Original Article

Dipstick urinalysis and antibiogram of bacteria isolates from asymptomatic undergraduate male students

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ABSTRACT

Objectives: The study aims to determine the prevalence of asymptomatic bacteriuria in male students and evaluate the effectiveness of dipstick urinalysis in detecting bacteriuria.

Material and Methods: A total of 312 undergraduate male students in the university across different departments within the age of 18–37 years old, who fulfilled the inclusive criteria for the study were sampled. Approximately 20–30 mL of midstream urine was collected from each participant in sterile, labeled containers, and transported to the laboratory within 2–4 h of collection. Dipstick urinalysis was carried out on each of the urine samples using Accu-Answer® dipsticks according to the manufacturer's instructions. Parameters measured included pH, protein, glucose, nitrites, urobilinogen, blood, ketone, bilirubin, and ascorbic acid. Urine samples were aseptically cultured on appropriate media to isolate bacterial strains and characterized them using standard microbiological and biochemical methods. The antibiotic susceptibility profile of the isolates was determined using the Kirby–Bauer disk diffusion method.

Results: Results obtained from the dipstick urinalysis were recorded for each participant, and any abnormal findings flagged for further bacteriological analysis. A total of 164 bacterial isolates were obtain from the samples with 90 *Staphylococcus aureus* having a prevalence of 54.87%, followed by 39 *Salmonella* typhi having a prevalence of 23.78%, with 28 *Escherichia coli* and 7 *Shigella dysenteriae* having a prevalence of 17.07% and 4.26%, respectively. Antibiotic susceptibility testing revealed that all of the isolates were resistant to most of the antibiotics that they were tested with. *S. aureus* and *Salmonella* typhi strains which showed between 45.1–89.0% and 43.5–100% resistance to all the antibiotic disc tested, respectively. However, both *E. coli* and *S. dysenteriae* had the highest level of resistance with the majority of the antibiotics disc having 100%, aspect for few.

Conclusion: The antibiotic resistance of these isolates calls for concern.

Keywords: Antibiogram and antibiotic resistance, Asymptomatic bacteriuria, Dipstick, Urinalysis

INTRODUCTION

Asymptomatic bacteriuria (ASB) is the presence of a significant quantity of bacteria in the urine, typically above 10^5 colony-forming units per milliliter, without the clinical symptoms associated with urinary tract infections (UTIs).[1] Although ASB often remains benign, it can pose a risk for progression to symptomatic UTIs or even more severe complications, such as pyelonephritis or sepsis, if left untreated in vulnerable populations.[2] Young male adults are generally considered

to be at a lower risk for UTIs compared to females, due to anatomical and physiological factors. However, recent studies have suggested that the prevalence of ASB in asymptomatic males, particularly in institutional settings such as universities, may be higher than previously thought.[3] This population is often subjected to a range of stressors and lifestyle habits, including inadequate hydration, irregular personal hygiene, and prolonged sitting periods, all of which may predispose them to urinary stasis and subsequent bacteriuria.[4] Early detection and appropriate management of ASB in young, healthy individuals are crucial for preventing the potential spread of drug-resistant bacterial strains within the community. Dipstick urinalysis is a rapid, non-invasive, critical initial step, and cost-effective tool used to detect indicators of infection and other urological conditions, including nitrites, leukocyte esterase, glucose, ketones, and protein in the urine.[1,5] This test can serve as an initial step in the identification of potential ASB cases, allowing for timely interventions to be made. However, despite its convenience and affordability, dipstick urinalysis has limitations, particularly regarding sensitivity and specificity, making it essential to confirm results with culture-based techniques. An antibiogram, which tests the susceptibility of bacterial isolates to a range of antibiotics, is another essential tool in the management of ASB. The growing threat of antibiotic resistance underscores the importance of conducting regular antibiogram assessments to guide effective treatment protocols.[6] In cases of ASB, understanding the resistance profile of uropathogens is critical, as the overuse or misuse of antibiotics can lead to the development of multidrug-resistant organisms (MDROs). Recent reports suggest that antibiotic resistance, particularly to commonly used agents such as ciprofloxacin (CIP), trimethoprim-sulfamethoxazole (SXT), and amoxicillin-clavulanate, is rising among uropathogens isolated from ASB cases in young adults.[7]

MATERIAL AND METHODS

Study area

The study was conducted in Madonna University Elele campus. Elele is one of the big towns in Ikwerre local government area of rivers state, south-south, Nigeria.

Study population

The study population include male students aged 18–37 years in Madonna university, Elele, Rivers State.

Study size

The calculated sample size of 310 was estimated using Yarmane's[8] formula:

$$n = \frac{N}{(1 + Ne^2)}$$

Where n = desired sample size

e = maximum acceptable margin of error, set at 0.05

N = population

1 = a theoretical constant.

$$n = \frac{1300}{(1 + 1300(0.5^2)}$$

Then adding 10% attrition

Using the formula, the sample size (n) was 312.

Study design

This descriptive cross-sectional study is aimed at evaluating the prevalence of ASB and the effectiveness of dipstick urinalysis among asymptomatic male university students. In addition, bacteriological analysis will be conducted to identify common urinary pathogens and their antimicrobial resistance (AMR) patterns.

Sampling technique

Participants will be selected using a stratified random sampling method to ensure a representative sample across different faculties within the university. This method will ensure that the sample is diverse and reflects the demographic characteristics of the broader student population.

Inclusion and exclusive criteria

Male university students aged 18–37 years and asymptomatic individuals (no symptoms of UTIs such as dysuria, frequency, urgency, or fever) will be included. Participants with a history of UTIs in the past 3 months, individuals currently on antibiotic therapy, and those with known chronic conditions, such as diabetes, renal disease, or immunosuppression will be excluded.

Ethical considerations

This study was conducted in accordance with ethical principles for medical research involving human subjects. Before sample collection, participants will be required to provide informed consent after being fully briefed on the study's purpose and procedures. All information collected from the participants was kept confidential, with results used exclusively for research purposes. The study protocol was reviewed and approved by Madonna University's Ethical Review Board (Ethics Committee) before the study was commenced. Approval number: MAU/DRC/HD/E/PHARM/2024/056.

Sample collection

Urine samples were collected in the morning from asymptomatic male students following informed consent, with instructions for midstream collection to minimize contamination.

Approximately 20–30 mL of midstream urine was collected from each participant in sterile, labeled containers, and transported to the laboratory within 2–4 h of collection.

Urine analysis using dipstick (dipstick urinalysis)

According to the manufacturer's instructions, each urine sample was analyzed using Accu-Answer® dipsticks. Parameters measured included pH, protein, glucose, nitrites, urobilinogen, blood, ketone, bilirubin, and ascorbic acid.

Results were recorded for each participant, and any abnormal findings were flagged for further bacteriological analysis.

Bacteriological analysis

Culturing and isolation

Urine samples were aseptically inoculated on nutrient agar, eosin methylene blue (EMB) agar, Mannitol Salt agar, Cetrimide agar, and *Shigella-Salmonella* agar plates using a spread plate method. Plates were incubated at 37°C for 18–24 h.

Identification of bacterial isolates

After incubation, bacterial colonies were examined for morphological characteristics. Gram staining was performed to classify isolates as Gram-positive or Gram-negative. Biochemical tests, including catalase, coagulase, oxidase, indole, and motility tests, were used for further identification.

Antibiotic sensitivity testing

Antibiotic susceptibility testing (AST) is usually carried out to determine the susceptibility pattern of the test organisms. Testing for antibiotic sensitivity of the clinical isolates (test organisms) was done using the Kirby–Bauer method.[9] Multiple antibiotic disc containing different antibiotics: Ofloxacin (OFX, 5 µg); Ciprofloxacin (CIP 5 µg); Amoxycillin-Clavulanic acid (AMC, 20/10 µg); Gentamicin, (GEN, 10 µg); Ceftazidime (CAZ, 30 µg); Cefotaxime (CTX, 30 µg); Trimethoprim-Sulfamethoxazole (SXT 1.25/23.75 µg); Ampicillin (AMP, 10 µg); Tetracycline (TE, 30 µg); and Ceftriaxone (CRO, 30 µg) ; Azithromycin (AZN, 15 µg); Nalidixic acid (NA, 30 µg); Ampicillin+Cloxacillin (ACX, 10 µg); Nitrofurantoin (NF, 300 µg) with specific concentrations was placed onto a sterile agar plate (Muëller-Hinton Agar) on which the test isolates, standardized to 0.5 McFarland are growing.

The plates were inverted and left on the work table for 30 min to allow for pre-diffusion of antibiotics into the agar. The plates were incubated at 37°C for 18–24 h. The susceptibility of each isolate to each antibiotic was shown by a clear zone of growth inhibition and this was measured using a meter rule in millimeters and the diameter of the zones of inhibition was then interpreted using a standard chart Clinical and Laboratory Standards Institute (CLSI) guidelines to determine susceptibility or resistance profiles.

If the test isolates are sensitive to the antibiotic, a clear ring, or zone of inhibition is seen around that disc indicating sensitivity whereas if no observable clear ring is seen around that disc, it indicates resistance.

Data analysis

Data obtained from dipstick urinalysis and bacteriological findings were statistically analyzed using the Statistical Package for the Social Sciences software. Descriptive statistics, such as frequencies and percentages, were used to summarize the prevalence of bacteriuria and dipstick results.

RESULTS

Table 1 summarizes the demographics of the participants across the various level of study with different age groups, lacking statistically significant results, with *P*-values exceeding 0.05 across all categories. Thus, this indicates no strong association between these demographics and the presence of isolates, while Table 2 summarizes the relationship between age groups and year of study with the presence or absence of bacteriuria. No significant correlation was observed, with *P*-values exceeding 0.05 across all categories.

Table 1: Demographic of the respondents to the isolates.

	Values recorded	Chi-square	*P*-value
Age			
<18–23 years	224	3.505	0.173
23–27 years	80	0.125	0.723
28–32 years	8	1.510	0.220
33–37 years	0	0	1.000
>37 years	0	0	1.000
Total	312		
Year of study			
100 level	32	0.712	0.399
200 level	68	1.327	0.249
300 level	83	0.249	0.619
400 level	68	0.153	0.696
500 level	40	0.056	0.813
600 level	21	0.076	0.783
Total	312		

Table 2: Correlation the demography and the bacteriuria condition.

	Bacteriuria present	Bacteriuria absent	Total	Chi-square	*P*-value
Age group (years)					
<18–23	201	23	224	0.324	0.568
23–27	70	10	80	0.025	0.423
28–32	6	2	8	0.422	0.421
33–37	0	0	0	0	1.000
>37	0	0	0	0	1.000
Total	277	35	312		
Year of study (level)					
100	30	2	32	0.232	0.347
200	57	11	68	0.456	0.267
300	76	7	83	0.723	0.221
400	60	8	68	0.632	0.216
500	35	5	40	0.311	0.121
600	19	2	21	0.032	0.34
Total	277	35	312		

Percentage prevalence

Table 3 presents the distribution and prevalence of the four main bacterial isolates identified in the study: *Staphylococcus aureus*, *Escherichia coli*, *Salmonella* typhi, and *Shigella dysenteriae*. The table shows the total number of isolates for each organism, as well as the percentage of each isolate relative to the total number of isolates. *S. aureus* is the most prevalent organism, comprising 55.15% of the total isolates, followed by *Salmonella* typhi at 23.78%, *E. coli* at 17.07%, and *S. dysenteriae* at 4.26%. The "Prevalence rate %" column provides the proportion of participants with each respective organism, indicating how common each pathogen is within the study population.

Dipstick urinalysis

The findings of dipstick urinalysis for different departments are shown in Table 4, which indicates whether or not, certain urine parameters were present in study participants. Including the number of participants in each department and their associated result parameters such as nitrates, urobilinogen, protein, pH, blood, ketone, bilirubin, glucose, and ascorbic acid.

Morphological and biochemical characteristics of isolates

Table 5 describes the morphological features of each bacterial isolate based on Gram staining and biochemical reactions. The distinctions are important for determining the bacterial type and to give guidance for further testing procedures, as Gram-negative bacteria are often associated with increased health risks.

Table 3: Number of isolated organisms.

Code	Isolates	Number of isolates	Prevalence rate %
A	*Staphylococcus aureus*	90	54.87
B	*Escherichia coli*	28	17.07
C	*Salmonella* typhi	39	23.78
D	*Shigella dysenteriae*	7	4.26
Total		164	100

Respondents and organisms isolated

Table 6 shows the clinical and demographic details of the study participants from each department, including the proportion of people who had microbial growth and those who did not. The information shows how participants from various departments were distributed in terms of isolated organisms, such as *Shigella, Salmonella, E. coli,* and *Staphylococcus*. Alongside the matching types and number of organisms isolated. The total number of participants in each department and the number of participants with positive microbial growth are also revealed. A summary of the pathogens' overall prevalence in each department is also included in the table, which sheds light on the variety of microbial isolates in respect to the participant demographics. This data is essential for comprehending microbial colonization patterns and possible correlations with different department.

Antimicrobial Susceptibility results of the isolates

Table 7 presents the antimicrobial susceptibility profile of *S. aureus* isolates according to the CLSI breakpoints for different

Table 4: Dipstick urinalysis results.

Parameters	Departments with positive results											
	MLS (31)	PHARM (50)	BCH (16)	OPT (31)	MD (40)	CS (37)	PHY (17)	ANT (9)	NSC (37)	MCB (7)	PH (28)	IC (9)
Nitrates	0	0	0	0	0	0	0	0	0	0	0	0
Urobilinogen	0	5	0	1	1	0	0	0	0	0	0	0
Protein	5	1	1	2	4	3	1	1	4	2	4	0
pH	5	3	2	6	2	3	2	0	2	0	2	0
Blood	0	0	0	0	0	0	0	0	0	0	0	0
Ketone	0	0	0	0	0	0	0	0	0	0	0	0
Bilirubin	10	22	2	3	2	1	3	1	4	1	3	0
Glucose	0	0	0	0	0	0	0	0	0	0	0	0
Ascorbic acid	1	0	0	0	0	0	0	0	0	0	0	0

MLS: Medical laboratory science, PHARM: Pharmacy, BCH: Biochemistry, OPT: Optometry, MD: Medicine and surgery, CS: Computer science, PHY: Physiology, ANT: Anatomy, NSC: Nursing science, MCB: Microbiology, PH: Public health, IC: Industrial chemistry

Table 5: Morphology and biochemical characteristics of the bacteria isolates.

Parameter / Unknown Isolates	A	B	C	D
Cultural characteristics	It gave a yellow coloration when streaked on a Mannitol Salt Agar	It forms pink coloration on MacConkey Agar	It forms a colorless colony with or without black centers on *Salmonella-Shigella* agar	Forms small, colorless colonies as it does not ferment lactose or produce H2S on *Salmonella-Shigella* agar
Gram staining	Gram-positive Cocci	Gram-negative Rod	Gram-negative Rod	Gram-negative Rod
Biochemical test				
Citrate	+	-	+	-
Oxidase	-	-	-	-
Indole	-	-	-	+
Motility	-	+	+	-
Coagulase	+	-	-	-
Catalase	+	+	+	+
Suspected organism	*Staphylococcus aureus*	*E. coli*	*Salmonella* typhi	*Shigella dysenteriae*

antibiotics. The table categorizes the isolates as susceptible (S), intermediate (I), or resistant (R) to a range of antibiotics, providing the percentage of isolates in each category. The data reveals notable resistance patterns across various antibiotics.

Table 8 reveals the antimicrobial susceptibility profiles for the three predominant Gram-negative bacterial isolates: *E. coli*, *Salmonella* typhi, and *S. dysenteriae*. The table presents the percentage of isolates categorized as susceptible (S), intermediate (I), or resistant (R) to a range of antibiotics.

Multiple antibiotic resistance (MAR) index *S. aureus*

Figure 1 below provides an overview of the MAR index patterns observed among the isolate *S. aureus* calculated

by dividing the number of antibiotics to which the strain is resistant by the total number of antibiotics tested with indices ranging from 0.08 to 0.83.

MAR index *E. coli*

Figure 2 below provides an overview of the MAR index patterns observed among the isolate *E. coli* with indices ranging from 0.00 to 0.33.

MAR index *Salmonella* typhi

Figure 3 below provides an overview of the MAR index patterns observed among the isolate (*Salmonella* typhi*)* with indices ranging from 0.08 to 0.58.

Table 6: Different departments and isolates present.

Departments	Study participants	Number of participants with growth	Number of participants with growth	Number of organisms isolated
MLS	31	17	14	*Staphylococcus* (12), *E. coli* (2), *Salmonella* (4), *Shigella* (0)
Pharmacy	50	23	27	*Staphylococcus* (15), *E. coli* (5), *Salmonella* (4), *Shigella* (2)
BCH	16	9	7	*Staphylococcus* (7), *E. coli* (1), *Salmonella* (2), *Shigella* (0)
OPT	31	14	17	*Staphylococcus* (9), *E. coli* (3), *Salmonella* (3), *Shigella* (1)
Medicine	40	11	29	*Staphylococcus* (7), *E. coli* (1), *Salmonella* (3), *Shigella* (1)
Computer science	37	16	21	*Staphylococcus* (9), *E. coli* (3), *Salmonella* (5), *Shigella* (1)
Physiology	17	8	9	*Staphylococcus* (5), *E. coli* (1), *Salmonella* (4), *Shigella* (0)
Anatomy	9	5	4	*Staphylococcus* (4), *E. coli* (2), *salmonella* (2), *shigella* (0)
Nursing	37	16	21	*Staphylococcus* (8), *E. coli* (5), *Salmonella* (4), *Shigella* (1)
Microbiology	7	5	2	*Staphylococcus* (4), *E. coli* (2), *salmonella* (1), *shigella* (0)
Public health	28	12	16	*Staphylococcus* (6), *E. coli* (2), *Salmonella* (6), *Shigella* (1)
Industrial chemistry	9	5	4	*Staphylococcus* (4), *E. coli* (1), *Salmonella* (1), *Shigella* (0)
Total	312	141	171	*Staphylococcus* (90) *E. coli* (28), *Salmonella* (39), *Shigella* (7)

MLS: Medical laboratory science, BCH: Biochemistry, OPT: Optometry

Table 7: Antibiotic Susceptibility Results for *Staphylococcus aureus* (*n*=90) isolate.

Antibiotics	S	%	I	%	R	%
Amoxicillin+clavulanate	5	5.4	5	5.4	81	89.0
Cefotaxime	30	32.9	9	9.8	52	57.1
Ceftriaxone sulbactam	20	21.9	6	6.5	65	71.4
Imipenem/cilastatin	28	30.7	6	6.5	57	62.6
Cefuroxime	13	14.2	7	7.6	71	78.0
Ofloxacin	39	42.8	11	12.1	41	45.1
Cefixime	34	37.3	8	8.7	49	53.8
Levofloxacin	41	45.1	9	9.8	41	45.1
Ciprofloxacin	30	32.9	11	12.1	50	54.9
Erythromycin	27	29.6	12	13.1	52	57.1
Gentamycin	15	16.4	6	6.5	70	76.9
Azithromycin	14	15.3	6	6.5	71	78.0

S: Susceptibility, I: Intermediate, R: Resistant

MAR index *S. dysenteriae*

Figure 4 below provides an overview of the MAR index patterns observed among the isolate (*S. dysenteriae)* with indices ranging from 0.25 to 0.58.

DISCUSSION

Bacteriuria has been discovered to pave the way for colonizing specific species of bacteria that produce UTIs. ASB is known to promote the significant spread of multi-drug-resistant pathogens. However, different microbes are known to infect and cause bacteriuria.[10-12] The prevalence of ASB in the study was 89.4% with *S. aureus* being the most prevalent organism, comprising 54.87% of the total isolates, followed by *Salmonella* typhi at 23.78%, *E. coli* at 17.07%, and *S. dysenteriae* at 4.26%. The most prevalent organism reported in this study is known to be a commensal organism found commonly in skin microflora and mucous membranes. It is known to cause opportunistic infections mostly among immunocompromised individuals. It has been reported to cause bloodstream, skin, and soft-tissue infections including UTI.[13-15] A similar, high prevalence rate of *S. aureus* has been reported in previous studies.[16-19] However, results from previous studies that are at variance with the present study have been reported.[20,21] The high prevalence of *S. aureus* can be ascribed to its high tolerance to pH and temperature variations, thus having a greater ability to colonize different areas of the body.[22] Antibiotic susceptibility profile was also recorded for *S. aureus* with susceptibility to levofloxacin being 45.1% and high resistance was recorded in amoxicillin clavulanate 89%, gentamycin 78%, and azithromycin 78%. *E. coli* also showed susceptibility to levofloxacin (32.1%) and OFX (28.1%) but had the least susceptibility to amoxicillin clavulanate (0%) and ampiclox (0%). *Salmonella* typhi showed susceptibility to levofloxacin (43.5%) and nitrofurantoin (38.4%), and showed significant resistance to CTX (100%), amoxicillin-clavulanate (94.8%), and cefuroxime (89.7%) among others. While for *S. dysenteriae* relative susceptibility was recorded in OFX (71.4%) and levofloxacin (42.8%), there was significant high resistance recorded in ampiclox, CTX, nalidixic acid, CRO sulbactam, and cefuroxime with each being at a 100%.

Table 8: Antibiotic susceptibility results for Gram-negative organisms.

Antibiotics	*Escherichia coli* (*n*=28)						*Salmonella* typhi (*n*=39)						*Shigella dysenteriae* (*n*=7)					
	S	%	I	%	R	%	S	%	I	%	R	%	S	%	I	%	R	%
ACX	0	0	0	0	28	100	8	20.5	2	5.1	29	74.3	0	0	0	0	7	100
CTX	0	0	0	0	28	100	0	0	0	0	39	100	0	0	0	0	7	100
IMP	0	0	0	0	28	100	3	7.6	2	5.1	34	87.1	0	0	3	42.8	4	57.1
OFX	8	28.5	3	10.7	17	60.7	4	10.2	3	7.6	32	82.1	5	71.4	0	0	2	28.5
ZEM	0	0	1	3.5	27	96.4	7	17.9	5	12.8	27	69.2	2	28.5	3	42.8	2	28.5
NA	0	0	0	0	28	100	8	20.5	6	15.3	25	64.1	0	0	0	0	7	100
CRO	0	0	0	0	28	100	2	5.1	3	7.6	34	87.1	0	0	0	0	7	100
CXM	0	0	0	0	28	100	2	5.1	2	5.1	35	89.7	0	0	0	0	7	100
LBC	9	32.1	4	14.3	15	53.5	17	43.5	5	12.8	17	43.5	3	42.8	2	28.5	2	28.5
GN	1	3.5	2	7.1	25	89.2	9	23.1	5	12.8	25	64.1	2	28.5	1	14.2	4	57.1
AUG	0	0	0	0	28	100	2	5.1	0	0	37	94.8	0	0	0	0	7	100
NF	3	10.7	3	10.7	22	78.5	15	38.4	1	2.5	23	58.9	0	0	3	42.8	4	57.1

S: Susceptibility, I: Intermediate, R: Resistant, ACX: Ampiclox, CTX: Cefotaxime, IMP: Imipenem, OFX: Ofloxacin, ZEM: Cefexime, NA: Nalidixic acid, CRO: Ceftriaxone sulbactam, CXM: Cefuroxime, LBC: Levofloxacin, GN: Gentamycin, AUG: Amoxicillin clavulanate, NF: Nitrofurantoin
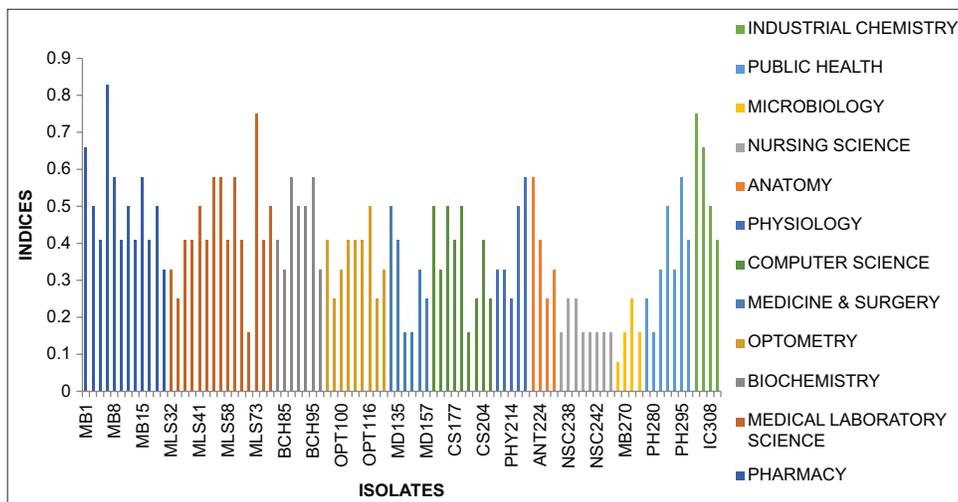

Figure 1: Graph showing multiple antibiotic resistance index *Staphylococcus aureus*.

The results of this study on the antibiogram profiles and dipstick urinalysis of male undergraduate students at Madonna University, Elele, who were asymptomatic, offer important new information about the frequency of bacterial infections and urine abnormalities in this population. A thorough understanding of urinary health and microbial resistance trends in an academic setting can be obtained from the results of the dipstick urinalysis, bacteriological analysis, and AST that follow.

The presence of distinct urine abnormalities across departments was shown by the dipstick urinalysis, which illustrates the range of physiological states and potential risk factors among students. Notably, proteinuria was found across a number of fields, with medicine and surgery and medical laboratory science (MLS) having the highest

prevalence. Although asymptomatic proteinuria may also be benign, protein in the urine may be a sign of renal pathology, such as glomerulonephritis or UTIs.[23] Although more research is needed to determine the clinical importance in asymptomatic persons, the presence of bilirubin in the urine was more common in pharmacies and may indicate hemolytic disorders or liver failure. Interestingly, ketones and glucose were absent in every area, which is in line with the research population's lack of obvious metabolic conditions such as diabetes or ketosis. In addition, no nitrates were found in any of the samples, suggesting that asymptomatic students did not frequently get UTIs from nitrate-reducing bacteria (such as *E. coli*). Nevertheless, several participants had urobilinogen, although in trace amounts. The modest
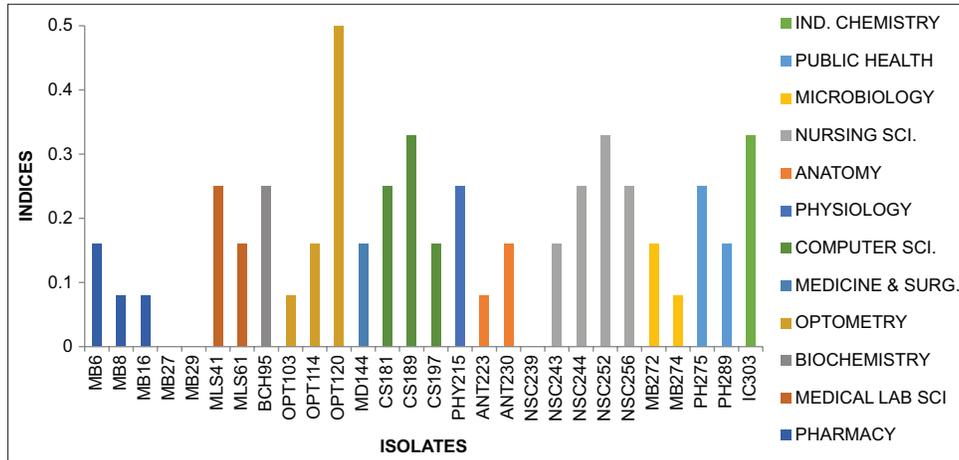
Figure 2: Graph showing multiple antibiotic resistance index *Escherichia coli.*
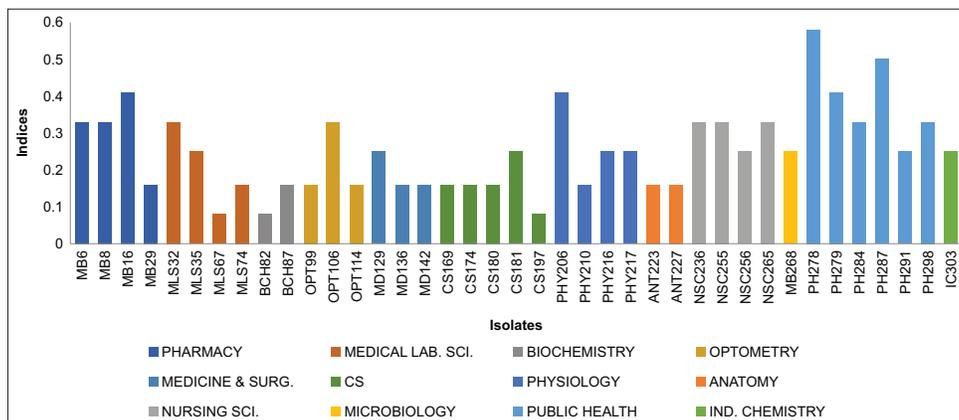

Figure 3: Graph showing multiple antibiotic resistance index *Salmonella* typhi.
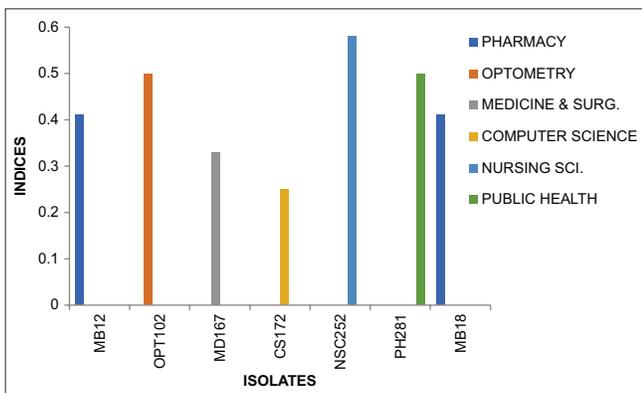

Figure 4: Graph showing multiple antibiotic resistance Index *Shigella dysenteriae.*

levels of urobilinogen detected here are probably not clinically significant and may be related to the physiological variability of asymptomatic persons, but elevated levels may indicate hemolysis or liver illness. In terms of the relationship between individual departments and bacteriuria, pharmacy had the highest significant level of bacteriuria, with 23 (16.3%) prevalence followed by MLS, with 17 (12.0%) prevalence, and the other subsequent department. This report is in contrast with the study done by Enwerem *et al.*,[24] although the outcome is dependent on difference in the number of departments and sample size used for the study. A substantial number of pathogenic bacteria was found by bacteriological examination, with *S. aureus* accounting for the majority of isolates (54.97%), followed by *Salmonella* typhi (23.78%), *E. coli* (17.07%), and *S. dysenteriae* (4.24%). Given that *S. aureus* is one of the main causes of both symptomatic and asymptomatic infections, our results are in line with the larger epidemiological trend of bacterial pathogens that commonly cause UTIs.[24] Due to the possibility of antibiotic resistance, the high frequency of *S. aureus* calls for concern. The relative prevalence of *S. aureus* in this study emphasizes the significance of taking into account both Gram-positive and Gram-negative pathogens when examining urinary health in asymptomatic populations, even though *E. coli* and *Salmonella* are also frequently linked to gastrointestinal and urinary infections. Significant AMR is evident in the antibiotic susceptibility patterns found in this investigation,

particularly among the isolates of *S. aureus*. The statistics reveal concerning rates of resistance to popular antibiotics, such as erythromycin (57.1% resistant), gentamicin (76.9% resistant), and amoxicillin-clavulanate (89% resistant). These high rates of resistance are in line with worries around the world regarding the abuse and overuse of antibiotics, which is causing MDROs to arise.[25] Given that *S. aureus* is a prevalent cause of skin infections and UTIs, which are commonly treated empirically with these antibiotics, this finding is particularly concerning.[26] Both *Salmonella* typhi and *E. coli* were shown to be resistant to routinely given medications such as CRO and CIP among the Gram-negative isolates. This is consistent with research demonstrating a growing pattern of cephalosporin and fluoroquinolone resistance in these organisms, which makes treatment choices more challenging.[27] Significantly, isolates of *E. coli* exhibited 100% resistance to CTX and ampiclox, indicating that these antibiotics may no longer be suitable first-line therapies in this population. The study's AMR profiles highlight how urgent it is to update empirical treatment recommendations, with an emphasis on minimizing the overuse of antibiotics. More efficient management of antibiotic prescriptions is necessary since the high rates of resistance to gentamycin, CIP, and amoxicillin-clavulanate in *S. aureus* isolates indicate that these widely used antibiotics are losing their effectiveness. The study's conclusions have important ramifications for clinical practice and public health at Madonna University and other comparable educational establishments. If neglected, ASB even in the absence of obvious clinical symptoms can have long-term effects, particularly when resistant bacterial strains are present. These results point to the necessity of more frequent student screenings for bacterial colonizations and UTIs, especially in light of the growing prevalence of AMR. To investigate the underlying risk factors linked to urine anomalies in asymptomatic persons, more research is necessary. The prevalence of UTIs and the emergence of AMR may be influenced by variables such as sexual activity, hygienic habits, history of antibiotic use, and socioeconomic position.[28] The long-term dangers associated with ASB might be better understood by longitudinal studies that monitor the development of subclinical infections into symptomatic illness. To discourage self-medication, encourage the prudent use of antibiotics, and lessen the needless use of broad-spectrum antibiotics, educational institutions must also establish antimicrobial stewardship programs in light of the high prevalence of resistance. The development of resistant infections may also be avoided by teaching students about good hygiene and the value of prompt treatment for urine symptoms. Interpreting the study's findings requires taking into account a number of limitations. Even while the sample size is somewhat representative of the student body, it is still too small to draw broad conclusions. Because the study only looked at male students, its conclusions cannot be applied to

female students or the broader public. In addition, although though the dipstick urinalysis is a helpful screening method, it is not always effective in identifying all kinds of urinary infections or anomalies. Therefore, more reliable information would be obtained from a more thorough diagnostic method that includes sensitivity testing and urine culture. This study concludes by highlighting the prevalence of bacterial infections and asymptomatic urine anomalies among male undergraduate students. The need for better diagnostic screening and antimicrobial stewardship is highlighted by the high frequency of *S. aureus* and other infections as well as concerning patterns of antibiotic resistance.

CONCLUSION

This study concludes by highlighting the prevalence of bacterial infections and asymptomatic urine anomalies among male undergraduate students at Madonna University, Elele River State south-south, Nigeria. The need for better diagnostic screening and antimicrobial stewardship is highlighted by the high frequency of *Staphylococcus aureus* and other infections as well as concerning patterns of antibiotic resistance. Universities and healthcare practitioners are urged by these findings to give infection control measures top priority, teach students good hygiene habits, and create focused interventions to fight antibiotic resistance.

Recommendation

Based on the findings of this study, several key recommendations can be made to improve the health and well-being of the undergraduate male students particularly in relation to urinary health and the management of AMR. It is recommended that routine urinary screening be introduced as part of the regular health check-ups for students, especially at the beginning of each academic year. Screening for urinary abnormalities, including proteinuria, bilirubin, and urobilinogen, should be prioritized to identify asymptomatic individuals at risk for UTIs or other renal disorders. Early detection of bacteriuria or other urine abnormalities could prevent the progression of infections and reduce the risk of developing more serious conditions. The findings of significant AMR to commonly prescribed antibiotics, particularly among S. aureus and E. coli isolates, underscore the need for implementing antimicrobial stewardship programs on campus. These programs should focus on educating students, faculty, and healthcare providers about the dangers of antibiotic misuse and overuse. Policies that limit the use of broad-spectrum antibiotics and encourage the appropriate use of targeted therapies based on sensitivity testing should be enforced. Furthermore, students should be educated about the importance of completing prescribed courses of antibiotics and avoiding self-medication. The university should collaborate with local health authorities and clinical laboratories to facilitate the timely diagnosis and treatment of bacterial infections among students. Collaboration could involve setting up referral systems for more complex cases, improving access to diagnostic

tests, and ensuring that students have access to appropriate antibiotics when necessary. This partnership can also aid in the implementation of public health campaigns to raise awareness about AMR and the importance of infection control. Longitudinal studies should be conducted to track the progression of ASB in university students over time, as well as to monitor the emergence of AMR. Research on the factors that contribute to the high prevalence of urinary abnormalities and bacterial infections in this population would provide valuable data for improving preventive health strategies. In particular, studies examining lifestyle factors such as diet, hydration, physical activity, and sexual behavior could help identify modifiable risk factors for UTIs and other urinary conditions.

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