

The Incidence Rate of Premature Rupture of Membranes (Prom)

Among Anemic and Non-Anemic Pregnant Women

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Abstract:

Introduction: Anemia and Premature rupture of the membrane are common conditions encountered in pregnancy, which have been known to impact each other to variable extents.

Aim of the study: To determine the incidence rate of premature rupture of membranes (PROM) in anemic and non-anemic pregnant women.

Subjects and Methods: This was a prospective cohort study carried out on 134 singleton pregnant women (67 singleton Anemic pregnant women and 57 singleton Non-Anemic pregnant women), Attending the Gynecology and Obstetrics department at Fayoum University and Sennuris Hospitals, Complete blood picture test (CBC) was evaluated in all the pregnant women and confirmatory tests (nitrazine and ferning tests) were evaluated in PROM cases. All the information regarding previous PROM and relevant pregnancy complications was determined in both groups and analyzed by statistical methods.

Results: Pregnant women with Anemia were at risk of Premature rupture of membranes three times greater than Non-Anemic pregnant.

Conclusions: The risk of Premature rupture of the membrane is higher in pregnant anemic women than the pregnant non-Anemic women. Therefore, women should be encouraged to begin antenatal care early after conception to allow adequate time for restoring iron stores.

Keywords: Anemia; Premature Rupture of Membranes; Pregnancy.

1. Introduction

Globally, anemia during pregnancy is a prevalent condition. Anemia is defined by the Centers for Disease Control and Prevention as hemoglobin levels below 11g/dl during the first trimester and below 10.5g/dl during the 2nd and 3rd trimesters.

2. Subjects and Methods

2.1. Subjects

This is a prospective cohort research that involved 134 pregnant women who attended and enrolled on the Department of Obstetrics and Gynecology at Fayoum University and Sennuris Central Hospitals, after obtaining the approval of the Scientific Research Ethics Committee of the Faculty of Medicine, Fayoum University.

2.2. Sample size

The sample size was calculated by (G power version 3.1.9.4). A minimum sample size of 61 patients per group was required to achieve a power level of 0.90, an alpha level of 0.05, and a 29 % difference in the incidence of PROM between the two groups (64% for anemic pregnant and 35% for non-anemic). To account for the loss to follow-up, the calculated sample size for

Premature rupture of membranes is defined as the splitting of the fetal membranes before the arrival of labor.

PROM and anemia are conditions that have the propensity to increase throughout the labor phase.

each group was increased by 10 %, reaching 67%.

According to this calculation, the study included two matched groups:

- Group (A): 67 Anemic pregnant women.
- Group (B): 67 Non-Anemic pregnant women matched in age and gestational age to women in the group (A).

Inclusion criteria

- The age of patients from 20 years old to 35 years old.
- Singleton, viable pregnancy.
- Pregnant women with gestational age (28-37 weeks).

Exclusion criteria

- Other predisposing factors for PROM
- Massive vaginal bleeding.

2.3. Methods

Evaluation of the study group for data collection was conducted by:

Full history taking

Measurements

Anemia was diagnosed by performing (CBC) for all patients.

Clinical examination

The diagnosis of PPROM was validated by observing amniotic fluid pooling in the vagina after passing through the cervical canal.

2.4. Study outcomes

The outcomes of the current study were a comparison between the incidence of PROM and its association with anemia. Stillbirth and its association with PROM were assessed as secondary outcomes.

2.5. Statistical analysis

Statistical Package for the Social Sciences (SPSS) 22.0 (IBM, Armonk, NY, United States) was utilized for the statistical analysis. Continuous data were presented as ±SD. Independent t-test means was inferential performed as statistics. Categorical variables were expressed in numbers and percentages. The chi-square test was applied as a test of significance. To estimate the risk of PROM about anemic status during pregnancy, the Modified regression Poisson analysis (Poisson regression with a robust estimator to decrease the standard error) was performed. Variables that were found to be associated with PROM at $P \le 0.20$ were entered into a Multiple Poisson regression model. Relative risk (RR) and adjusted RR and their 95% confidence intervals (CIs) were estimated. A two-sided P < 0.05 was statistically significant.

3. Results

This study included 67 anemic pregnant women and 67 non-anemic pregnant females. There was a statistically insignificant difference between the two cohorts regarding age (p = 0.580), gravidity (p = 0.885), parity (p = 0.719) and gestational age (p = 0.400). History of previous PROM was reported similarly in the anemic pregnant cohort and non-anemic pregnant cohort (20.9% vs. 19.4%), p = 0.829 (**Table 1**).

Variables		Anemic (N=67)	Non-anemic (N=67)	P-value	
Age		29.3 ±4.5	29.7 ±3.5	0.580	
Gravidity		3.5 ±1.3	3.5 ±1.1	0.885	
Parity		2.4 ± 1.3	2.4 ±1.1	0.719	
Gestational a	ge	34.2 ± 1.7	33.9 ±2	0.400	
History of previous	Negative	53 (79.1%)	54 (80.6%)	0.820	
PROM	Positive	14 (20.9%)	13 (19.4%)	0.829	

Table 1: Basic characteristics of the study population.

Although the prevalence of stillbirth was increased in anemic pregnant females (9.0%) than in non-pregnant females (6.0%), it was statistically insignificant, p=0.514, as presented in **Table 2**.

 Table 2: Pregnancy outcomes.

Variables		Anemic (N=67)	Non-anemic (N=67)	RR (95% CI)	P-value	
Pregnan		Live baby	53 (79.1%)	54 (80.6%)	1.500	0.514
	gnancy	Stillbirth	14 (20.9%)	13 (19.4%)	(0.443-5.076)	0.514

RR: Relative risk, CI: Confidence interval.

After adjustment of other variables, pregnant females with anemia were at risk of PROM about three times greater than non-anemic pregnant (RR = 2.832, 95% CI = 1.588-5.049, p <0.001). As well as, increasing gestational age was related to an increased risk of PROM (RR = 1.309, 95% CI = 1.084-1.581, p < 0.001), as shown in **Table 3** and **Figure 1**.

Variables	P-value	DD	95% CI	
v ariables		ann	Lower	Upper
(Intercept)	0.001	0.000	0.000	0.012
Anemic pregnant mothers	< 0.001*	2.832	1.588	5.049
History of PROM	0.216	1.362	0.835	2.223
Age	0.655	0.985	0.923	1.052
Parity	0.542	1.076	0.851	1.360
Gestational age	0.005*	1.309	1.084	1.581

Table 3: Multiple Modified Poisson regression analysis to predict PROM incidence.

aRR: adjusted Relative risk, CI: Confidence interval, *Significant.



Figure 1: Adjusted relative risks of different predictors for PROM.

After adjustment of other variables, among pregnant women with anemia, increasing parity was related to an increased risk of PROM (RR = 1.224, 95% CI = 1.013-1.480, p = 0.037). In addition, increasing HG was related to a decreased risk of PROM (RR = 0.604, 95% CI = 0.422-0.864, p =0.006) (**Table 4** and **Figure 2**).

Variables	P-value	aRR	95% CI	
v un un res	1 - <i>F</i> utuc	uitt	Lower	Upper
(Intercept)	0.942	0.765	0.001	1081.143
History of PROM	0.469	1.203	0.729	1.985
Age	0.725	0.991	0.939	1.044
Parity	0.037*	1.224	1.013	1.480
Gestational age	0.206	1.122	0.938	1.342
HG	0.006*	0.604	0.422	0.864
RBCs count	0.496	0.805	0.432	1.502
Hematocrit	0.697	1.017	0.934	1.107

Table 4: Multiple Modified Poisson regression analysis to predict PROM incidence among a pregnant anemic cohort.

aRR: adjusted Relative risk, CI: Confidence interval, *Significant.



Figure 2: Adjusted relative risks of different predictors for PROM in the pregnant cohort.

4. Discussion

Fanni and Adriani (2017) showed that the largest distribution was the sample gestational age group at the age of 38-42 weeks (68.33%) [1]. The majority of pregnant women deliver their babies at term or during the third trimester. Dewanti and Hidayat (2023) stated that anemia was observed in all 75 research samples of pregnant women, as indicated by a hemoglobin level below 11 g/dL [2]. Anemia is more prevalent among pregnant women because of the higher physiological demands that occur during pregnancy. Dewanti and Hidayat (2023) found that 21 pregnant women aged 15 to 25 had preterm rupture of membranes and were the most anemic (55.3 %) [2]. This study was substantiated by research conducted by Demiarti (2017), which reported that PROM manifests in pregnant women who are below the age of 20 and older than 35 years [3].

In our study, the incidence of PROM was increased in anemic pregnant (49.3%) than in non-anemic pregnant mothers (16.4%). Pregnant females with anemia had a threefold increased chance of developing PROM compared to those without anemia. PROM affects approximately 59% of anemic pregnant females. In a study by Setyaningsih (2019), Premature rupture of membranes occurred in 178 samples (44.9 %) from 396 women who delivered infants [4]. Fujiyarti et al. (2015) supported that a significant percentage of the population of mothers who have given birth have encountered preterm rupture of membranes [5]. Furthermore, it was revealed in a study done by Chu et al. (2020) that 32,234 pregnant females reported that anemia increased the incidence of early rupture of membranes in pregnant women [6].

After adjustment of other variables. In our study, the incidence of PROM was increased in anemic pregnant (49.3%) than in non-anemic pregnant mothers (16.4%). Pregnant mothers with anemia were at risk of PROM three times greater than non-anemic pregnant. Also, an increased risk of PROM was observed with advancing gestational age.

Pratiwi et al. (2018) conducted to assessment of the incidence of anemia among postpartum females who experienced early rupture of membranes vs those who did not have such complications [7]. They found that Age, maternal activity, and anemia status were identified as risk variables. According to a multivariate conditional logistic regression analysis, the risk of PROM for pregnant women with anemia is 3.59 times that of non-anemic moms.

Dewanti and Hidayat (2023) found that Among pregnant females who are anemic, preterm rupture of membranes is more prevalent than among those who have not encountered this condition [2].

The limitation of the current research is that was conducted at two obstetric centers, future studies that include multiple center are needed.

The strength of the study to our known that this is the first study carried out at the

obstetric clinic at Fayoum University Hospital designed to evaluate the incidence rate of PROM among anemic and non-anemic pregnant females.

Conclusion and Recommendations

Maternal anemia may be associated with an increased risk of PROM, according to the findings of this study, and an evaluation of connections with PROM may provide intriguing insights into underlying biological causes. We

Acknowledgement: I would like to express my deepest appreciation to my committee. I'm extremely grateful to my professors who would not have been possible without their support and nurturing of them. concluded that Pregnant anemic females had a greater chance of developing PROM than pregnant non-anemic females. The outcomes of this study's findings extend beyond the prevention and treatment of the condition to community awareness and maternal health.

Also, Anemia prevalence and predisposing risk factors for anemia identified at the time of delivery require further investigation.

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Conflicts of Interest: All authors declare they have no conflicts of interest.

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