Research Article

INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

www.irjponline.com

ISSN 2230-8407 [LINKING]

MAPPING THE LEVELS OF CREATININE, UREA AND BETA HCG IN VAGINAL FLUIDS

Dr. Abhijit Sarkar,[1] Dr. Vishal Bhuva Kishorbhai[2*]

[1]Assistant Professor, Department of Pathology, ICARE Institute of Medical Sciences and Research & Dr. B C Roy Hospital, Haldia, West Bengal

[2*]Assistant Professor, Department of Pathology, Gouri Devi Institute of Medical Sciences & Hospital, Durgapur, West Bengal

Address for correspondence

Dr. Vishal Bhuva Kishorbhai

Email Id- vishalbhuva@yahoo.com

How to cite: Sarkar A, Kishorbhai VB. Mapping The Levels Of Creatinine, Urea, And Beta Hcg In Vaginal Fluids. International Research Journal of Pharmacy. 2017;8(1):79-84.

Doi: 10.7897/2230-8407.080119

==========

ABSTRACT

Background: Creatinine and urea are used in the diagnosis of premature miscarriage (PROM) since urine excretion in amniotic fluid begins during the eighth and tenth gestational week. Beta-human chorionic gonadotropin, or B-hCG, is released by syncytiotrophoblast and found in mother's blood and amniotic fluid. Its evolutionary significance is being investigated.

Aim: In order to detect premature rupture of the membranes, or PROM, the current study set out to map the levels of creatinine, urea, and beta-human growth hormone in vaginal secretions.

Methods: The study evaluated women who were split into two groups. Group I included pregnant women in the 28–40 week gestational age range who had a history of leaking vagina without the commencement of labour pain and a clinical diagnosis of PROM. Group II consisted of control pregnant women with no PROM who were between the ages of 28 and 40 weeks. The amounts of creatinine, urea, and beta-hCG in the vaginal fluids of these two groups were compared.

Results: At baseline, demographic information was similar for both research groups. It was observed that the levels of urea, beta-hCG, and creatinine in vaginal fluids were considerably greater in the study group. For creatinine in vaginal fluid, the sensitivity, specificity, and cut-off values were 86.65%, 48.1%, and >0.08, respectively. For urea in vaginal fluid, these values were 63.31%, 98.1%, and >3.4 IU/L. For β-hCG in vaginal secretions, the corresponding cut-off values were >9 mg/dl, 83.1%, and 95%, respectively.

Conclusion: The current investigation shows that a quick, dependable, and easy way to diagnose PROM is by looking for creatinine, urea, and β-hCG in vaginal fluid. Since it can be shown to be a realistic, affordable, and viable test, it should be included in routine examinations even at low-resource centres operating at the community level.

Keywords: vaginal fluid, preterm rupture of membranes, urea, creatinine, and β-Hcg

INTRODUCTION

Premature rupture of membrane, or PROM, is a disorder that occurs when the foetal membrane bursts before labour begins, regardless of the female's gestational age. The accumulation of fluid in the posterior fornix during evaluation of the speculum and history of watery discharge per vaginum is the cornerstone for the diagnosis of PROM. Premature rupture of the membrane (PROM) can be misdiagnosed or overdiagnosed, which can lead to needless obstetric intervention and poor care, both of which increase the risk of life-threatening complications for the mother and baby.1

During the speculum examination, the fluid buildup in the posterior fornix and the clear amniotic fluid flow are used to first identify the PROM. When the pH indicator paper changes from yellow to blue, indicating that the amniotic fluid has a basic pH, PROM can also be identified with this test. A Fern test, which shows the minute palm-leaf pattern in the dried amniotic fluid, is also used to identify PROM. These three conventional approaches of evaluating the PROM, however, come with a number of shortcomings, downsides, and shortcomings.2

Foetal membranes are impermeable in the early stages of pregnancy. The danger of membrane rupture increases as the pregnancy gets closer to term because the membranes weaken and lose some of their collagen composition. In addition, different foetal movements throughout the latter stages of pregnancy heighten uterine tension and contraction, which helps facilitate the rupture of the membranes at term. About 2-4% of preterm pregnancies and roughly 10% of all term pregnancies have PROM, which can result in premature births and infection in the afflicted females.3.

The reliability of the patient histories provided in PROM ranges from 10% to 50%, and the speculum evaluation of fluid leaking from the cervix area is linked to false negative outcomes in around 12% to 30% of cases. The presence of any antiseptic agent, vaginitis, cervicitis, blood, semen, meconium, or urine in the cervicovaginal discharge is also linked to significant false positive rates for the Nitrazine test. These components are also alkaline, which might further impede accurate findings. False positive and false negative findings are also linked to the Fern test for measuring PROM. Since amniotic fluid assessment during an ultrasound examination cannot distinguish PROM from other potential causes of a reduction in liquor, the results may be deceptive.4

There are risks linked with many invasive diagnostics, such as intra-amniotic dye injections, for both mothers and foetuses. The Amnisure ROM test is a quick, simple, minimally invasive test with good specificity and sensitivity that may also be used to evaluate PROM. Amnisure is a costly test, though, and is not offered in many Indian centres. Recent research from the literature has supported the measurement of creatinine, urea, and beta-hCG in the cervicovaginal fluid. Since the foetus begins excreting urine in the amniotic fluid between weeks eight and eleven of gestation, foetal urine makes up the majority of the amniotic fluid in the second half of pregnancy. This excretion serves as the foundation for the use of creatinine and urea in the diagnosis of premature labour and delivery (PROM).

Only syncytiotrophoblasts release beta hCG, which is detected in amniotic fluid, mother's blood, and urine. The mother's blood is also examined for assessment.5. In order to detect PROM (premature rupture of membranes), the current study set out to map the amounts of creatinine, urea, and beta-human growth hormone in vaginal secretions.

MATERIALS AND METHODS

In order to detect premature rupture of the membranes (PROM), the current cross-sectional observational clinical comparison study set out to map the levels of creatinine, urea, and beta-human growth hormone in vaginal fluids. The study was conducted after approval from the relevant institutional ethical committee. The research participants came from the Institute's Department of Obstetrics and Gynaecology. Prior to their involvement in the study, all participants provided their written and verbal informed permission.

120 females total were enrolled in the study, and they were split into two groups of 60 subjects each. Group I comprised pregnant women between the ages of 28 and 40 weeks who had previously leaked vaginally without experiencing labour pain, as well as subjects who had been diagnosed with premature rupture of membranes, or PROM. Group II patients, who were pregnant women without PROM and with a gestational age of 28 to 40 weeks, served as the controls.

The study's inclusion criteria were women who were willing to participate, had a single intrauterine pregnancy, and were between the ages of 28 and 40 weeks as determined by credible LMP (last menstrual period) and ultrasound-confirmed dates.

Subjects with congenital malformations, irregular uterine contractions, intrauterine death, insulin-dependent diabetes mellitus or nephropathy, blood in vaginal discharge, placenta praevia, multiple pregnancies, and refusal to consent to study participation were among the exclusion criteria for this research. Following the final individuals' participation in the research, a thorough history was obtained, and each study participant underwent a thorough general and abdominal examination as well as a sterile speculum examination to confirm the flow of amniotic fluid from the cervix. Deeply into the vagina, a cotton applicator tip was inserted, and the collected fluid was then transferred to the pH paper.

When the pH paper changed from yellow to blue, it was determined that the research participants' cervixes had leaked amniotic fluid. A positive fluid leak on a sterile speculum examination and pH paper test led to the clinical diagnosis of PROM in 60 pregnant female participants from Group I who had complained of vaginal leaks. Sixty expectant women who had negative vaginal leakage, age and gestational age matched, negative fluid discharge on sterile speculum evaluation, and no change in pH paper test results were included in Group II.

Using the transabdominal sonography examination, a thorough evaluation of the participants' foetal viability, amniotic fluid index, and gestational age was completed. After injecting 5 ml of sterile saline solution into the posterior vaginal fornix, 3 ml of the vaginal aspirate was extracted using the same syringe. The sample process was carried out six hours after the membrane rupture, but before any medication was given or the vagina was examined. The laboratory received the collected samples and used the electro chemiluminescence test to measure the amounts of β-hCG, urea, and creatinine.

The enzymatic urease technique was used to measure urea levels, whereas Jaffe's method was used to measure creatinine levels. Numerous factors, including demographic information, obstetric features, ultrasonographic findings of AFI, β-hCG, urea, and creatinine levels, pH test results, and sterile speculum examination results, were assessed using a prefabricated, organised, pretested proforma. The collected data were statistically analysed using the unpaired t-test and the chi-square test, using IBM Corp.'s SPSS software version 21.0 (Armonk, NY, USA). The statistics were presented as percentage, frequency, mean, and standard deviation. An acceptable p-value for statistical significance was <0.05.

RESULTS

In order to detect premature rupture of the membranes (PROM), the current cross-sectional observational clinical comparison study set out to map the levels of creatinine, urea, and beta-human growth hormone in vaginal fluids. The study comprised 120 female participants who were split into two groups of 60 subjects each. Group I consisted of pregnant women between the ages of 28 and 40 weeks who had previously leaked vaginally without experiencing labour pain, and the participants had a clinical diagnosis of premature rupture of membranes (PROM).

Group II patients, who were pregnant women without PROM and with a gestational age of 28 to 40 weeks, served as the controls. Regarding the study subjects' demographics, their mean age was 26.30±2.98 years for Group II and 29.90±3.37 years for Group I. The bulk of research participants, including 64% of Group I individuals and 51% of Group II subjects, were between the ages of 36 and 39. Furthermore, the bulk of participants in both groups were primigravida, indicating that there was no statistically significant difference between the two groups' initial demographic data.

Regarding β-hCG levels in the two study groups, it was observed that β-hCG levels were 6.25±7.19 µ/L in Group II participants without premature rupture of membranes and 282.11±541.05 µ/L in Group I subjects with PROM. Table 1 illustrates that the levels in participants with PROM compared to controls were very statistically significant ($p=0.001$).

When urea levels in the two study groups were compared, it was found that subjects from Group I who had premature membrane rupture had significantly higher urea levels (1078±12.74 IU/L) than subjects from Group II (controls) who did not have premature membrane rupture and had a p-value of 0.001, as shown in Table 2. The findings of the study indicated that the vaginal fluid of the study individuals from group I (PROM subjects) had

greater levels of creatinine (0.68±0.74 mg/dl) than those of group II (control) subjects (0.23/0.27 mg/dl) who did not have the PROM. Table 3 summarises the statistical significance of the difference between the two groups (p=0.001).

As demonstrated in Table 4, it was also observed that when the amniotic fluid index (AFI) of the two study groups was compared, the amniotic fluid index (AFI) of Group I subjects who had premature membrane rupture was significantly lower, at 06.67±2.09, than that of Group II (control) subjects who had no premature membrane rupture, with p=0.001.

For creatinine in vaginal fluid, the sensitivity, specificity, and cut-off values were 86.65%, 48.1%, and >0.08, respectively. For urea in vaginal fluid, these values were 63.31%, 98.1%, and >3.4 IU/L. For β-hCG in vaginal secretions, the corresponding cut-off values were >9 mg/dl, 83.1%, and 95%, respectively.

DISCUSSION

In the current study, 120 females were evaluated and split into two groups of 60 subjects each. Group I consisted of pregnant women between the ages of 28 and 40 weeks who had previously leaked vaginally without experiencing labour pain, as well as subjects who had been diagnosed with premature rupture of membranes, or PROM.

Pregnant women without prostatic hypertension in the 28–40 week gestational age range made up Group II individuals, which served as controls. Regarding the study subjects' demographics, their mean age was 26.30±2.98 years for Group II and 29.90±3.37 years for Group I. The bulk of research participants, including 64% of Group I individuals and 51% of Group II subjects, were between the ages of 36 and 39. Furthermore, the bulk of participants in both groups were primigravida, indicating that there was no statistically significant difference between the two groups' initial demographic data. These findings were in line with research conducted in 2011 by Knapik D et al. and in 2014 by Palacio M et al., in which the authors evaluated participants using demographic information similar to that of the current study.

After β-hCG levels in the two study groups were evaluated, it was found that β-hCG levels in Group I participants with PROM were 282.11±541.05 µ/L, whereas β-hCG levels in Group II subjects without premature rupture of membranes were 6.25±7.19 µ/L. When comparing the levels between people with PROM and controls, there was a significant statistical difference (p=0.001). The present study's results aligned with the research conducted by Borg HM et al. (8 in 2019) and Bouzari Z et al. (9 in 2018), which found that participants with premature rupture of membranes had considerably higher levels of β-hCG.

When the urea levels in the two study groups were compared, it was found that subjects from Group I who had premature membrane rupture had significantly higher urea levels (1078±12.74 IU/L) than subjects from Group II (controls) who did not have premature membrane rupture (1.09±0.95 IU/L) with a p-value of 0.001. These results corroborated those of Ghasemi M et al. (2016) and Kuruoglu YS et al. (2019), who found that females with PROM had higher urea levels.

When the creatinine levels in the study individuals' vaginal fluid were analysed, the results showed that Group I (PROM subjects) had greater levels at 0.68±0.74 mg/dl than Group II (control) subjects without the PROM, who had lower levels at 0.23±0.27 mg/dl. With p=0.001, there was a statistically significant difference between the two groups. These findings were consistent with studies published in 2019 by Garg R et al. (12) and El-Garhy IT et al. (13), which found that individuals with PROM had noticeably higher creatinine levels than females without PROM.

When the amniotic fluid index (AFI) of the two study groups was compared, it was found that Group I subjects with premature membrane rupture had a significantly lower AFI (06.67±2.09) than Group II (control) subjects with no premature membrane rupture (10.12±3.00), with a p-value of 0.001. For creatinine in vaginal fluid, the sensitivity, specificity, and cut-off values were 86.65%, 48.1%, and >0.08, respectively. For urea in vaginal fluid, these values were 63.31%, 98.1%, and >3.4 IU/L. β-hCG in vaginal fluids had sensitivity, specificity, and cut-off values of 95%, 83.1%, and >9 mg/dl, respectively.

. These findings aligned with earlier research by Jain S et al. (2020) and Neil PR et al. (2010), where the current study's results were similar in terms of sensitivity, specificity, cut-off values, and AFI.

CONCLUSION

Considering its limitations, the present study concludes that detecting creatinine, urea, and β-hCG in vaginal fluid for diagnosis of PROM is a rapid, reliable, and simple method. Hence, it should be introduced into routine examination even at centers with low resources functioning at community levels as it can be proved as a cost-effective, practical, and feasible test. However, future longitudinal studies are needed for further exploration of the issue.

REFERENCES

1. Bahasadri S, Kashanian M, Khalili S. Evaluation of vaginal fluid β-human chorionic gonadotrophin for the diagnosis of preterm premature rupture of membranes. Obstet Gynecol. 2013;39:777-82.
2. Manuck TA, Maclean CC, Silver RM, Varner MW. Preterm premature rupture of membranes: does the duration of latency influence perinatal outcomes? Am J Obstet Gynecol. 2009;201:414-e1.
3. Mackeen AD, Seibel-Seamon J, Muhammad J, Baxter JK, et al. Tocolytics for preterm premature rupture of membranes. Cochrane database Syst Rev. 2014; 2CD007062.
4. Tamer F, Fouad MS, Mohammed IN. Evaluation of vaginal fluid β-Hcg for the diagnosis of premature rupture of membranes. WJPR. 2017;6:1716-23.
5. Begum J, Samal SK, Ghose S, Niranjan G. Vaginal fluid urea and creatinine in the diagnosis of premature rupture of membranes in resource-limited community settings. JFRH. 201;11:43.
6. Knapik D, Olejek A. Analysis of cervicovaginal fluid in the diagnosis of premature rupture of membranes. Ginekol Pol. 2011;82:1.
7. Palacio M, Kühnert M, Berger R, Larios CL, Marcellin L. Meta-analysis of studies on biochemical marker tests for the diagnosis of premature rupture of membranes: comparison of performance indexes.Bmc Pregnancy Child. 2014;14:183.
8. Borg HM, Omar M, Suliman GA. The Study of Vaginal Fluid Urea, Creatinine, B-HCG, and Placental Alpha-1 Microglobulin in Diagnosis of Premature Rupture of Membranes. OJOG. 2019;9:811.
9. Bouzari Z, Shah Hosseini R, Mohammadnetaj M, Barat S, Yazdani S, Hajian-Tilaki K. Vaginal discharge concentrations of β-human chorionic gonadotropin, creatinine, and urea for the diagnosis of premature rupture of membranes. Int J Gynecol Obstet. 2018;141:97-101.
10. Ghasemi M, Jaami R, Alleyassin A, Ansarimoghaddam A. The value of urea, creatinine, prolactin, and beta subunit of human chorionic gonadotropin of vaginal fluid in the diagnosis of premature preterm rupture of membranes in pregnancy. Turk J Obstet Gynecol. 2016;13:62.
11. Kuruoglu YS, Bildricin FD, Karli P , Özdemira AZ. Use of vaginal creatinine levels in detecting premature rupture of membranes. JOSAM. 2019;3:427-21.
12. Garg R, Nigam A. Novel markers for the diagnosis of premature rupture of the membrane in pregnancy: urea, creatinine, and prolactin of vaginal fluid. International Journal of Clinical Obstetrics and Gynaecology. 2019;3:27-30.
13. El-Garhy IT, Sabry NM, Abdel-Gahfar MA, Ahmed AA. Detection of Creatinine in Vaginal Fluid for Diagnosis of Preterm Premature Rupture of Membranes. The Egypt J Hosp Med. 201;75:2894-9.
14. Jain S, Jaiswar SP, Singh N, et al. Beta-HCG Concentration in Vaginal Fluid: Used as a Diagnostic Biochemical Marker for Preterm Premature Rupture of Membrane in Suspected Cases and Its Correlation with Onset of Labour. J Obstet Gynecol India. 2020;70:283-88.
15. Neil PR, Wallace EM. Is Amnisure® useful in the management of women with prelabour rupture of the membranes? Aust Nz J Obstet Gyn. 2010;50:534-8.

TABLES

S. No	Groups	β-hCG levels (Mean ± S. D)	p-value
1.	**PROM (I)**	282.11±541.05	**0.001**
2.	**Controls (II)**	6.25±7.19	

Table 1: Comparison of β-hCG levels in the two groups of study subjects

S. No	Groups	Urea levels (Mean ± S. D)	p-value
1.	PROM (I)	10.78±12.74	0.001
2.	Controls (II)	1.09±0.95	

Table 2: Comparison of urea levels in the two groups of study subjects

S. No	Groups	Creatinine levels (Mean ± S. D)	p-value
1.	PROM (I)	0.68±0.74	0.001
2.	Controls (II)	0.23±0.27	

Table 3: Comparison of creatinine levels in the two groups of study subjects

S. No	Groups	AFI (Mean ± S. D)	p-value
1.	PROM (I)	06.67±2.09	0.001
2.	Controls (II)	10.12±3.00	

Table 4: Comparison of AFI (amniotic fluid index) in the two groups of study subjects