ORIGINAL ARTICLE
Diagnostic Accuracy of Urine Dipstick for Diagnosis of Preeclampsia

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ABSTRACT
Objective: To determine the diagnostic accuracy of urine dipstick for diagnosis of preeclampsia in females with gestational hypertension taking 24hours urinary protein as gold standard
Methodology: In this Cross sectional study conducted at, Unit III, Department of Obstetrics & Gynecology, Fatima Memorial Hospital Lahore during the year 2019. A total 100 females fulfilling the inclusion criteria were included through OPD. Then females were given a sterile container to collect the urine sample. Dipstick was dipped in urine sample for 1-2 minutes. Results of dipstick was noted and patients were labeled as positive or negative. Then females were admitted in gynecology wards for 24 hours to collect urine sample in collection bag. After 24 hours, complete sample was sent to the laboratory of the hospital for assessment of urinary protein level. Reports were assessed and patients were confirmed as positive or negative. Females with preeclampsia were managed as per hospital protocol.
Results: According to urine dipstick test preeclampsia was diagnosed in 63(63%) women. According to 24 hours urinary protein criteria preeclampsia was diagnosed in 54(54%) women. Sensitivity and specificity of urine dipstick test was 90.74% and 69.5%. While PPV &NPV were 77.78% and 86.49% respectively. Diagnostic accuracy of urine dipstick was 81%.
Conclusion: The diagnostic tests accuracy of urine dipstick for diagnosis of preeclampsia in females with gestational hypertensionis reliable, relatively faster and accurate.It is also concluded that it is much more reliablethan 24hours urinary proteintest.
Key words: Diagnostic Accuracy Urine dipstick, Diagnosis, Preeclampsia, Gestational, Hypertension, 24hours, Urinary protein

INTRODUCTION

During gestational period, a significant portion faces hypertensive disorders i.e. PIH, preeclampsia, and essential hypertension, and it can be further complicated by superimposed preeclampsia.[1] Pre-eclampsia is known as a global problem affecting 2 to 8 percent of all pregnancies whereas annual incidence is estimated 8.3 million females. Obstetricians tend to prevent maternal death due to multi-organ morbidities of the disease.[2-3]

In a study, outcome of hypertensive pregnancies, 55% had preeclampsia.[4] This multi-system endothelial disease leads to glomeruloendotheliosis, while in severe cases it may cause impairment/renal failure. Permeability of glomerularbasement membrane to proteins is key to the diagnosis. In addition to hypertension, the presence of significant proteinuria predisposes a pregnant female to coagulopathy, stroke and liver disease.[5]

Proteinuria is a useful tool for classifying hypertensive disorders. A 24 hour urine protein is assessed in hypertensive pregnant women due to less accuracy of dipstick urinalysis.[6] If protein is detected in urine dipstick screening test, urine should be collected for 24hours to determine the amount of protein being lost. This urine will be tested to see if female is passing >300mg of protein in a day.[7]

It has been reported that Sensitivity of dipstick was found to be 97.56% (CI 87.1% to 99.59%), while specificity was 55.88% (CI 37.89% to 72.8%) for diagnosis of preeclampsia in pregnant females.[8] While another study found that the sensitivity and specificity of dipstick method was 81% and 47% respectively for diagnosis of preeclampsia in pregnant females with gestational hypertension.[9]

One more study found that the sensitivity and specificity of dipstick method was 59% and 67% respectively for diagnosis of preeclampsia in pregnant females with gestational hypertension.[10]

Rationale of this study is to determine the diagnostic accuracy of urine dipstick for diagnosis of preeclampsia in females with gestational hypertension taking 24hours urinary protein as gold standard. 24hours urinary protein us gold standard method for confirmation of preeclampsia. But it requires 24 hours collection of urine sample and delay in diagnosis of preeclampsia. But if dipstick method is reliable and accurate to detect preeclampsia and early management can be started then why to wait for further 24 hours.

Also the compliance of 24 hours urinary collection is poor. Literature has showed varied data regarding accuracy of dipstick for diagnosis of preeclampsia. Moreover, there is no local evidence found which could help us in confirmation of reliability of dipstick method for diagnosis of preeclampsia. However, it is used in routine in many setups. So, we want to conduct this study to find there liability of dipstick method for local setting. So that we may implement the results of this study in local population and be able to recommend whether to rely on dipstick method for diagnosis of preeclampsia. This will help to improve our practice and we will also update guidelines for diagnosis of preeclampsia in hypertensive pregnant females.

METHODOLOGY

A total of 100 females of age 18-40years, parity <5, presentingat gestational age >20weeks for antenatal check-up having gestational hypertension whereas those with chronic hypertension, chronic renal disease (creatinine>1.2mg/dl), lupus erythematosus or chronic or gestational diabetes (BSR>186mg/dl), urinary tract infection (on clinical examination) were excluded from the study. Demographic data (name, age, parity, gestational age, BMI) willbe recorded. Then females were given a sterile container to collect the urine sample. Dipstick was dipped in urine sample for 1-2 minutes. Results of dipstick were noted and patients were labeled as positive or negative (as per operational definition). Then females were admitted in gynecology wards for 24 hours. During 24 hours, females were advised to collect urine sample in collection bag. After 24 hours, complete sample was sent to the laboratory of the hospital for assessment of urinary protein level. Reports were assessed and patients were confirmed as positive or negative. Females with preeclampsia were managed as per hospital protocol. Frequency and percentage was calculated for qualitative variables includingpreeclampsia (on dipstick and 24hours urinary protein). Parity was also presented as frequency. Diagnostic accuracy of dipstick was calculated by drawing a 2x2 table and specificity, sensitivity, NPV, PPV and diagnostic accuracy of dipstick method by taking 24 hour urinary protein as gold standard.

RESULTS

Mean age of women was 30.65±5.78 years. Minimum and maximum age of women was 20 and 40 years, mean gestational age of women was 29.59±3.18 weeks. Minimum and maximum age of women was 25 and 35 weeks. According to parity status 30(30%) women parity was 1, 28% women's parity was 2, 23% women's parity was 3 and 19% women's parity was 4. As per body

mass index criteria 30(30%) women had normal BMI, 33% were overweight and 37% were obese. The mean systolic blood pressure of patients was 170.35±18.98 mmHg and mean diastolic blood pressure was 102.45±10.04 mmHg.

According to urine dipstick test preeclampsia was diagnosed in 63(63%) women.Figure-1 According to 24 hours urinary protein criteria preeclampsia was diagnosed in 54(54%) women.Figure-2 Sensitivity and specificity of urine dipstick test was 90.74% and 69.5%. While PPV & NPV were 77.78% and 86.49% respectively. Diagnostic accuracy of urine dipstick was 81%.Table-1&2
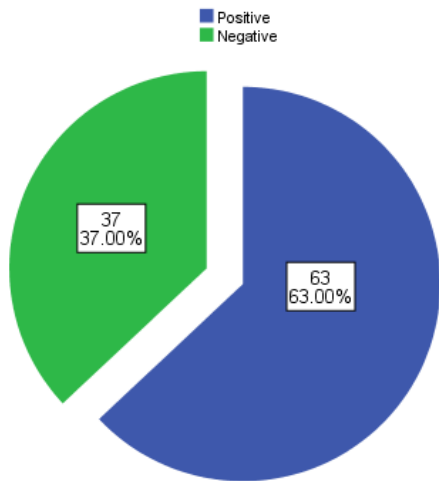
Figure-1: Preeclampsia according to Dipstick Criteria

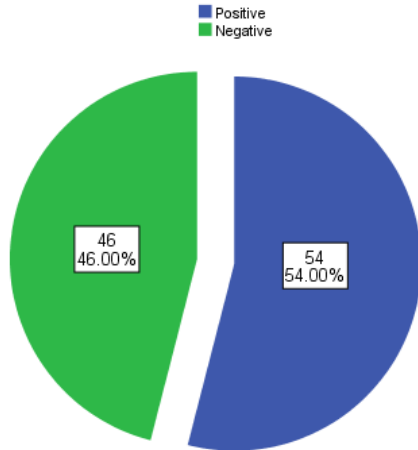Figure-2: Preeclampsia according to 24 Hours Urinary protein level

Table-1: Diagnostic Accuracy of Urine Dipstick for Diagnosis of Preeclampsia

	24 Hours Urinary Protein level			Total
	Present		Absent	
Urine Dipstick	Present	49(90.7%)	14(30.4%)	63
	Absent	5(9.3%)	32(69.6%)	37
Total	54		46	100

Table-2: Diagnostic Accuracy of Urine Dipstick for Diagnosis of Preeclampsia

	Value	CI (95%)
Sensitivity	90.74%	(80.09, 95.98)
Specificity	69.57%	(55.19, 80.92)
PPV	77.78%	(66.09, 86.28)
NPV	86.49%	(72.02, 94.09)
Diagnostic Accuracy	81%	(72.22, 87.49)

DISCUSSION

The role of proteinuria is essential while diagnosing preeclampsia and its effect on mother and child. Early detection and management of preeclampsia may prevent the development of eclampsia, whereas accurate diagnosis is also important for preventing and managing hypertensive disorders.[11]

Still the gold standard for diagnosing hypertensive disorders is 24 hour urine collection for estimation of proteinuria with various limitation including time delay and an inconvenient for hospital staff and patients as well. Additionally, incomplete collection may result in missed diagnosis.[12] Polymerase chain reaction can be a practicalalternative test which may reduce such errors and also helpful in clinical decision making.[13] This modality can be repeated in any evolving clinical situation which may impact the healthcare cost, time, and anxiety while waiting the results.[14] On the otherhand, ratio of Polymerase chain reaction produces promising results. To replace 24 hr urinary protein measurement may be dependent on a cut-off level which may maximize the diagnostic accuracy and to help in preventing of undetected pre-eclampsia and its adverse fetomaternal outcome. It isalso desirable to limit the number of false positive results inwomen who would then be subjected to increased monitoringand possibly pre-term delivery. If Polymerase chain reaction were to be used as ascreening test, with positive results requiring a 24 hour urinecollection to verify significant proteinuria, then false negative rates need to be minimized.[15]

This would allow false positiveresults to be identified by the second test and thus sensitivitycan be maximized at the expense of specificity. According to Obeid et al 2018the sensitivity and a specificity of Diagnosis of Preeclampsia using dipstick method was 97.6% and 44% respectively while in our study the sensitivity and specificity of urine dipstick diagnosis was 90.74% and 69.57% respectively which is little bit different from above mentioned study.[11]

Various cut off values for Urine Dipstick for Diagnosis of Preeclampsiawereused with sensitivity andspecificity ranged between (63.1%-92.9%) and (32.7%-82.7%) respectively whereas in our study the sensitivity and specificity Urine Dipstick for Diagnosis of Preeclampsiawas 90.74% and 69.57% almost greater than both above mentioned studies. Kayatas find the sensitivity and specificity of 60.4% and 77.9%, respectively which is also less than the sensitivity and specificity reported by our study.[16]

A study done by Shahbazian et al. identified sensitivity and a specificity of 91.2% and87.8% respectively[17] these findings are almost similar to the findings of our study as in our study the sensitivity and specificity of Diagnosis of Preeclampsia was 90.74% and 69.57% respectively. Wheeler and colleagues found sensitivity as 86.8% and specificity 87.5%[18] which is also different from the findings of our study. In clinical practice, the main concern in is false negative results of this test.

CONCLUSION

The diagnostic accuracy of urine dipstick for diagnosis of preeclampsia in females with gestational hypertensionis reliable, relatively faster and accurate. It is also concluded that it is much more reliable than 24hours urinary protein test.

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