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BIOCHEMICAL CHANGES IN THE URINE OF ASYMPTOMATIC PREGNANT WOMEN

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Abstract
Dipstick urinalysis is used as a quick, cheap and useful test during each prenatal checkup and gives a heads-up in the presence of a potential condition that requires treatment. Our study aimed to investigate changes in the urinary parameters and the detection of UTI in urine samples of pregnant women who live in Baaj district, Nineveh governorate. Fifty fresh urine samples of pregnant women were collected and tested by using (Cybow, Germany) reagent strip. The results showed that: ketone was positive, negative and trace in 10%, 82% and 8% of samples respectively. Urobilinogen was positive, negative and trace in 6%, 2%, and 92% respectively. Positive glucose was found in16% while trace amount was found in 34% of samples. Protein showed positive result in 8% and found in trace amounts in 38% of samples. Only 2% of samples were nitrite positive and trace amount found in 8%. Majority of samples 56% show trace leukocyte and 30% were positive. Trace amount of RBC was found in 44% of sample and 32% were RBC positive.

Keywords: pregnancy, dipstick, urinary parameters, biochemical changes.

Introduction
Pregnancy is defined as a process and series of changes that occur in a female's organs and tissues as a result of a growing fetus. An usual body response associated to physiological pregnancy changes make pregnant women more susceptible to complication such as urinary tract infections, preeclampsia, gestational diabetes, miscarriage and anemia [1]. Most pregnancies occur with no complications; Though, some pregnant women will undergo complications that can affect their health, their baby's health, or both [2].

UTI is a common encountered medical complication of pregnancy, the overall rate is about 8% [3]. High prevalence of UTI during pregnancy is a result of morphological and physiological changes that occur in the genitourinary tract during pregnancy [4]. The relaxation of smooth muscle and the dilation of ureters with pregnancy increase the susceptibility for ascending. Furthermore, aminoaciduria and glycosuria taking place during pregnancy offer an excellent culture medium for bacteria in parts of urinary stasis [5].

UTIs during pregnancy can be symptomatic or asymptomatic. It can be present at booking or appear acutely later during pregnancy and it can be persistent or recurrent but in most cases, the infections are asymptomatic; yet, even covert bacteriuria puts the mother at risk for low birth weight and pre-term birth, likewise, pyelonephritis can result in significant morbidity and mortality of the mother and the fetus [6]. Thus, an understanding of the mechanisms, diagnosis, and treatment of UTIs in pregnancy is vital to any physician involved in maternal health care.

Measuring urine protein is one of the commonest tests performed during pregnancy. Urinary excretion of protein increases in about 50% of pregnant women during normal pregnancy and is attributed to an increase in the glomerular filtration rate. Proteinuria has usually been considered as a hallmark of preeclampsia and a sign of its severity, but current guidelines mention that proteinuria is sufficient but not essential for the diagnosis [7].

The renal threshold for glomerular glucose reabsorption is reduced during pregnancy, causing an increase in glycosuria at some time in about 50% of all pregnancies, Glycosuria can also take place if pregnant woman develop gestational diabetes which is common diseases arising during pregnancy [8].

At normal times, urine pH stays inside the margin of 6.0 to 7.0; a normal pregnant woman can show high pH- up to 7.45. However, Urine pH test can show more acidic results due to the consumption of some hormonal drugs by the mother. Acidic urine with adequate urine volumes can result in uric acid stone formation [9]. However, renal stones during pregnancy is relatively rare and it has been linked with a significant increase in the risk of gestational diabetes mellitus [10].

A urine test is an important diagnostic tests used in modern medicine as a part of routine checkup during gestational age, and usually consists of dipstick analysis and microscopic evaluation of urine sample. Screening test uses either urine dipsticks or urine microscopy, and if either is positive, urine cultures are recommended [11].The study aimed to assess the biochemical changes and detect UTI in the urine of pregnant women using strip .

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Subjects

This study was conducted in Dari Human Organization Laboratories in Ba'aj city in the period from September to November 2020. A total of 50 pregnant women from Baaj district, Nineveh governorate included with ages range from 20-39 years old.

Methods

From each pregnant woman, 10–20 ml of fresh urine sample was collected in a sterile, dry, wide-necked, leak proof container labeled with patients name, number, date and time of collection. No urine preservatives were added. Routine tests for glucose, ketones, specific gravity, blood, pH, proteins, urobilinogen, nitrite and leukocytes were performed using dipsticks.

Results

A total of 50 random urine samples from pregnant women were collected from Baaj district, Nineveh governorate. Results showed changes in the urine during pregnancy. **Table (1)** shows the age distribution of pregnant women, where the majority 34% of pregnant women was between the ages of 25-29 years while the lowest percentage 18% was in the group of women aged 30-34 years.

Table 1: The distribution of pregnant women according to age

Age	No.	%
20-24	14	28
25-29	17	34
30-34	9	18
35-39	10	20
Total	50	100

Percentage distribution of test strip urinary findings among the study participants are demonstrated in **Table (2).**

Table 2: Urine test strip results for some urinary parameters among participants

Parameters	Positive		Trace		Negative	
	No.	%	No.	%	No.	%
Ketones	5	10	4	8	41	82
Urobilinogen	3	6	46	92	1	2
Glucose	8	16	17	34	25	50
Protein	4	8	19	38	27	54
Nitrite	1	2	4	8	45	90
Leukocytes	15	30	28	56	7	14
RBC	16	32	22	44	12	24

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Table (3) shows the association of pyuria with hematuria with P value of 0.01.

Table (3): RBC and WBC Cross tabulation

WBC	RBC			Total
	Positive	Trace	Negative	
Positive	9	6	0	15
Trace	6	14	8	28
Negative	1	2	4	7
	16	22	12	50
P value= 0.01<0.05 (S)*				

*S: Significant

Table (4): Association of pyuria with nitrite results.

WBC	Nitrite			Total
	Positive	Trace	Negative	
Positive	1	1	13	15
Trace	0	3	25	28
Negative	0	0	7	7
Total	1	4	45	50
P value= 0.5 >0.05 (NS)*				

*NS: Non-significant

The PH value of the samples ranged from was normal for all samples. The range of specific gravity among samples is shown in **Table (5)**. The range in majority 60% of samples was 1.025-1.030, while 36% showed a result between 1.010 and 1.020 and the result was < 1.010 in only 4 % of samples.

Table 5: The range of urine specific gravity among participants

Specific gravity	No.	%
1.025-1.030	30	60%
1.010-1.020	18	36%
< 1.010	2	4 %

Discussion

During pregnancy, many changes occur in the body's functions to support fetal survival in addition to preparing for labour, including urination. These changes in urine can indicate health issues during pregnancy; it is Therefore, important for these changes in urinary parameters is to be detected to aid in the diagnosis and management of common medical problems during pregnancy, like hypertension, preeclampsia, gestational diabetes and UTIs. [12].

In our study, ketones appeared in trace amounts during normal pregnancy as a part of changes in the metabolism of glucose [13], this result fits with the theory that the presence of excess urinary ketones for considerable time could be a sign of gestational diabetes. The prevalence of ketonuria during pregnancy is not well described. Researches show a wide variation in frequency ranging from 5% to 89% of women. This difference in prevalence may be the result of heterogeneity in study design and patient population. Some studies show that ketonuria has been linked with adverse outcomes of pregnancy like reduced childhood intelligence quota (IQ), fetal heart rate decelerations, oligohydramnios and non-reactive non-stress tests. The level of urinary ketones that has been linked with these adverse outcomes shown to be as low as 1–3 mmol/L, equating to a trace - small level on the urine dipstick [14].

The results showed mild glycosuria which is normal as more glucose are allowed to pass into urine by the kidney during gestational age, it could also suggest the possibility that the mother had undetected diabetes before being pregnant, so additional testing is required to clarify if this is so [15].

The data suggests that slight increase in urinary protein is normal as a result of increasing in glomerular filtration rate (GFR) that may exceed the renal tubules ability to reabsorb protein [16]. proteinuria is also hypothesized to be a possible sign of preeclampsia [17].

The current study showed only small amounts of urinary urobilinogen; However, it is important to determine the cause of elevated level of urobilinogen, as it can be a sign of hemolysis and hepatocellular disease linked with pregnancy-related conditions such as hemolysis, elevated liver enzymes and low platelet count (HELLP) [18].

The results on the presence of leucocytes and nitrates was important to focus on as many studies revealed that urine dipstick test can be used as a screening test to diagnose UTI by combining specificity and sensitivity of leukocyte esterase and nitrate [19,20]. Studies show that even asymptomatic pyuria detected using urinalysis can result in poor perinatal outcomes such as preterm delivery, Preterm premature rupture of the membranes (PPROM), low birth weight and lower Apgar scores [21]. Poor awareness of proper care during pregnancy and the lack of personal hygiene in women included in this study offered us a clearer understanding of the cause of infection.

The nitrite test is considered specific but not highly sensitive. Therefore, a positive result is helpful, but a negative result doesn't exclude UTI. False negative result may result from high urobilinogen levels, urinary pH of < 6.0, nitrate reductase-negative bacteria, vitamin C consumption, patients who consume a low-nitrate diet [22] or due to a low colony forming unit (CFU) count or dilute urine [23]. False negative nitrite test

may also result from the fact that bacteria require at least 4 hours to reduce the nitrate to nitrite [24]

A prospective case-control study showed that about 1 in 5 women have dipstick positive hematuria results at some time during their pregnancy even with a careful collection of midstream urine sample but this was detected in at a fairly low level and when examined more by nephrologists, almost 40% of cases had normal urine microscopy, ie, false-positive dipstick test results. Still, this suggests that a large number of pregnant women, about 15%, have true hematuria (either isomorphic or dysmorphic) noted during their pregnancy[25]. In another study, results found that women with dipstick positive hematuria had a greater chance to develop preeclampsia or deliver a low birth weight baby. This difference is attributed to the fact that 32% of their study group had associated proteinuria, suggesting more significant underlying renal disease and consequently, a greater tendency for preeclampsia [26].

Our results showed that urine pH levels were normal during gestational age and were most close to neutral ; however, slight increase or decrease in pH level were mostly affected by the different diet habits of pregnant women [27].

Conclusion

Dipstick test can be used reliably for evaluating biochemical changes in urine and the detection of UTI during pregnancy.

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