

other reports where similar isolation rate was obtained.^{11,12} However these findings differ from the report of other studies where lower isolation rate of *Proteus* species was obtained.^{13,14} Many studies as well have reported higher prevalence of *Proteus* species in clinical samples.^{15,16} Usually in most laboratories the frequency of isolation of *Proteus* compared to other members of the Enterobacteriaceae is usually very low.

Wound samples in this study, contributed the highest percentage of *Proteus* (57.1%), followed by urinary samples which accounts for (20.4%). This agrees with the findings of Jitendra *et al*¹⁷ where wound samples account for (67.85%). Similar report from Ghana also reported wound swabs to be the predominant source of *Proteus* isolates. Our findings is however at variance with reports from other parts of the World where *Proteus* are more frequently isolated from urine.^{18,19} Usually *Proteus* have been implicated in many community acquired infections and can also be isolated in individuals in hospitals and in those that are immunocompromised, but are more frequently isolated in wounds and urine in our area of study. They have some virulence factors such as Pilli which allows them to attach to epithelial surfaces and this favours their ability to cause urinary tract infections.

Majority of the isolates were recovered from males (53.1%) closely followed by 46.9% from females. The age group with the highest yield of *Proteus* was the 31-40 years of age, and followed by the 21-30 years of age. No age group were spared from *Proteus* infection. This findings differ from other studies where *Proteus* was found to be predominant (21.2%) in young males less than 14 years.²⁰ The higher incidence to sexual activities, since this age group are the sexually active age group, and so also vulnerable to development of wound. In this study, as the age increases; the incidence of *Proteus* as an agent of infection diminishes more especially in the males and are more noticeable in the females. This findings can be attributed to short urethra which can easily predispose to the develop of urinary tract infections.

In our survey, the antibiotics with the highest sensitivity to *Proteus* isolates are Piperacillin and Imipenem, all isolates of *Proteus* were sensitive to these two antibiotics (100%). Similar studies conducted with report comparable to ours, where Imipenem and Piperacillin were 100% effective was seen in India and North America.^{21,22,23} The *proteus* species were much sensitive to Ofloxacin (76.5%) than ciprofloxacin (57.9%). Among the fluoroquinolones, Ciprofloxacin is much common than Ofloxacin, readily available and often much prescribed by physicians than Ofloxacin. The reduced susceptibility to ciprofloxacin can be attributed to over use misuse of this particular antibiotics. This findings however agrees with a report from India where ciprofloxacin and Ofloxacin were found to be (71.0%) and (74.0%) sensitive

respectively. Similar studies done in other part of the country have reported *Proteus* species to be sensitive to Ciprofloxacin and Ofloxacin.^{25,26}

The isolates of *Proteus* were moderately sensitive to cephalosporins. This findings correlates with the result of the workers where ceftazidime, cefuroxime and ceftriaxone (55.0%) were moderately sensitive to *Proteus*.¹⁷ Meanwhile other studies in the country have also reported moderate sensitivity of *Proteus* species to cefuroxime (53.0%), ceftazidime (58.0%) and ceftriaxone(55.0%).²⁸ However our findings are at variance to a report in the South-South part of the country where *Proteus* are found to be resistant to some Cephalosporins such as cephalixin and cefotaxime.^{7, 29} Resistance if these production of Extended Spectrum Beta Lactamases(ESBLs) and in part due to over consumption of this group of antibiotics. Cephalosporins are one of the antibiotics most often prescribed by physicians particularly the general practitioners. In Ibadan, isolates of *Proteus* have been demonstrated as ESBL producers,²⁸ but however horizontal transfer of resistance genes among pathogens cannot be over ruled.

Conclusion

In conclusion, *Proteus* remains a common pathogen among patients with wound infections, urinary tracts infections, otitis media and some other infections as well. It exhibits high sensitivity to Imipenem and Piperacillin and are moderately sensitive to commonly used antibiotics such as the cephalosporins and fluoroquinolones. However the resistance rate of *Proteus* towards the common antibiotics is low, compared to the sensitivity pattern of the isolates. However further prospective study to document the rate of production of ESBL by these isolates should be consider.

References

1. Pal N. Sharma N. Hooja S and Maheshwari RK. Prevalence of multidrug (MDR) and Extensively Drug Resistant(XDR)*Proteus* species in a tertiary care hospital. India. Int J. Curr. Microbiology, App Sci.2014;10:243-252.
2. Bahashwan SA. Shafey HME. Antimicrobial Resistance Patterns of *Proteus* Isolates from Clinical Specimens. European Scientific Journal 2013;9:27:188-202.
3. Jacobsen SM. Stickler DJ. Mobley HLT and Shirtliff ME. Complicated Cather-associated urinary tract infections due to *Escherichia coli* and *Proteus mirabilis*. Clin. Microbiol. Rev 2008;21:1:26-59.
4. Wasan WA and Abdul-Kareem AK. The Isolation and characteristics of *Proteus mirabilis* from Different Clinical Samples. Journal of Biotechnology Research Centre 2013;7:2:24-30.
5. Dharmadhikari SM and Reshwe AS. Molecular