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LIMU

The Incidence Rate of Asymptomatic Bacteriuria Among LIMU Students

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Abstract

Urinary tract infections (UTIs) affect any part of the urinary system, with most cases occurring in the lower urinary tract, caused mainly by E.coli. Females are at more risk of infection, mostly due to shorter gap between anus to urethra. Bacteriuria is when bacteria is found in urine. It is classified into symptomatic and asymptomatic. For asymptomatic bacteriuria (ABU) to be assessed as significant, the bacterial count should be ≥100,000 colony-forming units (CFUs)/mL of urine. Data was collected from 24 participants, 12 males and 12 females, using urinalysis and urine culture. Results showed that only 2 of the female participants had significant growth on the culture media, while the rest of the participants showed no growth, or no significant growth. It can be concluded that there is a correlation between gender and ABU, and to further prove this, more studies should be done on a more diverse sample.

Introduction

Urinary tract infections (UTIs) are a group of common diseases infecting any part of the urinary system, mainly the lower urinary tract that is comprised of the bladder and urethra.[1] UTIs are principally caused by bacteria, primarily Escherichia coli. Women are up to 30 times more likely to develop a UTI compared to men, mainly due to the shorter gap between the anus to the urethra.[2] Other risk factors include but are not limited to, a previous UTI, sexual activity, pregnancy, age (more common in older adults and younger children) and poor hygiene (especially in potty-training children).[3]

Most UTIs are uncomplicated as they happen in healthy, non-pregnant women. Complicated UTIs involve those with a disease or a pathogen that is resistant, decreasing the change of a successful treatment. These occur mainly in all UTIs of men, patients with a urinary tract abnormality, immunosuppressed patients and patients with a urethral catheter.[4]

Signs and symptoms do not always appear, and include strong urge to urinate, burning sensation when urinating, cloudy or cola-colored urine, strong-smelling urine and pelvic pain in women (specifically in the center and around the pubic bone).[1]

Bacteriuria, a type of UTI, is defined as the presence of bacteria, from the urinary tract, in urine and is classified as symptomatic and asymptomatic.[5]

Symptomatic bacteriuria with a low bacterial count of 1000 colony-forming units (CFUs)/mL of urine can be considered significant,[6] and is associated with urethritis (urethral infection), cystitis (bladder infection), prostatitis (prostate infection), and more. Symptomatic bacteriuria requires treatment by antimicrobial agents.[5]

For asymptomatic bacteriuria (ABU) to be considered significant, a bacterial count of at least 100,000 CFU/mL of urine must be found on 2 occasions in women and one occasion in men.[5,6] ABU presents with no symptoms, and is not considered an infection as treatment is usually not required.[4] On the other hand, pregnant women would require antimicrobial treatment.[5]

The aim of this report is to investigate the incidence rate of ABU among LIMU students, and to verify in which gender asymptomatic bacteriuria is more frequent.

Materials and Methods

For this study, data was collected from 24 participants. 12 males and 12 females, both from the young adult age group. All subjects were randomly asked to collect a urine sample by urinating into a sterile, screw-top container, and handing them in within an hour. The containers were labelled with the subject's name, gender, date of birth, and the date of collection for accuracy of data.

To check for bacteriuria, both urinalysis and urine culture was done. For urinalysis, the color of the urine sample was checked, which is normally some shade of yellow. This depends on how diluted the sample was. Then a drop of urine was put on a slide, and checked under the microscope for cells, urinary casts, bacteria and other microorganisms.[7]

Urine culture was then done by dipping a sterile inoculating needle into the urine sample and using the streak plate method on the gram culture. The culture was then put into the incubator, set at 37 °C. Results were checked after 24-48 hours. The test was marked positive or negative, depending on if there was any bacterial growth. If there was, the colonies were counted.[8]

The data collected was inputted into the biostatistics program IBM SPSS Statistics Version 26. Statistical analysis was run utilizing the Fisher's Exact Test, used for independence between two nominal variables.

Results and Statistical Analysis

The null hypothesis states that there is no association between gender difference and ABU, while the alternative hypothesis states that there is an association.

Table 1: Correlation Between Gender and ABU Expressed Using Percentages

Gender * CFU Crosstabulation						
			CFU			
			No growth	No significant growth	Significant growth	Total
Gender	Female	Count	2	8	2	12
		% within Gender	16.7%	66.7%	16.7%	100.0%
		% within CFU	18.2%	72.7%	100.0%	50.0%
	Male	Count	9	3	0	12
		% within Gender	75.0%	25.0%	0.0%	100.0%
		% within CFU	81.8%	27.3%	0.0%	50.0%
Total		Count	11	11	2	24
		% within Gender	45.8%	45.8%	8.3%	100.0%
		% within CFU	100.0%	100.0%	100.0%	100.0%

Table 2: Chi-Square Test Results Exhibiting that the P-value is ≤ 0.05

Chi-Square Tests						
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	8.727[a]	2	.013	.019		
Likelihood Ratio	9.949	2	.007	.015		
Fisher's Exact Test	8.180			.019		
Linear-by-Linear Association	8.065[b]	1	.005	.007	.004	.003
N of Valid Cases	24					

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

b. The standardized statistic is -2.840.

Table 3: Summary Table of Data Collected

Gender	***Bacteriuria Growth***			***P-Value***
	No growth (N=11)	***No significant growth (N=11)***	***Significant growth (N=3)***	
Male	9 (75%)	3 (25%)	0 (0%)	0.019
Female	2 (16.7%)	8 (66.7%)	2(16.7%)	

Discussion

As seen in Table 1 and 3, there was no growth noted in 75% of male participants and 16.7% of female participants. This was expected as the frequency of ABU in healthy young men is almost 0%.[9]

No significant growth (<100,000 CFU/mL)was noted in 25% of male participants and 66.7% of female participants.

Only female participants (16.7%) showed significant growth (≥100,000 CFU/mL). This was anticipated as ABU is common for women of all ages, but rates rise with age for both genders.[10]

Reported cases of ABU include 1-5% in premenopausal women, 2.8-8.6% in postmenopausal women and up to 16% in women aged 70 years and older.[9] Prevalence increases in men after the age of 60, mostly like due to obstructive uropathy and nullified function related to prostatic hypertrophy.[11]

An important group at risk, who were not included in our study, are pregnant women. ABU is found in 1.5-9.5% of cases in the first trimester.[9] Physiological changes occurring during pregnancy elevating the risk of ABU, as well as acute pyelonephritis.[12] ABU is crucial in pregnancy as 20-30% of cases that go untreated advance to acute pyelonephritis.[13]

ABU does not increase the risk of unfavorable health conditions in healthy and nonpregnant individuals. [14]

Only pregnant women receive antimicrobial treatment, based on their urine culture results and monitoring after follow-up. How antimicrobial treatment is chosen

depends on which trimester the patient is in, how safe the antimicrobial is in pregnancy, and the pattern of the antimicrobial's resistance.[12]

Another important group at risk, also excluded in our study, were diabetic individuals. ABU is more frequent in diabetic individuals (type 1 or 2 diabetes) of all ages, when compared with non-diabetic individuals.[15] The prevalence of ABU in diabetic individuals is 0.7-11% in males, and 10.8-16% on females, with no adverse effects in females.[16] Treatment with antimicrobial agents is only recommended in patients with two or more comorbidities.[17]

The last risk group not included in our study are those using catheters. Firstly, patients with spinal cord injury (SCI) and bladder impairment have a 23-89% chance of ABU with intermittent catheter use, and 57% with sphincterotomy and a condom catheter.[16]

Secondly, those with short-term bladder catheterization. Chance of ABU increases by 3-5% for each day the catheter is still there , with a higher frequency in females. If catheters are left for more than 30 days, then ABU can be expected in these patients. These patients would also be at risk for pyelonephritis, urosepsis, renal stones, renal failure and eventually bladder cancer.[16]

Table 2 shows the results of Chi-Square tests. Pearson Chi-Square test was not used as one of the requirements were not fulfilled, which was having an expected count <5. Therefore, Fischer's Exact test was used, which is generally better for smaller samples. Fischer's Exact test shows a p-value of 0.019 (≤ 0.5), proving the alternative hypothesis (there is an association between gender difference and ABU).

Conclusion

In conclusion, it was proved that there is a correlation between ABU and gender, with females at a higher risk. This is because females have a shorter urethra, decreasing the distance microorganisms needs to cross the reach the bladder. To conduct a more accurate research on ABU in the future, more assorted groups should be involved. This includes those at risk like pregnant women, diabetic individuals, those

using a catheter, and if possible, participants around the age of 70 to further diversify the data collected.

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