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USE OF URINE CELLULAR DEPOSITS OF FEMALE STUDENTS IN EBONYI STATE UNIVERSITY, AS PREDICTIVE INDEX FOR URINARY TRACT INFECTIONS.

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ABSTRACT

Background: Urine cytology is a diagnostic test, normally undertaken in hospitals to look for abnormal cells in urine. The method depends on the fact that the mucosa of the whole urogenital tract undergoes continuous regeneration and that urothelial cells are constantly shaded into and excreted with the urine. **Objectives:** This research work was carried out to determine the effectiveness of urine cytology in the diagnosis of urinary tract infections in female students from Presco campus, Ebonyi State University, Abakaliki. **Materials and Method:** Urine specimens were collected randomly from female students of Ebonyi State University (Presco campus). Voided urine samples were collected from 100 females into universal sterile containers and transported to Histopathology/cytopathology laboratory for analysis. Aliquot of each sample was transferred into a clean test tube, centrifuged and sediments used to make smears which were fixed immediately in 95% alcohol. The smears were finally stained using haematoxylin and eosin staining technique. The smears were viewed with a light microscope. **Results and Discussions:** The result obtained from the photomicrographs of stained voided urine samples from females without any sign of urinary tract infections

showed normal urothelial cells. Among those with signs and symptoms of urinary tract infections, the photomicrographs obtained showed abnormal urothelial cells, abnormal cells with irregular nuclear outline and blood cells which are suggestive of urinary tract disorder. The presence of blood cells in voided urine samples (haematuria) confirms urinary tract infection. **Conclussion:** This shows that urine cylotogy can be an indispensable tool in the diagnosis of urinary tract disorders.

KEYWORDS: Urothelial, Cytology, Haematoxylin, Eosin, Smears.

INTRODUCTION

Urinary tract infections (UTIs) are one of the most common bacterial infections in humans both in the community and hospital settings.[1-2] The reservoir for urinary tract pathogens is the human bowel flora and most infections result from uropathogens moving into bladder via the urethra. Organisms that cause UTI are those from the normal vaginal, perineal, and fecal flora. They include *Escherichia coli, Staphylococcus aureus, Staphylococcus faecalis, Proteus mirabilis, Klebsiella* species, and *Streptococcus* species amongst others[3], although only a small fraction of *E. coli* are uropathogenic.[4-5] It is generally estimated that the yearly global episodes of UTI could be in the range of 150 million with a large proportion of the infections being in-apparent; many also manifest with obvious clinical features while others still show complications in addition.[6] UTI has become the most common hospital-acquired infection, accounting for as many as 35% of nosocomial infections, and it is the second most common cause of bacteraemia in hospitalized patients.[7] UTI accounts for a significant part of the work load in clinical microbiology laboratories and enteric bacteria remain the most frequent cause of UTI, although the distribution of pathogens that cause UTI is changing.[8] The prevalence is increased by several factors. Poor socioeconomic status is reported to be a major risk factor with indigent patients having a fivefold increased risk.[9] The risk is doubled in sickle cell disease.[9] Other risk factors include poor perineal hygiene, history of recurrent UTI, diabetes mellitus, neurogenic bladder retention, anatomic or functional urinary tract abnormality, and increased frequency of sexual activity.[10] Predisposing determinants of high prevalence of UTI in pregnancy include hormone induced ureteral dilatation, urinary stasis, reduced immune function, and presence of vesicoureteric reflux. The incidence of UTI is more frequent in women (17.5% incidence between 18 and 24yrs)[4] than in men (0.5% incidence in the same age range).[11] The anatomical relationship of the female's urethra and the vagina makes it liable to trauma during sexual intercourse as well as bacteria being

massaged up the urethra into the bladder during pregnancy/child birth.[12] UTI is challenging, not only because of the large number of infections that occur each year, but also because the diagnosis of UTI is not always straight forward. UTI has to be distinguished from other diseases that have a similar clinical presentation, some UTIs are asymptomatic or present with atypical signs and symptoms, and the diagnosis of UTI in neutropenic patients may require different diagnostic criteria than those used for the general patient population.[13] Detection of UTI using low-cost tests could improve patient management.[14] Urine cytology is a diagnostic test normally undertaken in hospitals to look for abnormal cells in urine. It is an examination of the urine for the purpose of an early detection of disease. The method depends on the fact that the mucosa of the whole urogenital tract undergoes continuous regeneration and that urothelial cells are constantly shed into and excreted with the urine. Those benefits are useful for renal transplant patients due to infections and cancers as a result of prolonged immunosuppressant.[14] Urine cytology is used along with other tests and procedures to diagnose urinary tract disorders. It is one of the most sensitive and specific methods for detecting malignant cells due mainly to its easy availability, minimal invasiveness and low-cost.[15] Urine cytology is most often used to diagnose bladder cancer, though it may also detect cancers of the kidney, prostate, ureter and urethra. This test may be recommended if blood has been detected in urine (hematuria). Urine cytology may also be used in people who have already been diagnosed with bladder cancer and have undergone treatment. In these cases, a urine cytology test may help detect a bladder cancer recurrence.[15] Cytology also has a relatively high sensitivity at detecting high-grade lesions. Urinary cytology identifies malignant cells that have been exfoliated from the urothelium into the urine. The specificity of cytology is greater than 90%[16] while the sensitivity for high-grade disease and carcinoma-in-situ (CIS) can be as high as 80% to 90%.[17] The art and science of cytology and cytopathology has been implemented and recognized as early as the 18th and 19th centuries.[17] The examination of urine is one of the oldest medical procedures dating back to the Old Egypt.[18] First microscopical examination of the cells in the urinary sediment was reported by the Czech doctor Lambl back in 1856.[18] The American Urological Association (AUA) best-practice policy for urine cytology recommends the test in patients with risk factors for transitional cell carcinoma.[19] Currently, it is most widely and routinely employed as: i) the preliminary analysis in the evaluation of patients presenting with haematuria or painful urination suggestive for urinary system pathology; ii) screening test for the early detection of bladder cancer in selected populations exposed to known bladder

carcinogens; and iii) the mainstay in the follow-up of patients with a history of malignancy involving the urinary tract.[20]

MATERIALS AND METHOD

Study Area (Site)

This research work was conducted on human populations in Ebonyi State University (Presco Campus), Abakaliki, Nigeria.

Duration of the Research Project

This research work took duration of four (4) months.

Ethical clearance

This research study was approved by the research ethics committee of the Department of Medical Laboratory Science, Faculty of Health Sciences and Technology, Ebonyi State University, Abakaliki, Nigeria.

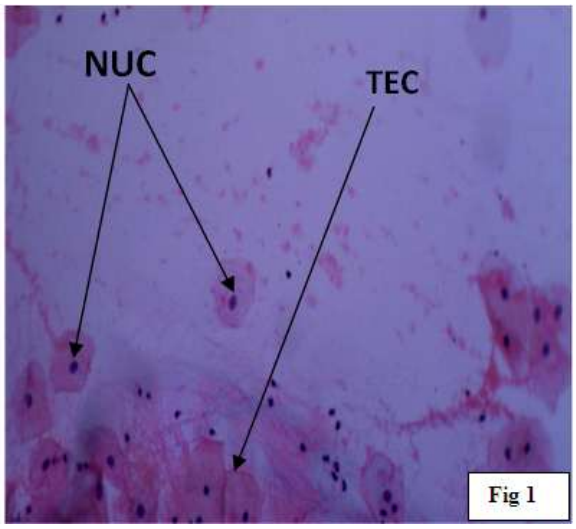
Source of Urine Samples

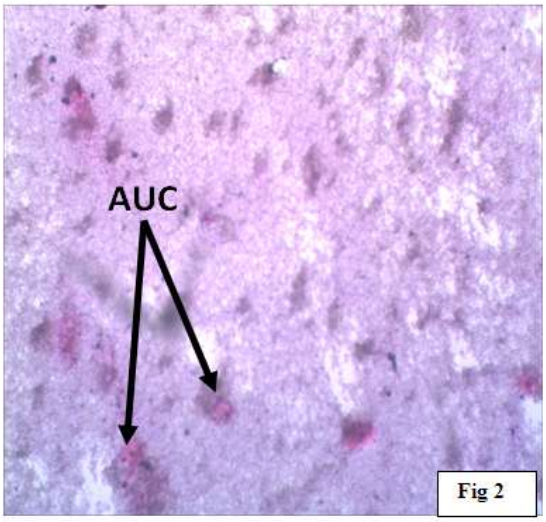
Urine specimens were collected randomly from female students in Ebonyi State University (Presco campus). Informed consent was gained from one hundred (100) participants and universal sterile containers were distributed to them and were instructed to clean to the labia majora with clean tissue paper and then get clean catch urine into the containers.

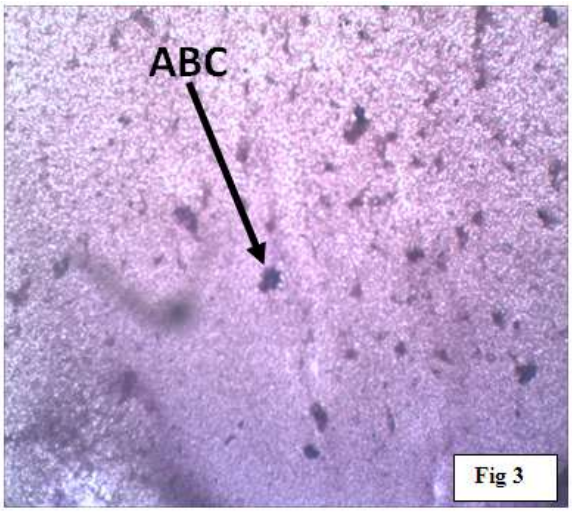
METHODS

Voided urine specimens were collected into universal sterile containers; 10mls from each sample were transferred into a labeled clean test tube and centrifuged at 1500 revolution per minute (rpm) for 10 minutes and the deposits or sediments were used to make smears on grease free slides. The smears were fixed immediately in coupling jars containing 95% alcohol for 15 minutes to 30 minutes. The smears were fixed immediately in coupling jars containing 95% alcohol for at least 30 minutes before staining the smears with haematoxylin and Eosin stain (Method Adopted from[21]). The slides were analyzed with the aid of a light microscope for cytomorphological changes and then captured on a Brunel light microscope, 20 mega pixels (Brunel SP35 Digital Trinocular).

RESULTS







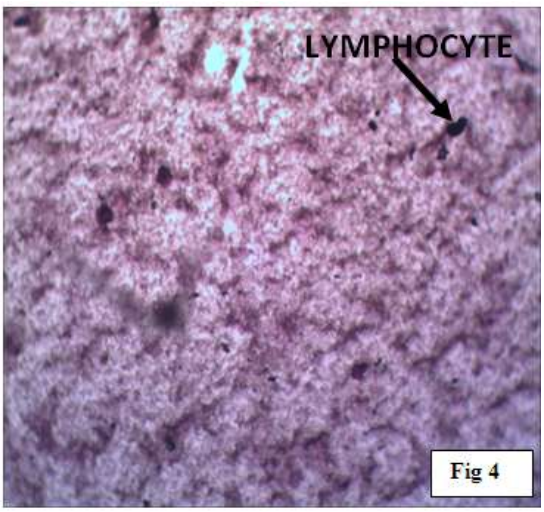


Fig 1: shows Normal Urothelia Cells (NUC) and Transitional Epithelial Cells (TEC) which are normal cells that line the urinary tract. These cells are exfoliated or shaded off into urine.

Fig 2: Shows Atypical Urothelial Cells (AUC) which indicate neoplastic changes of the urinary tract.

Fig 3: Shows Abnormal Cells (ABC) with Irregular Nuclear Outline which indicates abnormal cell activities (neoplasia or cancer) which is usually confirmed alongside with other diagnostic procedures.

Fig 4: Indicating presence of White Blood Cell (Lymphocyte) which indicates one of the signs of Urinary Tract Infections. Wet preparations also showed presence of blood cells, epithelial cells and some crystals. The result obtained from the photomicrographs of the voided urine samples are shown in figures below.

DISCUSSION

Urine cytology is most often used to diagnose bladder cancer, though the test may also be used to diagnose prostate cancer, ureter cancer and urethra cancer.[15] In this present study, white blood cells (lymphocytes) and transitional epithelial cells were detected in about 80% of the entire urine smears examined; these cells line the urethra and bladder. In a person with an active inflammation, more cells may be shed as a result of irritation. Likewise, injuries can cause an increase in transitional epithelial cells. Paired with findings like blood in the urine and bacteria, they can be a sign of an infection. Few of the voided urine smears showed abnormal cells with irregular nuclear outline. Renal tubular epithelial cells are not a good sign. While a few may slip through, if they are present in large numbers, it is indicative of a problem with the kidneys. Wet preparations showed presence of white blood cells, epithelial cells and crystals. Other findings from the urinalysis can provide more information about what is happening in the kidneys and a doctor may also request a blood test to get an idea of how efficiently the kidneys are functioning. If testing shows epithelial cells in urine, it is important to find out what kinds of cells are involved and in what concentrations. Minor numbers of epithelial cells in urine are generally not a cause for concern. If the numbers of squamous cells are high, a new urine sample may need to be taken to get a cleaner collection of urine for testing. Increased numbers of renal tubular cells call for additional testing to find out more about what is happening inside the patient. In similar study, Beech *et al.*,[22] compared 70 urine specimens prepared by the Thin Prep and Cytospin technique. They reported greater case of diagnosis and fewer non diagnostic samples for the ThinPrep method, in contrast to the findings of this study. In another comparison study, by Luthra *et al.*,[23] the findings of cleaner background for the ThinPrep slides are similar to those in this study. Skacel *et al.*,[24] in a retrospective cohort study reported that 8 out of 9 FISH positive patients with atypical cytology but negative biopsy had biopsy proven bladder cancer within 12 months. In another study, Bubendrof *et al.*,[25] reported that 4 of 5 so-called “false positive” UroVysion™ tests had recurrence within 8 months; none of the true negative cases recurred within 18 months. New molecular ancillary tests on urine samples have been described in the recent literature that can detect early renal diseases. Although some of these methods show great potential, problems such as suboptimal specificity, sensitivity or technical difficulties compared to urine cytology have limited their clinical utility in a routine laboratory setting.[26]

Overall, urine Cytology show better cell distribution. Diagnostic usefulness is also superior with the other routine laboratory methods, resulting in accurate diagnosis more consistently.

Although newer molecular techniques have yet to supersede the practice of urine cytology, they will probably complement this simple diagnostic method in the near future.

CONCLUSION

The findings of this research support the use of urine cytology as a diagnostic tool for urinary tract disease. Hence, urine cytology may be used in people who have already been diagnosed with bladder cancer and have undergone treatment. In these cases, a urine cytology test may help detect a bladder cancer recurrence.

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