



# Urinalysis Assessment of Potential Blood Donors in a Tertiary Hospital, South-Western Nigeria

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## ABSTRACT

**Background:** Blood donors are routinely screened for eligibility to donate blood, safe for transfusion and primarily directed to protect the recipient. The donors are usually assumed healthy and there is no protocol for routine medical assessment of donors hence, this study.

**Objective:** To assess the urinalysis findings of potential blood donors attending the donor centre of Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife.

**Methodology:** Two hundred prospective blood donors were recruited between January and March 2019. Data on demography and medical history were obtained from each subject using an interviewer-administered questionnaire, followed by collection of 10 millilitre urine for dipstick analysis.

**Results:** Subjects were predominantly males (94.5%) with mean age of  $29.3 \pm 7$  years. Majority (88.5%) of donors had a minimum of secondary school education and 61.5% were self-employed. Seventy percent of subjects had no prior routine medical examination. Mean body mass index ( $21.3 \text{ kg/m}^2 \pm 4.6 \text{ kg/m}^2$ ) and blood pressure ( $117/72.6 \text{ mmHg} \pm 25.1/17.1 \text{ mmHg}$ ) were normal. However, proteinuria, urobilinuria, hematuria, nitrituria, leucocyturia and ketonuria were found in 31.5%, 10.5%, 8.5%, 3%, 5.5% and 1% for respectively.

**Discussion:** This study found that self-employed individuals constitute pool of potential donors without routine medical investigations. Abnormal urinalysis were not uncommon in them suggesting undetected health challenges despite being eligible to donate.

**Conclusion:** Potential blood donors will benefit from routine medical investigations at the point of donation, as this will give a general overview of their health, as well as promoting safe and healthy donation.

**Keywords:** Blood donors; Urinalysis; Medical examination; Leucocyturia

## INTRODUCTION

Blood donors constitute a minor fraction of users of the hospital usually through the blood transfusion centre of haematology department. In many countries, sources of blood and its products are from Family Replacement Donors (FRD) and Paid Donors (PD) with few Voluntary Non-Remunerated Doors (VNRD). According to WHO, voluntary blood donors constitute the safest type of donors and satisfy the WHO policy for the availability of blood and blood products to meet the increasing need of blood transfusion. Although, blood donors receive services within the

hospital settings, these services usually do not directly impact their health except for certifying them free of certain infections. The main purpose of pre-donation screening of blood donors is to ensure the safety of blood transfused to the recipients and not necessarily ensuring that the donor is also healthy. The awareness and interest for voluntary blood donation is on the increase mainly due to increased public awareness campaigns. However, the pool of voluntary, non-remunerated blood donors remains low in developing nations where majority of the donors were paid. Previous studies had reported a prevalence of blood donation rate between 11% and 38% worldwide with 15% in Nigeria.

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Therefore, this suggests a possible increase in voluntary donors coming to the hospital for the first time who may not have had prior routine medical investigation. Thus, a need for routine medical screening. As blood donation is a part of the preventive and therapeutic component of the health care delivery system, transfusion centre might be a good avenue for routine medical examination which will also serve as an incentive to encourage voluntary donors [1].

Potential blood donors are usually assumed healthy as long as they are deemed fit and eligible to donate. A previous study reported that young students are healthy and should be motivated to willingly donate blood. There is a need to evaluate prospective blood donors for the presence of silent asymptomatic disease conditions which can easily be detected by routine medical examination and subsequently managed as appropriate. The usual practice is limited to screening of the donors for adequate haematocrit, transmissible infections and compatibility with the recipient. Thus, more emphasis is placed on the recipients' health than the donors. Previous studies found that most blood donors were young between 24 and 35 years and mostly males which may also be the reason for assuming these donors are healthy.

Routine medical examination is the periodic assessment of one's health using different clinical and laboratory investigations to screen for the presence of occult diseases allowing for early detection and management at a time where different complications can be prevented. It is most applicable to the formal setup in most developing countries as there are no all-inclusive policies in place neither are there adequate hospitals and personnel to cater for the vast majority of the population. Therefore, most citizens are not even aware of basic medical education and cannot seek for it. However, since most people are family donors or voluntary donors, they can benefit from the hospital services not directly linked to blood transfusion but as part of caring for the health of both donor and the recipient.

Most citizens would have loved to voluntarily donate blood but because they feel there are no benefits to them the process is perceived as not gratifying so they are not motivated. Introduction of urinalysis as part of medical examination for potential blood donors would motivate and encourage these donors to voluntary unpaid service.

Urinalysis is the physical, chemical and microscopic examination of the urine. Since the advent of point of care testing, the cumbersome process of urine examination has been simplified to a more rapid, cheap and convenient procedure with adequate information about the internal milieu of the subject. Urinalysis is considered as part of the basic examination for routine medical checks and often incorporated to periodic medical examination. This is because of the enormous information that can be obtained from the urinalysis results. Also, the clinical utility of urinalysis is not limited to routine examination but can be used as a diagnostic tool for Urinary Tract Infection (UTI) as well as a screening and monitoring tool for other comorbidities like diabetes mellitus.

Incorporating urinalysis as a screening tool for potential blood donors as part of routine medical examination cannot be over emphasised. It would go a long way in early detection of diseases involving the genitourinary systems as well as other systemic diseases which otherwise would have gone undiagnosed despite having a contact with the hospital [2].

Dipstick urine strips are manufactured as a panels of reagent-impregnated pads incorporating the combination of some physical and chemical examinations of the urine in a dry chemistry process. They are usually marketed as varying degrees of panels to serve different purposes and to target different patients. For example, the two panel urine dipstick has reagent pads for glucose and protein solely for monitoring of diabetic patients. A ten panel urine dipstick has impregnated pads for different constituent of urine including protein, glucose, bilirubin, haemoglobin, urobilinogen and some physical properties which are pH, Specific gravity (Sg), osmolality.

Application of routine dipstick urinalysis for screening potential donors can give numerous information about the wellbeing of the assumed healthy donors and when coupled with other screening tools like blood pressure and physical examination. Many patients would be detected for various health challenges unknown to them and treated appropriately.

## MATERIALS AND METHODS

This study was carried out at the blood bank of the department of haematology and blood transfusion, Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife. This hospital is a 500-bed tertiary hospital serving as a referral centre to the neighbouring hospitals. It is located in Osun-east senatorial district of Osun state, south-western Nigeria [3].

The study was a cross-sectional descriptive study involving 200 consenting potential blood donors aged 18 to 60 years who presented for pre-donation screening. Ethical approval was obtained from the OAUTHC ethics and research committee. Prospective donors who refused to give consent and those with any known chronic disease were excluded from the study.

Information on bio-data and medical history were obtained using interviewer-administered questionnaire followed by measurement of anthropometric parameters. The weight and height of each subject were measured using a sica weighing scale with metric rule in Kilogram (Kg) and metres respectively. The Body Mass Index (BMI) was then calculated using Quetlet equation and expressed in  $\text{kg}/\text{m}^2$ . The abdominal circumference was measured using a measuring tape passing through both iliac crests and umbilicus in centimetre (cm).

Ten millilitre (ml) of urine specimens were collected from each consenting subject into a universal bottle and urinalysis was performed immediately using a commercial 10-panel dipstick (Dirui® H10 urinalysis strips, Dirui industrial Co., Ltd, China) to detect the presence of abnormal urine constituents. Positive and negative controls were run with each sample. The dipsticks container was stored in a cool dry place and prevented from exposure all through the period of specimen collection. Appropriate standard precautions were observed [4].

The urine was then centrifuged at 1500 g and the supernatant decanted to get the sediment. A drop of urine sediment was put on a slide and covered with cover slip for examination under the microscope at low power field for presence and characterization of casts, sediments, crystals and cells. Results of urinalysis were both quantitative and qualitative.

Data were analysed using SPSS 22, frequency tables were generated for both continuous and categorical variables and results expressed as mean  $\pm$  S.D for quantitative data and as percentages for qualitative data.

## RESULTS

Two hundred potential donors were recruited for this study comprising predominantly males 189 (94.5%) compared to females (5.5%) in a ratio 17.2:1. The mean age was  $29.3 \pm 7.0$  years with mean BMI ( $21.3 \text{ kg/m}^2 \pm 4.6 \text{ kg/m}^2$ ), waist-hip ratio ( $0.9 \pm 0.2$ ), abdominal circumference ( $71.5 \text{ cm} \pm 16.2 \text{ cm}$ ), systolic ( $117 \text{ mmHg} \pm 25.1 \text{ mmHg}$ ) and diastolic ( $72.6 \text{ mmHg} \pm 17.1 \text{ mmHg}$ ) blood pressures, all these parameters were within normal limits [5]. Ninety-seven (48.5%) respondents were married with 51.5% single. Majority (55.5%) of the respondents had a secondary education while 33% had minimum tertiary education. Most (61.5%) respondents were self-employed with 20.5% unemployed leaving those in government and private employment to be 7.5% and 9% respectively.

**Table 1:** Age and anthropometric measurements.

Parameter	Mean
Age (years)	$29.3 \pm 7.0$
BMI ( $\text{Kg/m}^2$ )	$21.3 \pm 4.6$
W:H ratio	$0.9 \pm 0.2$
Systolic BP (mmHg)	$117 \pm 25.1$
Diastolic BP (mmHg)	$72.6 \pm 17.1$
ABD circumference (cm)	$71.5 \pm 16.2$

**Table 2:** Demography of participants.

Parameters	Frequency (n)	Percentage (%)
<b>Gender</b>		
Male	189	94.5
Female	11	5.5
Total	200	100
<b>Marital status</b>		
Single	100	50
Married	97	48.5

Respondents with christian faith comprised were 70.5% while those in Islam and traditional faiths were 26% and 2% respectively. A large number (69.5%) of respondents had never had a routine medical examination done with no knowledge of their blood pressure and glucose in 99% and 98.5% respectively. Proteinuria of varying degrees was detected in 63% of the respondents comprising trace proteinuria in 26% and 3+ proteinuria in 1.5%. Haematuria was found in 8.5% of the respondents with 1% having 3+ value. Bilirubinuria accounted for 10.5% of abnormal urinary constituent while 53 (26.5%) participants were positive for urobilinogen. Nitrite and leucocytes were positive in 3% (6) and 5.5% (11) of the respondents respectively while 1% had ketonuria. The urine pH and Specific gravity (Sg) were within normal limits (1.015-1.025) in 168 (84%) and 159 (59%) respondents while the pH was observed to be alkaline and acidic in 17 (8.5%) and 14 (7%) respondents. However, 31 (15.5%) and 10 (5%) respondents had dilute ( $<1.010$ ) and concentrated ( $>1.025$ ) urine respectively. Urine microscopy yielded presence of casts, crystals and cells in 133 (66.5%), 104 (52%) and 15 (7.5%) respectively. Cellular casts was most predominant (76%), followed by granular cast (16%), mixed cast was found in 34% and the least (1.5%) encountered cast was waxy. The crystals were mainly of triple phosphate crystals. Yeast cells were seen on microscopy in 5% (10) of respondents followed by WBC (1.5%) and RBC (1%) (Tables 1-3) [6].

Missing	3	1.5
Total	200	100
<b>Educational status</b>		
None	2	1
Primary	18	9
Secondary	111	55.5
Tertiary	66	33
Missing	3	1.5
Total	200	100
<b>Employment status</b>		
Unemployed	41	20.5
Self-employed	123	61.5
Private employed	18	9
Government employed	15	7.5
Missing	3	1.5
Total	200	100
<b>Religion</b>		
Christianity	141	70.5
Islam	52	26
Traditional	4	2
Missing	3	1.5
Total	200	100
Past medical history	Yes (%)	No (%)
Hypertension	0	198 (99)
Diabetes mellitus	0	198 (99)
Previous routine exam	59 (29.5)	139 (69.5)
Missing	2	2
Total	200	100

**Table 3:** Dipstick urinalysis assessment of subjects.

	Positive (%)	Negative (%)	Total
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Glucose	0 (0)	200 (100)	
Protein	63 (31.5)	137 (68.5)	200
Trace	52 (26.0)		
1 plus	8 (4.0)		
2 plus	0		
3 plus	3 (1.5%)		
Blood	17 (8.5)	183 (91.5)	200
1 <sup>+</sup>	6 (3.0)		
2 <sup>++</sup>	9 (4.5)		
3 <sup>+++</sup>	2 (1)		
Ketones	2 (1%)	198 (99%)	200
Bilirubin	21 (10.5%)	179 (89.5%)	200
Urobiliogen	53	147	200
1 <sup>+</sup>	44		
2 <sup>++</sup>	9		
Nitrite	6 (3%)	194 (97%)	200
Trace	2		
1 <sup>+</sup>	3		
2 <sup>++</sup>	1		
*WBC	11 (5.5%)	189 (95.5%)	200
3	1	0	
15	5	0	
70	5	0	
Urine pH	5.2-8.4 (normal)	<5.2 (acidic)	>8.4 (alkaline)
5.2-8.4	168	14	17
Urine Sg <sup>**</sup>	1.010-1.025	<1.010	>1.025
1.010-1.025	159	31	10
Urine microscopy	Present	Absent	Total
Casts	133	67	200
Cellular	76		
Granular	16		

Hyaline	4		
Waxy	3		
Mixed	34		
Crystals	104	96	200
Cells	15	185	200
Yeasts	10		
WBC	3		
RBC	2		

Note: \*White blood cells; \*\* specific gravity

## DISCUSSION

This study had more male participants as potential blood donors suggesting that males are more inclined to blood donation. This is similar to earlier reports. This may be due to the belief system of some people that males are more endowed to bear physical stress than females apart from the lower haematocrit concentration in females. Blood donation is viewed as a form of physical stress by some people coupled with fear and perception that blood donation is dangerous. This may support the fact that many individuals view blood donation as a stressful, harmful or even dangerous procedure which could have a deleterious effect on individual health. Although, the recommended age range for blood donation is between 18 and 60 years, this study found that the respondents were predominantly young adults in support of earlier claims that most blood donors are students. This may also be due to cultural perceptions that donating blood is harmful there by deterring those with advanced age. It may also be because of erroneous believe that those older are short of blood and therefore unfit to donate. We observed that our participants were more of single unmarried young individuals explaining the adventurous, bold and altruistic lifestyle. This may also be due to the fact that they are in need of alternate sources of income in the case of paid donors since many of the respondents were unemployed or self-employed. Many potential donors in this study were paid donors with no form of employment, they often engage in donating blood for the purpose of making extra income while those in paid employment were very few [7].

This study found that our respondents were normotensive and non-obese from their anthropometric parameters suggesting healthy subjects. This may be because of the relatively young age and socio-economic status as many were unmarried and without employment. The low socioeconomic status may affect their feeding pattern ultimately impacting their anthropometric parameters. Religion was found to be related to the tendency towards donation as majority of the potential blood donors were christians. This is similar to previous report. It was observed that many respondents had never done a routine medical examination in previous times despite the high educational

level. This finding may be because majority of our respondents were self-employed or unemployed with low level of awareness on the health benefits of routine medical screening. In addition, blood donation awareness is not part of the educational curriculum taught in schools. Similarly, there's no policy in place for routine medical check-up of citizens. Those who had previous medical check-up were probably enforced to do so by their employer or as part of pre-employment screening. Therefore, since just a little fraction of respondents were in paid employment. Majority would have been excluded from the benefit of routine medical examination. Thus, considering the level of unemployment in our environment and low socioeconomic status coupled with lack of policy on routine medical screening, incorporating routine medicals as part of screening process for individuals that may come for donation. This will help to identify those that will require further evaluation and management. Also, potential donors will benefit from this, in terms of early detection of significant co-morbidities and providing awareness of baseline health parameters which may be useful in the future. It will also create a feeling of satisfaction to the donors.

This study reveals that despite having satisfactory anthropometric parameters, a significant proportion of potential blood donors had abnormal urinalysis parameters. This supports earlier reports of 32.1% asymptomatic urinary abnormality in healthy adolescents in Egypt with a male preponderance. Most urine specimens were positive for protein with a minute having significant proteinuria. Earlier reports from Nigeria found proteinuria as the most prevalent (3.5% to 18.1%) urine abnormality in children. Comparable values (2.1%-2.6%) were reported from previous studies. Although, trace proteinuria is a common urinary finding which may be due to physiological factors like fever, prolonged standing and exercise which were absent in our study population. Asymptomatic proteinuria requires follow up, quantification and monitoring to prevent End-Stage Renal Disease (ESRD); this however, is beyond the scope of the objectives of this study. Haematuria found may suggest infection of the genitourinary tract or compromised glomerular integrity in form of glomerulonephritis. Faoud et al., in his study among adolescents

reported 9.8% prevalence of haematuria comparable to 8.5% found in this study and other reports. Bilirubinuria observed in a portion of the respondents suggest a conjugated form of bilirubin that is water soluble, filtered by the glomerulus and excreted in urine. This usually suggests obstruction of the biliary tract. However, the high level of urobilinuria observed suggest a pre-hepatic component with increased intra-hepatic circulation [8].

Nitrituria and leucocyturia were found in minority of respondents' which may suggest Asymptomatic Bacteriuria (ASB). Previous studies reported prevalence of 4.5% to 7% of ASB in children, associated with poor personal hygiene and low socioeconomic status complicated by glomerulonephritis and Chronic Kidney Disease (CKD). Although, previous studies found ASB and leucocyturia to be prevalent among females with a value 2% and 5% of school girls and young women respectively and could be as high as 15.8% in girls. However, the proportion of females in this study is too low to justify this. Early diagnosis and management of UTI prevents these complications. Ketonuria was found in just 1% of the study population which may indicate prolonged fasting or starvation since they were all negative for glucosuria, this is similar to previous reports, although in children. This may be explained by the unemployment rate and low socioeconomic class.

The urinary pH and specific gravity are dependent on the hydration status of an individual with a wide range and interpreted based on other findings. The observed alkaline pH may be due to the presence of uro-pathogenic organisms [9].

The urine microscopy showed that majority of the respondents had cellular casts with predominantly. Urine casts in form of hyaline and some cellular casts are regarded as normal urine constituents while waxy and granular cast are mostly pathologic. Cellular cast was found to be most prevalent in this study which may be due to the abundant presence of different cells in the urine specimens as cellular cast may compose of either RBC, WBC or epithelial or bacterial cells. This may also suggest the high proteinuria observed. The crystals observed were majorly triple phosphate with no pathologic relevance. However, yeast cells were prominent in 5% of urine specimens which may suggest fungal infection which is associated with poor hygiene and immunosuppression from malnutrition. Microscopy done revealed white (WBC) and red (RBC) blood cells further suggesting a possibility of active or asymptomatic infection.

These findings justify the inclusion of urinalysis in the routine assessment of fitness and health status of prospective blood donors in addition to anthropometric and other established parameters.

The limitations of the study include the absence of follow up on potential donors with positive dipstick urinalysis by quantitative

measurements and that the inability to perform urine culture studies for those with positive nitrite and leukocyte esterase due to financial constraints [10].

## CONCLUSION

This study found that there are prevalent determinants of urine abnormalities among healthy adults with potentials to donate blood. The pattern of urine abnormalities are proteinuria, bilirubinuria, hematuria and leucocyturia which may suggest renal disease and ASB requiring follow up. Dipstick urinalysis should be incorporated to the routine screening of potential donors to determine those that may benefit from follow up and also serve as incentives and motivation towards voluntary donation.

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