

## Staphylococcus Aureus Nasal Carriage Among Medical Staff In AL-Nasiriyah Teaching Hospital ,Thi-Qar,Iraq.

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### الخلاصة

المكورات العنقودية الذهبية هي بكتريا إيجابية الغرام، عادة ما تعيش على جلد الإنسان أو تجوف الأنف ووجودها في تجوف الأنف يعتبر مشكلة صحية شائعة. تهدف هذه الدراسة الى تقييم وبائية وجود المكورات العنقودية في جوف الأنف لدى العاملين في مستشفى الناصرية التعليمي في محافظة ذي قار جنوب العراق. أخذت مسحات من جوف الأنف لـ 140 ممن يعملون في أقسام المستشفى المختلفه وتم زرعها في أوساط زرعيه لبيان وجود المكورات العنقودية الذهبية ولتحديد من يحملها في جوف أنفه وأعتبر الشخص حاملا للبكتريا اذا كانت نتيجة الزرع ايجابية لمرتين متتاليتين و بفارق زمني قدره أسبوعين. أظهرت الدراسة أن 31 (22.14%) شخصا كانوا يحملون المكورات العنقودية الذهبية في جوف الأنف وكانت معظمها مقاومة للبنسلين (74.19%) ولكن أغلبها تستجيب لعقار الميثيسلين ولكن وجدنا حالتين مقاومتين للميثيسلين (1.43%). أن وجود المكورات العنقودية الذهبية في جوف الأنف لدى العاملين في المستشفيات يشكل مشكلة صحية شائعة في العالم وأن ظهور حالات مقاومة لعقار الميثيسلين تكشف عن حاله خطيره تستوجب الأهتمام والرصد .

### Abstract

**Background :** nasal carrier of Staphylococcus aureus is a common health problem world wide.

**Objective:** The present study was conducted to assess the epidemiology of Staphylococcus aureus nasal carriers among hospital staff in AN- Nasiriyah teaching Hospital ,Thi-Qar ,Iraq.

**Patients and methods:** Nasal swabs were taken from each of 140 personnel. After culturing on blood agar for overnight, probable staphylococcal isolates were identified and subjected to tube Coagulase test. After a two-week interval, second nasal swabs were taken from the subjects whose first cultures were positive for S. aureus.

**Results:** Nasal carriage was defined in 31 (22.14%) personnel with positive culture for both sampling time. 74.19% are penicillin resistant, most of them are methicillin sensitive but 2 cases (1.43%) are methicillin resistant.

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**Conclusion:** Staphylococcus aureus nasal carriage is a common health problem all over the world and methicillin resistant Staphylococcus aureus is an emerging subject even in our community ,which requires further attention and support.

**Key words:** Staphylococcus aureus, nasal carrier, penicillin resistance, methicillin resistance.

## **Introduction**

Staphylococcus aureus literally "Golden Cluster Seed" and also known as golden Staphylococcus, is the most common cause of staph. infections. It is a spherical bacterium, frequently living on the skin or in the nose of a person. Approximately 20%-30% of the general populations are "staph carriers".[1] Staphylococcus aureus can cause a range of illnesses from minor skin infections to life-threatening diseases. It is still one of the four most common causes of nosocomial infections, often causing post surgical wound infections.

S. aureus was discovered in Aberdeen, Scotland in 1880 by the surgeon Sir Alexander Ogston in pus from surgical abscesses. [1] Each year some 500,000 patients in American hospitals contract a staphylococcal infection.[2] S. aureus is a Gram-positive coccus, which appears as grape-like clusters when viewed through a microscope and has large, round, golden-yellow colonies, , when grown on blood agar plates.[3]

S. aureus is catalase positive and primarily coagulase-positive. [4] S. aureus may occur as a commensal on human skin (particularly the scalp, armpits, penis and vagina); it also occurs in the nose (in about 25% of the population) and throat and less commonly, may be found in the colon and in urine. The occurrence of Staphylococcus aureus under these circumstances does not always indicate infection and therefore does not always require treatment (indeed, treatment may be ineffective and re-colonisation may occur). It can survive for some hours on dry environmental surfaces, but the importance of the environment in spread of S. aureus is currently debated. It can infect other tissues when normal barriers have been breached (e.g. skin or mucosal lining). This leads to furuncles and carbuncles. In infants S. aureus infection can cause a severe disease Staphylococcal scalded skin syndrome (SSSS).[5]

S. aureus infections can be spread through contact with pus from an infected wound, skin-to-skin contact with an infected person by producing hyaluronidase that destroy tissues, and contact with

objects such as towels, sheets, clothing, or athletic equipment used by an infected person.

Antibiotic resistance in *S. aureus* was almost unknown when penicillin was first introduced in 1943; indeed, the original petri dish on which Alexander Fleming observed the antibacterial activity of the penicillium mould was growing a culture of *S. aureus*. By 1950, 40% of hospital *S. aureus* isolates were penicillin resistant; and by 1960, this had risen to 80%. [6]

Penicillinase-resistant penicillins such as methicillin, oxacillin, cloxacillin, dicloxacillin and flucloxacillin are able to resist degradation by staphylococcal penicillinase

Today, *S. aureus* has become resistant to many commonly used antibiotics. In the UK, only 2% of all *S. aureus* isolates are sensitive to penicillin with a similar picture in the rest of the world, due to a penicillinase (a form of  $\beta$ -lactamase). The  $\beta$ -lactamase-resistant penicillins (methicillin, oxacillin, cloxacillin and flucloxacillin) were developed to treat penicillin-resistant *S. aureus* and are still used as first-line treatment. Methicillin was the first antibiotic in this class to be used (it was introduced in 1959), but only two years later, the first case of methicillin-resistant *S. aureus* (MRSA) was reported in England. [7]

Despite this, MRSA generally remained an uncommon finding even in hospital settings until the 1990s when there was an explosion in MRSA prevalence in hospitals where it is now endemic. [8]

The present study was conducted to assess the epidemiological relation of *Staphylococcus aureus* isolates from nasal carriers of hospital staff in AN- Nasiriyah General Hospital and to determine the status of antibiotic sensitivity.

### Patients and Methods

Nasal swabs were taken from each of 140 medical personnel working in different departments in An-Nasiriyah Teaching Hospital. After culturing on blood agar for overnight, growth are stained by gram stain and grape like clusters gram positive cocci considered as probable staphylococci isolate were subjected to coagulase test (slide method) where positive results are considered as definite staphylococci. Isolate with coagulase positive results are subcultured in manitol salt agar over 24 hours incubation. Those with ability for manitol fermentation considered as definite *staphylococcus aureus*.

After two weeks interval, second nasal swabs were taken from subjects whose first cultures were positive for *staphylococcus aureus*

and the same procedures were done, nasal carrier was defined in personal with positive culture for both sampling time.

Growths of bacteria on manitol salt agar are subcultured on Muller Hinton agar with antibiotics disc are incubated at 37 c for 24hr. and the results of antibiotic sensitivity were analysed.

### Results

We found that 22.14% of the medical personale who are included in the study carry *Staphylococcus aureus* in their nostril with no significant sex differences. Among those with *Staphylococcus aureus* carrier, 74.19% are resistant to penicillin. most of those who are penicillin resistance they are methicillin sensitive and only tow cases are found to have methicillin resistance.

**Table- 1 : nasal carrier for *Staphylococcus aureus* by sex.**

Character	Medical Staff		%of nasal carriers
	carriers	Non carriers	
Male (n = 78)	17	61	21.79%
Female (n= 62)	14	48	22.58%
Total (n = 140)	31	109	22.14%

$$X^2 = 0.290$$

$$df = 1$$

$$p = 0.590$$

**Table -2: penicillin sensitivity by sex.**

Character	Penicillin sensitive ( % )	Penicillin resistance ( % )
Male (n = 17 )	5 (29.41 % )	12 ( 70.59% )
Female (n = 14 )	3 (21.43 % )	11 ( 78.57% )
Total (n = 31 )	8 (25.81 % )	23 ( 74.19% )

$$F = 0.08$$

$$df = 1$$

$$p = 0.804$$

**Table -3: Methicillin sensitivity in those with Penicillin resistance by sex.**

Character	Methicillin sensitive ( % )	Methicillin resistance ( % )
Male (n = 12)	11 (91.67 %)	1 ( 8.33%)
Female (n = 11 )	10 (90.91 %)	1 ( 9.09%)
Total (n = 23 )	21 (91.3 %)	2 ( 8.7%)

F= 0.006

df = 1

p= 0.948

### **Discussion**

**Staphylococcus aureus is one of the most common human pathogens and is capable of causing a wide range of infections. Although primary Staphylococcus aureus infections are not common, a great deal of the virulence from this organism occurs through cross-infection by spread from patient to patient in hospitals and other institutional settings. In contrast, healthy individuals have a small risk of contracting an invasive infection caused by Staphylococcus aureus, but they can be carriers of the organism.<sup>[3]</sup> Because its primary habitat is moist squamous epithelium of the anterior nares,<sup>[6]</sup> most invasive Staphylococcus aureus infections are assumed to arise from nasal carriage.<sup>[3]</sup> Anterior nares are the most common sites, where the Staphylococcus aureus colonizes and disseminates to other parts of the body. [9] A variety of studies have examined community prevalence of nasal carriage of Staphylococcus aureus in diverse subpopulations, such as adult outpatients, health care workers, college students, and injection drug users.<sup>[10,11,12]</sup> The prevalence of Staphylococcus aureus ranges from 20% to 45%, our study reveal that the prevalence rate for nasal carrier for staphylococcus aureus among medical personnel in An-Nasiriyah Teaching Hospital is 22.14% . This result is comparable to a prevalence rate of 24.4% and 22% obtained from Selangor, Malaysia. [11] and Salford, United Kingdom. [12] respectively. While less than (32.40%) the rate reported from united state[13]**

**Today, Staphylococcus aureus has become resistant to many commonly used antibiotics. In the UK, only 2% of all Staphylococcus aureus isolates are sensitive to penicillin with a**

variable picture in the rest of the world[11] .we found that 74.19% of the staph. aureus isolate are penicillin resistance. similar to other studies , our study reveals that most of penicillin resistance staphylococci .are methicillin sensitive and the prevalence of MRSA among Staphylococcus aureus isolates was 1.43% compared with 2.4% in American study[13]

In our study we not found significant sex difference in methicillin resistance (1.28%for male and 1.61%for female) compared with (1.33% and 4.14% ) respectively. This can be explained by the size of the sample and may be due to some of habit and cultural variation. MRSA have evolved resistance not only to beta-lactam antibiotics, but to several classes of antibiotics. . [11] Some MRSA are resistant to all but one or two antibiotics, including vancomycin so it is wise for New strategies in the pharmaceutical industry to find antimicrobial drugs involve identifying potential molecular targets in cells (such the active sites of enzymes involved in cell division) . [13] , then developing inhibitors of the specific target molecule. Hopefully, this approach will turn up new antimicrobial agents for the battle against staphylococcal infections. Indeed, since 2003, alternatives to vancomycin have been approved for treatment of MRSA.

## Conclusion

Spread of Staphylococcus aureus infections is through human-to-human contact nasal carriage is a common health problem all over the world and methicillin resistant Staphylococcus aureus is an evolving event even in our community Because of the high level of resistance to penicillin, and because of the potential for MRSA to develop resistance to vancomycin, it is wise published [guidelines](#) for the appropriate use of methicillin and vancomycin or our community. In situations where the incidence of MRSA infections is known to be high, the attending physician may choose to use a glycopeptide [antibiotic](#) until the identity of the infecting organism is known. Staff or patients who are found to carry resistant strains of Staphylococcus aureus may be required to undergo "eradication therapy" which may include antiseptic washes and shampoos (such as [chlorhexidine](#)) and application of topical antibiotic ointments (such as [mupirocin](#) or [neomycin](#)) to the anterior [nares](#) of the nose. farther studies with larger numbers may exposed greater heath care problem.

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