

Contribution of the Urine Dipstick in the Diagnosis of Preeclampsia at the Bon Samaritain University Hospital of N'Djamena (Chad)

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Abstract

Introduction: Preeclampsia and its complications are a major public health problem in Africa and worldwide, because they cause very high maternal and fetal morbidity and mortality. Few studies have been conducted in Chad. The main objective of this study was to describe the role of the urine dipstick in the diagnosis of preeclampsia at the Bon Samaritain University Hospital of N'Djamena.

Patients and Method: This was a descriptive cross-sectional study with a 12 months prospective data collection from August 1st, 2017 to July 31st, 2018 conducted at the Bon Samaritain University Hospital in N'Djamena, Chad. All parturient women who developed hypertensive disorders of pregnancy that were hospitalized in the obstetrics and gynecology department were included. A free and verbal consent was obtained from the patients after they were informed about the study. The variables studied were socio-demographic, clinical, paraclinical, therapeutic and evolutionary. The data collected was analyzed by Excel 2016.

Results: Out of a total of 3067 pregnant women, 80 of those were diagnosed with preeclampsia, with a hospital prevalence of 2.6%. The average age was 24.9 years \pm 6.9 with a range of 15 to 43 years. The pregnant women were primiparous in 65% of the cases. It was noted that 10% of the pregnant women had a premature birth. Patients had presented with pregnancy-induced hypertension in 7.5% and preeclampsia in 6.25% of the cases. In 12.5% of the cases, the presence of chronic hypertension was noted. On admission, a systolic blood pressure of \geq 160 and/or a diastolic blood pressure of \geq 110 was noted in 62.5% of the cases. The urine dipstick showed proteinuria with 1 cross (7.5%), 2 crosses (38.8%), 3 crosses (48.7%) and 4 crosses (5%). A clinical evolution was favorable in 53.8% of the cases. Complications were mainly represented by eclampsia (31.2%), retroplacental hematoma (2.5%) and death (2.5%).

Conclusion: Preeclampsia is underdiagnosed in our country. A good follow-up of the pregnancy during antenatal and postnatal periods with the utilization of a urine dipstick test during routine investigations will solve this problem and avoid complications.

Keywords: Preeclampsia • Urinary dipstick • Hypertension • Chad

Introduction

Preeclampsia (PE) and its complications are a major public health problem in Africa and worldwide, because they cause very high maternal and fetal morbidity and mortality [1]. According to the World Health Organization (WHO), 10 to 15% of pregnant women are hypertensive [2]. However, complications related to preeclampsia are preventable through medical treatment and screening tests for risk factors. According to the 2015 Chad Health Statistics Yearbook, only 3.43% of deliveries took place in adequate health facilities. Preeclampsia and eclampsia ranked the 4th among pregnancy

complications after obstructed labor/prolonged labor, hemorrhage and infectious complications [3]. In Chad, only a few studies had been devoted to hypertensive complications of pregnancy, while maternal and fetal morbidity and mortality remain very high. There are no records of the number of births performed outside of the hospital; therefore, the frequency of this pregnancy induced hypertension pathology and its complications remains unknown. It is in this context that we had carried out this study, where the main objective was to systematically do screening tests for preeclampsia with the detection of proteinuria by using a urine dipstick in hypertensive pregnant women at the Bon Samaritain University Hospital of N'Djamena.

Patients and Method

This was a descriptive cross-sectional study spread over a period of 12 months from August 2017 to July 2018 at the Bon Samaritain University Hospital of Wala in N'Djamena, Chad. Recruitment of patients was done randomly. The data has been collected from an established survey sheet and through clinical records. The study population consisted of pregnant women with hypertension that were hospitalized in the Obstetrics and Gynecology department. This study included, patients that were on follow-up for preeclampsia and that have benefited from the utilization of a urinary dipstick. All the patients that were included in the study had received an informed consent with a clear and detailed description of the objectives and purpose of the study. Any hospitalized

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pregnant woman with chronic hypertension or gestational hypertension without proteinuria, heart or kidney problems, were not included in the study. The variables studied were sociodemographic (age, profession, level of study), clinical, paraclinical and therapeutic. An obstetrics and gynecological past medical history (age of first pregnancy, estrogen-progestogen contraception, gestation, parity, previous pregnancy-induced hypertension, preeclampsia/eclampsia, chronic hypertension, history of fetal death in utero and change of sexual partner) was taken. The clinical variables were hypertension, presence of proteinuria in a urine dipstick and pregnancy monitoring during prenatal visits. The paraclinical variables consisted of quantitative proteinuria, blood count, creatinine, blood urea and transaminases. Therapeutic variables included antihypertensives, anticonvulsants, drugs for lung maturation and the obstetrics variables included the route of delivery, fetal complications at birth and postpartum follow-up. The diagnosis of preeclampsia was made according to the WHO criteria [4]. Pregnancy hypertension is defined as systolic blood pressure (SBP) \geq 140 mmHg and/or diastolic blood pressure (DBP) \geq 90 mmHg, which usually begins after 20 weeks of pregnancy in a woman whose blood pressure had been normal and disappearing before the end of the sixth week postpartum. Preeclampsia is defined as a condition in pregnancy characterized by high blood pressure and protein in the urine (>0.3 g/day). It is considered to be severe if it is associated with at least one of the following criteria; severe hypertension (systolic blood pressure \geq 160 mmHg and/or diastolic blood pressure \geq 110 mmHg), renal impairment; oliguria (<500 ml/24h) or creatinine (>135 mol/L), or proteinuria (>5 g/day), acute pulmonary edema, persistent epigastric pain, HELLP (Hemolysis, elevated liver enzymes, low platelet count) syndrome, eclampsia, intractable neurological disorders (visual disturbances, polykinetic osteotendinous reflexes), thrombocytopenia <100 G/l retroplacental hematoma, or abnormalities in fetal development. Preeclampsia is said to be early if it occurs before 32 weeks [5]. The data obtained was processed and analyzed using Excel 2016 software.

Results

During our study period, 3067 women were pregnant, of which 80 patients had preeclampsia with a hospital prevalence of 2.6% as shown in Figure 1.

The average age was 24.9 years \pm 6.9 with a range of 15 to 43 years. There were 41 patients (51.2%) aged under 20 years. The age groups of 20 to 24 years and 25 to 29 years accounted for 26.3% and 15% respectively. The pregnant women had a secondary educational level in 40%, university level in 22.5% and non-schooling in 22.5% of the cases. Furthermore, 65% (n=52) of the patients were primiparous, 10% had premature births and 6.25% had intrauterine fetal deaths without any case of perinatal mortality. Twin pregnancies accounted for 6.25%. Estrogen-progestin oral contraceptives were used by 11.25% (n=9) of the patients. The past medical history was marked by chronic hypertension in 12.5%, gestational hypertension in 7.5%, obesity in 13.7% and preeclampsia/eclampsia in 6.25% of the patients. According to the family history, hypertension, diabetes and eclampsia were present in 32.5% (n=26), 15% (n=12) and 6.2% (n=5) of the patients, respectively. Regarding perinatal consultations (PNC), 17.5% of pregnant women did not seek perinatal care. The distribution of PNCs is shown in Figure 2.

On admission, all the parturient women presented with hypertension. Severe hypertension constituted of 62.5% of the cases. The onset of preeclampsia was late in 83.7% of the patients (\geq 34 weeks of amenorrhea) and was diagnosed during signs of severity in 88.7% (n=71). In 11.2% (n=9) of the cases, preeclampsia was present between the 29th and 33rd week of amenorrhea. During the prenatal care, before the 20th week of pregnancy, there was the presence of proteinuria with 1 cross in 11.2% (n=9) of the patients, in which they all had a past medical history of hypertension (gestational or chronic). The urine dipstick performed on admission showed proteinuria with 3 crosses in 48.7% (n=37) of cases. Table 1 highlights the distribution of patients according to proteinuria.

Headaches, dizziness and edema of the lower limbs were noted in 21.2% of cases; visual disorders in 16.5% and seizures in 3.7% of cases.

The complete blood count was measured in 51 patients, the results

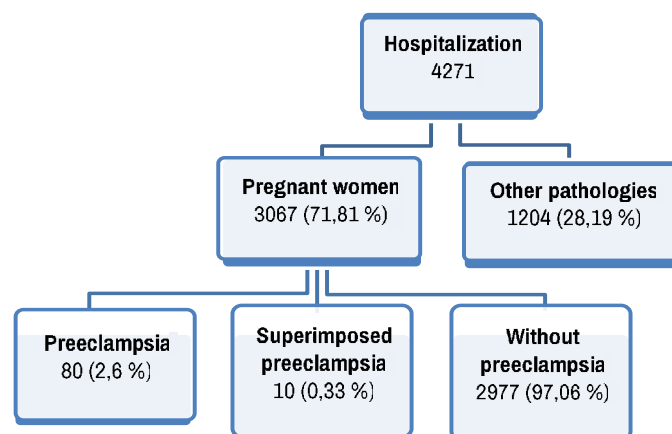


Figure 1. Inclusion criteria for study patients.

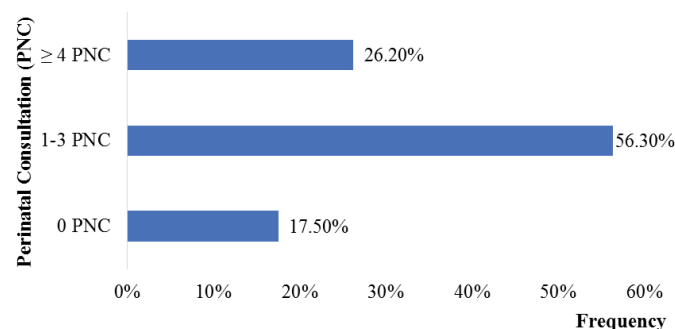


Figure 2. Distribution of patients according to perinatal consultations (PNC).

Table 1. Distribution of patients according to proteinuria.

| Number of crosses | Population (n) | Percentage (%) |
|-------------------|----------------|----------------|
| + (1+) | 6 | 7,5 % |
| ++ (2+) | 31 | 38,8 % |
| +++ (3+) | 39 | 48,7 % |
| ++++ (4+) | 4 | 5,0 % |
| Total | 80 | 100 % |

revealed anemia in 37.2% and thrombocytopenia in 11.76% of cases. The renal function test was performed in 45 patients; 8.9% of them had acute renal failure. The liver function test was performed in 43 patients; 4.6% of them had an abnormal liver function with elevated liver transaminase levels of > 3 times the normal.

During prenatal care, 15% of the patients had received antihypertensive treatment while 85% (n=68) of the patients had not received any antihypertensive treatment. Moreover, during hospitalization, 15% of the patients had not received any antihypertensive treatment. Methyldopa (26.25%), Nifedipine (23.75%) and Nicardipine (12.5%) were the most prescribed antihypertensive medications. During eclampsia, magnesium sulphate was used in 93.6% (n=29) of the cases. The corticosteroid, betamethasone was used for lung maturation and was achieved in 6.25% (n=5) of all deliveries. A caesarean section was performed in 62.5% (n=50) of the patients; the main causes of which were preeclampsia (22.6%), eclampsia (39.6%) and long labor contractions (13.3%).

Patients' evolution was favorable in 53.8% of cases. Maternal complications included eclampsia in 29.9% (n=24), renal failure in 5% (n=2), retroplacental hematoma in 2.5% (n=2), HELLP syndrome in 1.25% (n=1) and death in 2.5% (n=2). Concerning newborns, 28.9% had a low birth weight for gestational age, of which 36% had an Apgar score \leq 7 to 10 minutes. Respiratory distress, prematurity and fetal death in utero were the main complications of newborns in 28.9% (n=26), 22.2% (n=20) and 12.2% (n=11), respectively. For the postpartum follow-up, 58.7% (n=47) of the patients did not come for postnatal

care. Ten patients (22.2%) developed a complication at 6 months after delivery, including; chronic renal failure in 6.2% (n=2), heart failure (n=2) and chronic hypertension (n=2). In the multivariate analysis, chronic hypertension, severe hypertension and the presence of even minimal proteinuria were linked to preeclampsia ($p < 0.000$).

Discussion

Selection bias and the difficulty of performing certain additional examinations were the main limitations in our work. Indeed, we selected pregnant women that were hospitalized in the obstetrics and gynecology department, when we could have recruited all pregnant women in prenatal consultation. This would have made it possible to obtain a more precise hospital frequency of preeclampsia. Some pregnant women came for prenatal care at the Bon Samaritain University Hospital, gave birth either at home or in other health facilities. Worldwide, preeclampsia is the leading cause of maternal and perinatal illness with 10 million women developing preeclampsia each year [6]. In France, the prevalence is estimated to be around 1% of the general population, 1.5% on average for primipara and 0.8% on average for multipara [7]. Several studies in sub-Saharan Africa had found a hospital prevalence of 8.4% in Cameroon and 3.6% in Senegal [8,9]. The lack of systematic search for proteinuria in pregnant women from the 2nd trimester or in those with hypertension would be the reason for the diagnosis of preeclampsia at a later stage during complications. Preeclampsia is a prognostic factor for cardiovascular and renal diseases in both mother and child [10]. In case of a preterm birth following preeclampsia, patients were 8 times more likely to die from cardiovascular disease. Any fetal death in utero increases the risk of developing preeclampsia in the next pregnancy. This therefore, always requires screening for preeclampsia in a new pregnancy. Our results (6.2%) are similar to those of Assogba in Benin (7.6%) [11].

In our study, the patients were younger, and often primiparous because the average age was 25 years and more than half of the patients were under 20 years old. This could be explained by targeted screening. Primiparity thus increases the risk of occurrence of preeclampsia. In a work in Mali, the age group in the range of 20 to 24 years represented 17% of the patients [12]. Primigravida is a risk factor for preeclampsia due to immunological intolerance of certain elements in the sperm. Nearly half of the pregnant women were primigravidas. In our series, 62.5% of the pregnant women had severe hypertension. Preeclampsia is severe when it is associated with severe hypertension defined by systolic blood pressure ≥ 160 mmHg and/or diastolic blood pressure ≥ 110 mmHg, or in the presence of clinical signs of visceral pain such as oliguria < 500 ml/24h and acute edema of the lung [6]. The risk of developing preeclampsia is greater in women who had already had damage to their vascular endothelium due to the presence of diabetes, or pre-existing hypertension before pregnancy [13,14]. Thus, in our study, it is shown that 12.5% of pregnant women have had chronic hypertension. The same is true for Baragou S in Lomé with a proportion of 14% [15]. Severe hypertension was noted in 62.5% of pregnant women. In 2012, in Chad, Lomadje MG listed 80% of pregnant women with severe hypertension [16]. Proteinuria with 3 crosses (3+++) on a urine dipstick was the most represented with 48.75%, as proteinuria was estimated to be at 3 g/l. The same is true for Ngo IHN in Mali with a rate of 58.9% [17]. It is recommended that from the first prenatal examination, a urine dipstick should be used to check for any indications of kidney disease. If the strips are positive; proteinuria (threshold: 300 mg/day) and hematuria (threshold: 10 mm³ RBC's) should be assessed [5]. It is clear that chronic hypertension and the severity of hypertension associated with proteinuria on a urine dipstick are predisposing factors for preeclampsia. A high rate of proteinuria is present in African people, therefore, this should encourage its early detection to be done usually from the beginning of prenatal care in pregnancy. Screening for proteinuria with a urine dipstick is essential and systematic in the first few months of pregnancy in all pregnant women. However, in our study, ¼ of the patients had only attended 0 to 3 prenatal care visits as well as in a Moroccan study, it was noted that 89.9% of pregnant women had insufficient prenatal care [18]. In sub-Saharan Africa, insufficient attendance of prenatal care increases the risk of having preeclampsia along

with its complications such as eclampsia. Its prevalence is high which leads to high mortality rates in developing countries. The management of preeclampsia is multidisciplinary. In our study, 15% of patients seen in prenatal care were not treated for hypertension. For hospitalized patients, only ¼ had received antihypertensive treatment compared to 99.3% in Morocco in 2015 [15]. The average length of hospitalization that we noted was 6.87 days with a range of 2 to 12 days against an average of 2.89 days in Mali [17]. Patients that had undergone a cesarean section accounted for 62.5%. This result is lower than those obtained in Burkina Faso in 2014, and in Algeria in 2017 with 88.60% and 81.40%, respectively [15,19,20]. These abnormalities in management would explain the development of complications of preeclampsia such as eclampsia and acute renal failure. In our study, eclampsia accounted for 13.75%. Its rate is even higher in some sub-Saharan African countries, which was around 24% [21] and 83.2% [17]. In our study, acute renal failure accounted for 8.9% of cases. This result remains high compared to the Malian study with a lower rate of 6.5% of cases [17]. Frequent prenatal care visits with some routine clinical and paraclinical examinations is effective for the prevention of preeclampsia.

Conclusion

Preeclampsia and its complications are a risk of fetal and maternal morbidity and mortality. The interest of our study is twofold: we were able to show the feasibility in clinical routine screening tests for preeclampsia by the use of a urine dipstick for the presence of proteinuria and respecting consultations during pregnancy. This would reduce the incidence of preeclampsia and its complications, which can cause high morbidity and mortality in Chad and sub-Saharan Africa. The urine dipstick remains an easy-to-use, accessible and reliable physical examination. This work has provided an idea of the epidemiology of this pathology.

Conflict of interest

The authors declare no conflict of interest.

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