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Faculty of Applied Medical Science

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The Incidence Rate of Asymptomatic Bacteriuria Among LIMU Students

Name: Eslam Alsahabi

Student Number: 2898

University: Libyan International Medical University

Faculty: Applied Medical Sciences

ABSTRACT

Asymptomatic bacteriuria is the presence of bacteria in urine without symptoms of acute urinary tract infection. It can predispose to a more complicated development of urinary tract infections and pyelonephritis, especially among pregnant women, giving rise to pregnancy-related complications. The prevalence of asymptomatic bacteriuria was 54.2%. The incidence rate was higher in females (83.3%) and less common in males (25%). This indicates that females are 41.2% more likely to have asymptomatic bacteriuria than their male counterparts. The report has an overall higher prevalence than other studies conducted in the city of Benghazi where one study involved 120 females of which half were pregnant and further testing is needed. Treatment and screening should be prioritized for patients at risk of developing symptomatic urinary tract infection and pyelonephritis, mainly pregnant females.

INTRODUCTION

Urinary Tract Infections (UTI) are an inflammatory immune response to microbial invasion and are commonly associated with bacteriuria or pyuria. However, asymptomatic bacteriuria is the presence of bacterial microbes found in the urine in the absence of acute urinary tract infection symptoms. Bacteriuria, which may be a positive indicator of an ongoing urinary tract infection may involve the lower or upper urinary tracts. This comes with a myriad of infections including but not limited to, the urethra, causing urethritis, the prostate, causing prostatitis, the bladder, causing cystitis, or the kidney, causing pyelonephritis. Nevertheless, the whole urinary system is constantly at risk of invasion by infectious microbes once any single part is infected.

However, asymptomatic bacteriuria, the presence of bacteria in urine without symptoms of acute urinary tract infection. It can predispose pregnant women to the development of urinary tract infections and pyelonephritis, with pregnancy related complications. It is commonly accepted that the bacterial count found in a standard urine sample must be at least 100,000/mL for confirmation that significant bacteriuria is present in asymptomatic individuals [1].

UTI affects any age, ranging from neonates to geriatrics, with females being the most affected population. Women are prone to developing a urinary tract infection due to various anatomical factors (e.g. shorter length of the urethra) that provide convenient access for the microbe to reach the bladder. Other non-anatomical factors include poor hygiene, sexual intercourse, use of contraceptives, and hormonal variations e.g. in menopause [2] Enterobacteriaceae account for 90% of asymptomatic bacteriuria cases, with the most common isolated microbe from this family

being Escherichia coli [3].

The prevalence of asymptomatic bacteriuria and its associated risk factors for students studying at the Libyan International Medical University to date is not well established and must be investigated. The goal of this report is to shed light on its prevalence and isolated organisms by collecting and screening mid-stream urine and analyzing them. In addition to spreading awareness on the educational institution and the student population alike to provide a more efficient treatment policy.

METHODS AND MATERIALS

The study population consisted of 63 students of the Faculty of Applied Medical Sciences, Libyan International Medical University, Benghazi, Libya. Samples were collected via early morning mid-stream urine from each subject in a sterile container with their oral consent. The standard technique for urine cultures will be done via a numeric threshold of colony-forming units (CFUs) per milliliter. Samples were inoculated using the spread plate method with a standard 0.00uL wire loop and the choice of media used for our urine cultures were 5% blood sheep agar plate, CLED, and Macconkey agar plate. This ensures the detection of most gram-negative bacilli, in addition to staphylococci, streptococci, and enterococci. After inoculating the urine sample into the Macconkey agar it shall be incubated for approximately 24 hours and at a set temperature of 37°C. Once the incubation period is done the colonies are counted on each plate [4] and will be multiplied by 1000 to determine the number of microorganisms per mL in the original specimen. For confirming infection in samples obtained from mid-stream void $\geq 1 \times 105$ CFU/µL must be attained. However, If there was no

significant growth even after incubating the culture for 48 hours then the urine culture is considered negative.

RESULTS

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
CFUcat * Gender	24	100.0%	0	0.0%	24	100.0%

CFUcat * Gender Crosstabulation

			Gender		
			Male	Female	Total
CFUcat	No growth	Count	9	2	11
		% within CFUcat	81.8%	18.2%	100.0%
		% within Gender	75.0%	16.7%	45.8%
	Growth	Count	3	10	13
		% within CFUcat	23.1%	76.9%	100.0%
		% within Gender	25.0%	83.3%	54.2%
Total		Count	12	12	24
		% within CFUcat	50.0%	50.0%	100.0%
		% within Gender	100.0%	100.0%	100.0%

Table 1

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence Interval		Significance	99% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	8.727[a]	2	.013	.020[b]	.016	.023			
Likelihood Ratio	9.949	2	.007	.016[b]	.013	.020			
Fisher's Exact Test	8.180			.020[b]	.016	.023			
Linear-by-Linear Association	8.065[c]	1	.005	.008[b]	.006	.010	.005[b]	.003	.006
N of Valid Cases	24								

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.00.

b. Based on 10000 sampled tables with starting seed 221623949.

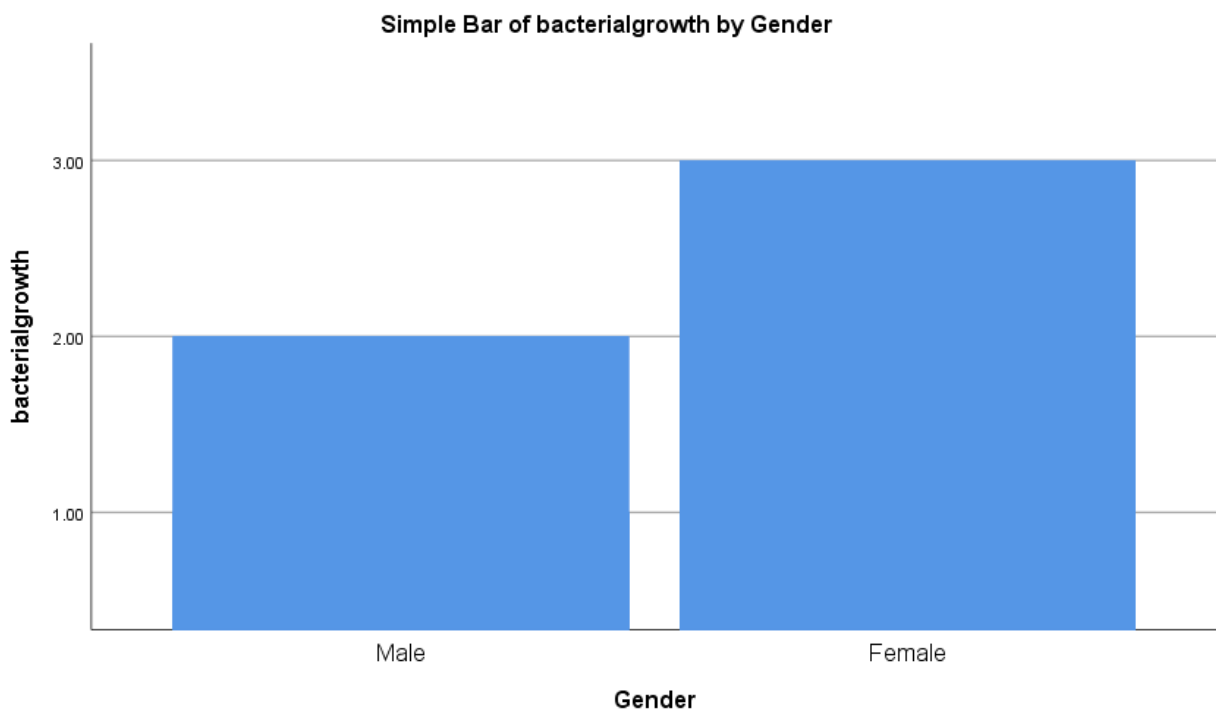c. The standardized statistic is 2.840.

Table 2

Figure 1

DISCUSSION

Findings from the lab results indicate that the prevalence of asymptomatic bacteriuria among students attending the Libyan International Medical University is 54.2%. This was after calculating based on the collection of a quantitative count of ≥105 colony-forming units/ml for a positive diagnosis of asymptomatic bacteriuria.

Females make up a larger proportion of its prevalence of asymptomatic bacteriuria at 83.3% (10 out of 12) within its gender and 16.7% (2 out of 12) unaffected. While males within their gender indicate their prevalence at 25% (3 out of 12) and 75% (9 out of 12) unaffected. This indicates that females are 41.2% more likely to have asymptomatic bacteriuria than their counterparts males. P-Value was calculated to see if there was any correlation regarding gender differences (P=0.004), the results after statistically analyzing the numbers indicated that the association between the growth of bacteria in both genders is higher in females than males. (See Table 2) This can be attributed to the various anatomical factors such as the shorter length of the urethra from the anus that provides convenient access for pathogenic microbes to reach the bladder, causing bacteriuria as a result.

Assuming the female portion of the study are young premenopausal nonpregnant women, the prevalence of asymptomatic bacteriuria is between 1% and 5%. However, the prevalence of asymptomatic bacteriuria in pregnant women is significantly higher in nonpregnant, premenopausal women (1.9−9.5% versus 1.0−5.0%) [2]. This higher incidence is largely contributed to several factors of pregnancy that aid in predisposing them to asymptomatic bacteriuria, including increased progesterone, slowed peristalsis, urinary stasis in ureters, uterine growth, bladder displacement, and increased volume of residual urine [7]. As for premenopausal females, the most common factor is sexual intercourse. There has been a link between the frequency of sexual intercourse (particularly 4 or more times per week), the use of spermicides that contributes to alterations in the vaginal pH which can affect the normal flora of a female, and having a different sexual partner within the previous year [8]. In contrast, these results were significantly higher than other studies performed in the city of Benghazi where

one study involved 120 females of which half were pregnant. Significant bacteriuria was found in 13.3% (16) with pregnant females at 16.7%. [5]

Treatment options for asymptomatic bacteriuria vary depending on the overall medical condition of the individual being treated. In general, treatment for asymptomatic bacteriuria is not indicated for healthy premenopausal and nonpregnant women. As well as in patients with pyuria, females with diabetes mellitus, geriatric individuals, patients with spinal cord injury, and patients with in situ catheters. [9,10] The Infectious Diseases Society of America (IDSA) guidelines recommend 3–7 days of antibiotic treatment for ABU in pregnant women, as well as screening. It shows that screening and treatment of asymptomatic bacteriuria decrease the incidence rate of pyelonephritis by up to 75%. [10] Further studies should be conducted to determine the results obtained in this study to allow for more awareness and to provide optimal care for patients who are at risk of carrying an infection.

CONCLUSION

The prevalence of asymptomatic bacteriuria at the Libyan International Medical University is 54.2%, which is significantly higher in males than females (see Figure 1). In addition, these findings indicate a higher prevalence of asymptomatic bacteriuria at this university than what has been found in other studies conducted in the city of Benghazi, Libya. The organism was not revealed. However, it leads to more lab studies to be conducted in the city of Benghazi among other cities in Libya to further investigate its concrete prevalence in the Libyan Society. The complications associated with asymptomatic bacteriuria require that screening is done for all pregnant women, and appropriately provide treatment to them whereas not indicated for healthy premenopausal women.

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