıcısı olduğu saptandı. Nazal taşıyıcı olanlar ve olmayanların ortalama yaşları arasında istatistiksel bir fark yoktu (p>0.05). Postmenopozal kadınların %57.14'ü, premenopozal kadınların %61.62'si taşıyıcı idi (p>0.05). Son üç ay içinde penisilin tedavisi almış olan kadınların taşıyıcılık oranı almayanlardan istatistiksel olarak farklı bulunmadı (p>0.05). S.aureus taşıyıcılık oranı yüksek karyopiknotik indeksti kadınlarda %80, orta indeksti kadınlarda %60.71 ve düşük indeks/ilerde %59.70 idi. Bu oranlar arasında istatistiksel fark bulunmadı (p>0.05). [TurkJMedRes 1995; 13(2): 55-58]

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