Journal of Wasit for Science and Medicine 2026: 19, (1), 11-19

Study of The Prevalence of *Staphylococcus aureus* In Urine Among Student of Wasit University

Dhuha Abd Al-Hadi Hamzah

College of Education for Pure Science, Wasit University, Wasit, Iraq.

Abstract

Urinary tract infection (UTI) refers to every part of urinary system infection caused by the presence and growing of microorganisms everywhere in the urinary tract. Women were frequently affected by the diseases. Urinary tract infections can be caused by *Staphylococcus aureus*. The current study aimed to determine the prevalence of *Staphylococcus aureus* in urine among students of Wasit University from December 2021 to March 2022. A total of 100 midstream urine specimens were taken from symptomatic Wasit University students. Fifty were male samples, and fifty female samples aged from 18 to 22. Patients had symptoms such as polyuria, pelvic and back pain, and dysuria. Patients did not receive any antimicrobial treatment. Out of 100 students 21 (21%) were infected with *Staphylococcus aureus*. Females had a slightly higher prevalence than males 12 (24%) were females, and 9 (18%) were males. There are significant differences (P value = 0.0343) between males and females for *Staphylococcus aureus* and high temperature. The statistical analysis showed significant (P. value = 0.0374) association between *Staphylococcus aureus* infection and dyuria in male and female. A statistically significant association was observed between *Staphylococcus aureus* infection and flank pain.

Keywords: Urinary tract infections, *Staphylococcus aureus*, and dysuria.

1. Introduction

Urinary tract infections (UTIs) are the second most frequent cause for hospital visits and one of the major causes of morbidity in the general population [1]. They are a serious health issue that impacts 150 million individuals annually worldwide and are a common reason for adults to seek medical advice [1].

One of the most prevalent bacterial infections in primary care is urinary tract infections, which are also among the illnesses for which antibiotic resistance is

rising [2]. In the general population, *Staphylococcus aureus* is a rare cause of urinary tract infections [3]. However, in certain individuals, *staphylococcal* bacteraemia infections such as endocarditis can lead to ascending colonization and *Staphylococcus aureus* infection in the urinary tract [4].

Staphylococcus aureus was a G+ve spherically shaped bacterium, catalase and nitrate reduction are positive for *Staphylococcus aureus*. Pathogenic strains often promote infections by producing a cell-surface protein that binds and inactivates antibodies, together with additional virulence factors including potent protein toxins [5]. The risk of Staphylococcus aureus transmission is increased when indwelling catheters and other devices are present in the urinary system [4].

Extracellular enzymes are among the bacterial virulence factors that are linked to *Staphylococcus aureus's* pathogenicity [6]. Urinary tract infection symptoms are not linked to most occurrences of *Staphylococcus aureus* bacteriuria [7].

The therapeutic significance of *Staphylococcus aureus* isolation from urine in patients undergoing long-term urinary catheterization is uncertain due to the practically constant occurrence of bacteriuria alongside this condition. In the older population, it might be challenging to distinguish between asymptomatic bacteriuria and a clinical urinary tract infection [7]. Numerous virulence factors that enable colonization and persistence, dispersion within the host, and immune system evasion are linked to this bacterium's capacity to cause disease [8]. In developed countries, 0.2–1 % of urine samples primarily contain *Staphylococcus aureus* and in West Africa, this frequency was higher [9].

2. Materials and Methods

2.1 Samples Collection

The current study was conducted in the College of Education for Pure Sciences, Wasit University from December 2021 to March 2022. A total of one hundred midstream urine specimens were taken from symptomatic Wasit University students. Fifty samples from males, and fifty samples were collected from female with aged 18 to 22. Patients had symptoms such as polyuria, pelvic, back pain, and dysuria. Moreover, it was confirmed that all patients had not received any antimicrobial treatment.

2.2 Sterilization Methods

Inoculating loops were sterilized using a Bunsen burner, glassware was sterilized in an oven set to 180 °C for two hours. Solutions, media, and chemical ingredients

were autoclaved for 15 minutes at 121 °C (15 pounds/inch2). In contrast, filtration (0.45 µm) was used to sterilize the solutions, sugars, and other chemical compounds that were impacted by heating.

2.3 Samples Analysis

Urine samples were directly cultured on blood agar and Mannitol Salt Agar (MSA) using spread plate technique. Gram-staining, MSA, catalase, and coagulase tests are among the biochemical features of these pure colonies that are used to identify *Staphylococcus aureus* based on established microbiological procedures. The Vitek system used established criteria to identify clinical isolates of *Staphylococcus aureus*.

2.4 Statistical Analysis

The t-test, Odds Ratio (OR), and Relative Risk (RR) in the GraphPad Prism Software (version 8.0.2) were applied to statistical analysis of obtained data. Differences between the results of study groups were considered significant at $p < 0.05$ (*), $p < 0.01$ (**), $p < 0.001$ (***), and $p < 0.0001$ (****).

Significant increasing in values of OR and RR (above 1) in a study group meaning that this group at higher risk of infection than other study group. Among all study groups, females were showed significantly a higher risk of *S. aureus* infection than males.

3. Results

Total positivity rate of prevalence of *Staphylococcus aureus* among student of Wasit University 50 males and 50 females aged from 18 to 22 years old was 21%. The prevalence rate of *Staphylococcus aureus* in the study population is listed in table 2. From students, 50 (18%) were males and 50 (24%) were females. females had a slightly higher prevalence (24%) than males (18%).

However, the p-value was 0.493 as shown in (table 3) shows statistically significant association between the rate of infection with *Staphylococcus aureus* and the high temperature (P .value = 0.0343). A statistically significant (P .value = 0.0374) in (table 4) was association between *Staphylococcus aureus* infection and dysuria in male and female. Moreover, significant differences (P. value = 0.0374) are listed in table 5 between males and females for *Staphylococcus aureus* infection and flank pain.

Table 1: Prevalence of *Staphylococcus aureus*.

Total	Infected		Non-infected	
	No.	%	No.	%
100	21	21	79	79

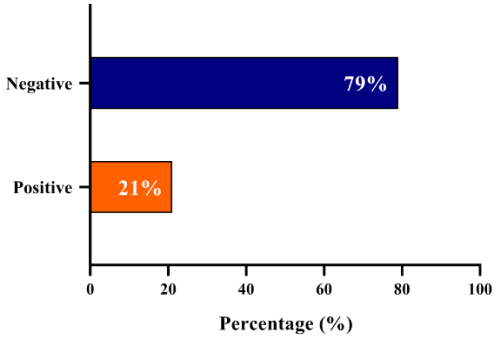

Figure 1: Total prevalence of *Staphylococcus aureus* infections.

Table 2: Prevalence of infection with Staphylococcus aureus.

Gender	Total No.	Positive		OR	RR
		No.	%		
Male	50	9	18	0.696	0.75
Female	50	12	24	1.436	1.33
p-value		0.493		0.0001	0.0001
95% CI		1.12 to 59.12		36.35 to 176.7	26.45 to 47.25
R^2		0.9800		0.8925	0.9279

CI (Confidence interval), OR (Odds Ratio), RR (Relative Risk)

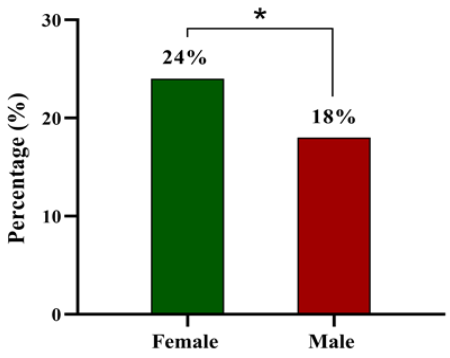

Figure 2: Prevalence of positive *Staphylococcus aureus* infections among females and males.

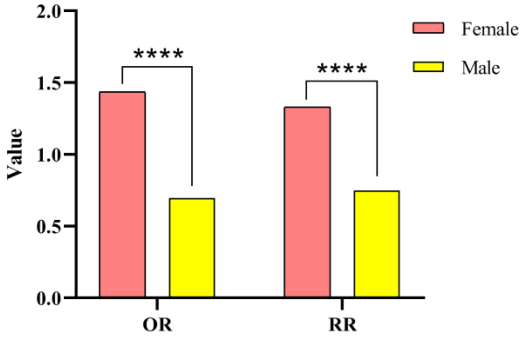

Figure 3: Risk of positive *Staphylococcus aureus* infections on females and males.

Table 3: Prevalence of positive infections according to gender and temperature.

Gender	Total No.	Positive		OR	RR
		No.	%		
Male	9	5	55.56	0.625	0.836
Female	12	8	66.67	1.6	1.196
p-value		0.0343		0.0001	0.0001
95% CI		9.468 to 131.7		15.82 to 173.7	12.71 to 133.3
R^2		0.9918		0.8389	0.9696

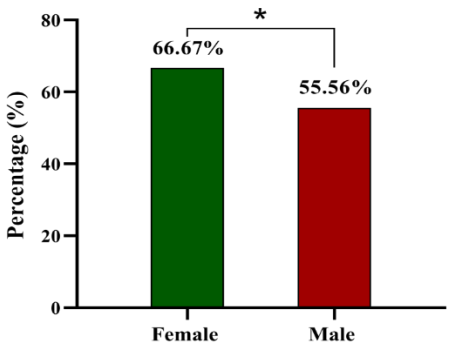

Figure 4: Prevalence of positive *Staphylococcus aureus* infections according to gender and temperature.

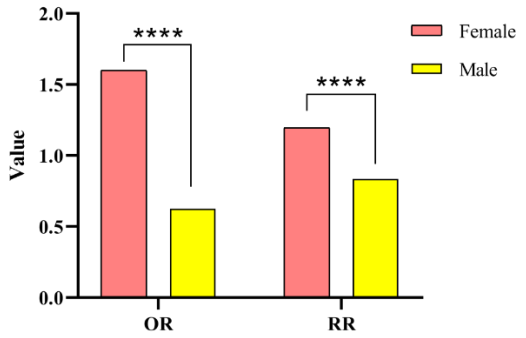

Figure 5: Risk of positive *Staphylococcus aureus* infections according to gender and temperature.

Table 4: Prevalence of positive infections according to gender, and dysuria.

Gender	Total No.	Positive		OR	RR
		No.	%		
Male	9	6	66.67	0.667	0.893
Female	12	9	75	1.5	1.119
p-value		0.0374		0.0001	0.0007
95% CI		17.91 to 123.8		4.209 to 63.76	4.298 to 24.42
R^2		0.9966		0.8713	0.9875

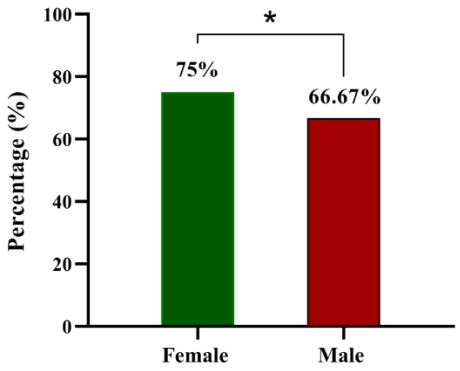

Figure 6: Prevalence of positive *Staphylococcus aureus* infections.

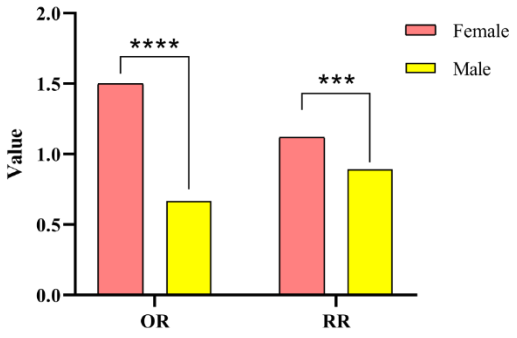

Figure 7: Risk of positive *Staphylococcus aureus* infections.

Table 5: Prevalence of positive infections according to gender and flank pain.

Gender	Total No.	Positive		OR	RR
		No.	%		
Male	9	6	66.67	0.667	0.893
Female	12	9	75	1.5	1.119
p-value		0.0374		0.0001	0.0007
95% CI		17.91 to 123.8		4.209 to 63.76	4.298 to 24.42
R^2		0.9966		0.8713	0.9875

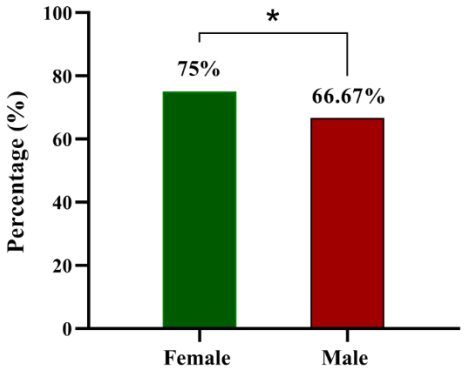

Figure 8: Prevalence of positive *Staphylococcus aureus* infections according to gender and flank pain.

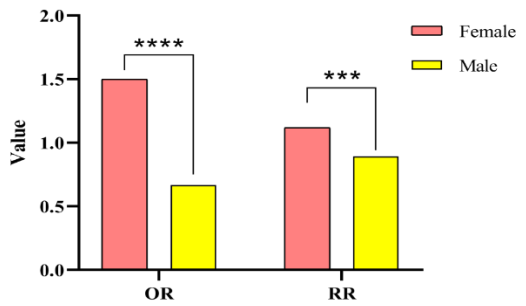

Figure 9: Risk of positive *Staphylococcus aureus* infections according to gender and flank pain.

4. Discussion

Urinary tract infection affects a high number of populations during their lifetime [10-11]. It is the second most common infection in societies, with an estimated 150 million people suffering from urinary tract infection each year [10]. Urinary tract infection is caused by bacteria that cause inflammation of the urinary tract [11].

Given the seriousness of *staphylococcal* infection that the human urinary system is exposed and its possession of multiple and variable mechanisms in causing rapid infections. The study includes isolation of *staphylococcal* bacteria from urinary tract infections. Where urine samples were collected from groups of students from Wasit University. Results of the current study showed that the incidence of *Staphylococcus aureus* infection was 21%.

Similar studies have reported the presence of *Staphylococcus aureus* in various regions researchers worldwide. In close similar studies of *Staphylococcus aureus* were reported by different researchers in several part of the world. *Staphylococcus aureus* was recorded 21.5% in West Africa [12], and 28.6% in Nigeria [13].

On the other hand, results disagreed with results of William et al. 0.4% [14], Ali12.6% in Zakho city [15], Qutaiba and Hadi 4% [16], and Joaquín 63% [17]. Our findings regarding that *Staphylococcus aureus* infection with relation to gender revealed that females were more susceptible to infection 24% than males 18%. This result agrees with Shilpi and Guide 2024 [18], as well as Awss, and Jassim [19].

The reason might be that women are significantly more prone to UTIs than men due to the shape of the female lower urinary tract and the reproductive organs. Bacteria can enter the body more readily because female urethra is shorter than the male. Furthermore, due to the prevalence of vaginitis and vulvar vestibulitis, it opens into the vulvar vestibule, a region that is also very susceptible to infections. Sexual activity and overuse of personal hygiene products that disrupt the natural vaginal microbiota are frequently to fault in this situation [20].

The observation of current study showed association between the rate of infection with *Staphylococcus aureus* and

high temperature. These findings consistent with Karzan Mohammed et al. [17], and Czajkowski et al. [21]. Temperature has a crucial role in the survival and pathogenicity of bacteria, and during the development of fever, germs may be exposed to an increase in host temperature [7, 21].

Based on the results, that was a relationship between *Staphylococcus aureus* and dysuria in males and females. The relationship with flank pain and *staphylococcus aureus* in males and females.

Urinary tract infections are more prevalent in females compared to males due to the anatomical difference of a shorter urethra [22, 18]. Some behavioural factors which include detention in sexual exertion, micturition and the use of contraceptives which promote colonization of the peri urethral area with coliform bacteria [18].

5. Conclusion

Staphylococcus aureus was a cause of urinary tract infection among student with urinary tract catheterization; females had a slightly higher prevalence 24% than males 18%. There was a statistically significant association between *Staphylococcus aureus* infection and dysuria, flank pain in male and female.

6. References

1- Onanuga A., and Awhowho G. O., (2012). Antimicrobial resistance of *Staphylococcus aureus* strains from patients with urinary tract infections in Yenagoa, Nigeria. Journal of Pharmacy and Bioallied Sciences. 4, 3, 226-230.

2- Kbyeh F. R., and Abedsalih A. N., (2023). Study the Antibacterial Mechanism of Diclofenac and its Activity Alone or Combined with Ciprofloxacin in Treating Urinary Tract Infection. Wasit Journal for Pure Sciences. 2, 3, 292-310.

3- Xu K., Wang Y., Jian Y., Chen T., Liu Q., Wang H., Li M., and He L., (2023). *Staphylococcus aureus* ST1 promotes persistent urinary tract infection by highly expressing the urease. Frontiers in Microbiology. 14, 1101754.

4- Abduljabar Y., and Khalid H., (2023). Isolation and antibiotic susceptibility of E. coli and S. aureus from urinary tract infections in Dohuk city, Iraq. Journal of Population Therapeutics and Clinical Pharmacology. 30. 262-267.

5- Eltwisy H. O., Abdel-Fattah M., Elsisi A. M., Omar M. M., Abdelmoteleb A. A., and El-Mokhtar M. A., (2020). Pathogenesis of Staphylococcus haemolyticus on primary human skin fibroblast cells. Virulence. 11, 1, 1142-1157.

6- Fadhel A., Abureesha R., and Al-Azzawi R., (2013). Prevalence of S. epidermidis and S. aureus and their biofilm ability among Iraqi patients suffering from urinary tract infection. Iraqi Journal of Science. 54, 3, 547-552.

7- Muder R. R., Brennen C., Rihs J. D., Wagener M. M., Obman A., Stout J. E., and Yu V. L. (2006). Isolation of Staphylococcus aureus from the urinary tract: association of isolation with symptomatic urinary tract infection and subsequent staphylococcal bacteremia. Clinical infectious diseases: an official publication of the Infectious Diseases Society of America. 42, 1, 46-50.

8- Vandenesch F., Lina G., and Henry T., (2012). Staphylococcus aureus hemolysins, bi-component leukocidins, and cytolytic peptides: a redundant arsenal of membrane-damaging virulence factors?. Frontiers in cellular and infection microbiology. 2, 12.

9- Baba-Moussa L., Anani L., Scheftel J. M., Couturier M., Riegel P., Haïkou N., Hounsou F., Monteil H., Sanni A., and Prévost G., (2008). Virulence factors produced by strains of Staphylococcus aureus isolated from urinary tract infections. The Journal of hospital infection. 68, 1, 32-38.

10- El Astal Z., (2005). Increasing ciprofloxacin resistance among prevalent urinary tract bacterial isolates in Gaza Strip, Palestine. Journal of biomedicine and biotechnology. 2005, 3, 238-241.

11- Farid A., Naz I., Ashraf A., Ali A., Rehman A. U., Sarwar Y., and Haque A., (2015). Molecular detection of antimicrobial resistance in local isolates of Staphylococcus epidermidis from urinary tract infections in Faisalabad region of Pakistan. EXCLI Journal. 14, 697-705.

12- Baba-Moussa L., Anani L., Scheftel J. M., Couturier M., Riegel P., Haikou N., and Prévost G., (2008). Virulence factors produced by strains of Staphylococcus aureus isolated from urinary tract infections. Journal of hospital infection. 68, 1, 32-38.

13- Olatunbosun M. O., (2023). Occurrence of staphylococcus spp associated with Urinary Tract Infections among women attending Ibrahim Badamasi Babangida (IBB) specialist hospital, Minna, Nigeria. Tanzania Journal of Health Research. 24, 2, 17-30.

14- Stokes W., Parkins M. D., Parfitt E. C. T., Ruiz J. C., Mugford G., and Gregson D. B., (2019). Incidence and Outcomes of Staphylococcus aureus Bacteriuria: A Population-based Study. Clinical infectious diseases: an official publication of the Infectious Diseases Society of America. 69, 6, 963-969.

15- Ali, B. N., (2025). Molecular Detection of Drug-Resistant Genes Among Clostridioides difficile From Diarrhetic Children in Duhok City-Iraq. Science Journal of University of Zakho. 13, 2, 179-184.

16- Hashim Q. D., and Rasheed Al-Taai H. R., (2023). Molecular Identification of Staphylococcus aureus Isolated from Hospital and Community-Acquired in Baqubah City. Academic Science Journal. 1, 3, 113-129.

17- Bermejo J., Gianello M., Pascale M. L., Borda N., Freije J., and Notario R., (2013). Significado clínico del aislamiento de Staphylococcus aureus en muestras de orina [Clinical significance of Staphylococcus aureus in urine]. Enfermedades infecciosas y microbiologia clinica. 31, 6, 389-391.

18- Karzan Mohammed, K., Faeza Burhan, O., and Shahida Nooruldeen, Y. ,(2017). Isolation and identification of urinary tract infectious bacteria and exploring their anti-drug potential against some common antibiotics. Journal of Microbial and Biochemical Technology. 9, 6.

19- Hayyawi A., and Mukharmish J., (2019). Molecular Study to Detect of Prevalence Biofilm Genes and Effect of Probiotic on The Staphylococcus Aureus Isolation in Al-Kut City, Iraq. 1141-1148.

20- Czajkowski K., Broś-Konopielko M., and Teliga-Czajkowska J., (2021). Urinary tract infection in women. Przeglad menopauzalny Menopause review. 20, 1, 40-47.

21- Sheetal, Sachin Yadav, Soniya Ranawat. (2025). A Review on Urinary Tract Infection. International Journal for Multidisciplinary Research. 7, 3, 1-9.

22- Williams G., and Craig J. C., (2019). Long-term antibiotics for preventing recurrent urinary tract infection in children. The Cochrane database of systematic reviews. 4, 4, CD001534.