Original Article

"Prevelance Of Preterm Premature Rupture Of Membrane And Its Associated Factors Among The Pregnant Women In The Selected Tertiary Carehospital, Bhubaneswar, Odisha"

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Abstract

BACKGROUND
Preterm premature rupture of the membranes (PPROM) is the spontaneous rupture of the fetal membranes and amniotic fluid loss prior to the onset of labour in a pregnancy earlier to 37 weeks of gestation, described as painless flow of fluid which escape from vagina in the absence of consistent painful uterine contraction. Spontaneous rupture of membranes is a normal component of labor and delivery.

Method:-
A descriptive clinical study was done among 446 pregnant mothers in between 28-37 weeks of gestation from the Department of Obstetrics and Gynecology ward, OPD and Labor room at Pradyumna Bal Memorial Hospital KIMS, Bhubaneswar, Odisha. Consecutive sampling technique was used to select the samples. A self-structured questionnaire on Preterm Premature Membrane Rupture was employed, and data were obtained via the Interview technique.

Results:
After screening among 446 mothers, 6 mothers were having PPROM and there was a 100% response rate. The combined prevalence of premature membrane rupture among pregnant women at PBMH, KIMS, Bhubaneswar, Odisha was **1.34%.**Factors related with premature membrane rupture were identified like Obstetrical variables and risk factors as evidenced by- Accidental fall (P = 0.01), Lifting of heavy objects (P= 0.01), Urinary tract infection (P=0.01),Anemia (P= 0.02), Type of vaginal discharge (P=0.04) and Abnormal vaginal discharge (P =0.02) ,gestational weeks (P=0.02), amniotic fluid index as per USG (P= 0.02),color of amniotic fluid (P= 0.01), sign of true labor pain (P=0.01), presentation (P= 0.01) and gestational diabetes mellitus (P= 0.01).

Conclusion:-PPROM is a significant obstetric problem. The prevalence rate of preterm premature rupture of membrane was **1.34%** which is less in comparison to the National prevalence i.e. 3-4% as per WHO. PPROM is one of the leading causes of premature birth and can increase both maternal and perinatal morbidity and mortality. As a result, extensive prenatal monitoring is required during antenatal care as well as early screening, diagnosis, and therapy to decrease the PPROM.

Key words: Prevalence, Preterm premature rupture of membrane, presentation, gestational weeks, amniotic fluid

INTRODUCTION:-

Pregnancy is the joyous moment in women life. Being pregnant means every day is another life of mother's own. During pregnancy there is progressive anatomical, physiological and biochemical changes not only to genital system but also to all system of the body. When an expectant mother is exhausted, elevated level of cortisol can lead to premature labor, premature rupture of membrane and more instances of tripping and falling.

Premature membrane rupture (PROM) is a significant public health concern, especially in low and middle-income nations where maternal and neonatal morbidity and mortality are higher. In-spite of its significant contribution to fetal-maternal problems, the impact of premature membrane rupture has not been thoroughly investigated in Ethiopia in accordance with the 2021 status. As a result, the purpose of this study was to evaluate the prevalence of preterm rupture of membrane and its related variables in pregnant women in Ethiopia. Premature membrane rupture was observed in 9.2% of pregnant women in Ethiopia. No antenatal care visit, a history of premature rupture of the membrane, a history of abortion, abnormal vaginal discharge, and urinary tract infection were all associated with premature rupture of the membrane.

Preterm premature rupture of the membranes (PPROM) is the spontaneous rupture of the fetal membranes and amniotic fluid loss prior to the onset of labour in a pregnancy earlier to 37 weeks of gestation, described as painless flow of fluid which escape from vagina in the absence of consistent painful uterine contraction. Spontaneous rupture of membranes is a normal component of labor and delivery.

Premature birth is one of the top three causes of infant mortality globally[1]and PROM is accountable for more than 40% of premature births [2]as well as 18%-20% and 21.4% of perinatal mortalities and morbidity, respectively [3,4].It is a major cause of perinatal, neonatal, and maternal morbidity and mortality in both high- and low-income countries [5].

PPROM is the most common cause of preterm birth, complicating 3-8% of pregnancies and accountingapproximately90% of newborn mortality and one-third of all preterm births. It also raises the probability of preterm and other perinatal and neonatal complications such as newborn sepsis, umbilical cord prolapse, intraventricular hemorrhage, respiratory distress syndrome, and so on, which increases the risk of fetal death by 1-2% [6].PPROM causes serious maternal problems involving puerperal infections, disseminated intravascular coagulopathy, placental abruption, surgical delivery, chorio-amnionitis, psychological disorders, lactation problems, maternal sepsis, delayed menstruation, and so on [7].The percentage of PPROM varies by country and population. It affects 3-4.5% of all pregnancies in the world.

According to the World Health Organization, According to the 2012 World Action Plan for Premature Births, India ranks top among the 10 nations accountable for 60% of premature births.

According to the India New Born Action Plan, Prematurity is accountable for 35% of all newborn fatalities in India. [8].

METHODOLOGY

STUDY DESIGN AND SETTING

A health-care facility-based descriptive study was conducted to investigate the prevalence rate of preterm premature membrane of rupture and its related varibles among the women who were pregnant &who agreed to participate in the research & the study was conducted in Obstetrics and Gynaecology ward, OPD and Labour room of KIMS, PBMH in Bhubaneswar, Odisha. Pregnant mothers with complicated high risk (like GDM, pre-eclampsia, Eclampsia and so on) and all incidences of Artificial Rupture of fetal membranes were omitted from the investigation.

SAMPLE SIZE & SAMPLING TECHNIQUE

All the mothers who came to Obstetrics and Gynaecology ward, OPD and Labour room were screened for the prevalence of PPROM. After Identification of PPROM cases, the screened mothers 446 between 28-37 weeks of gestation were Interviewed by using a Self-structured questionnaire.

The samples were drawn from the population using a process known as Consecutive sampling technique.

DATA COLLECTION TOOLS AND TECHNIQUE

A self-structured questionnaire with three questions was used to collect data. These are (a) Socio-demographic variables, (b) Obstetrical variables and (c)Questionnaire on associated risk factors of Preterm Premature Rupture of membrane. Each section contains multiple-choice questions.

Study Variables:-

The quantities, qualities, properties or characteristics of people, things or situations that change or vary

In this study the variables were classified into:-

- Dependent variables –

Preterm premature rupture of membrane.

- **Demographic Variables**:- Age, educational status, occupational status, habit, mode of admission.
- **Obstetric Variables**:-Parity, gestational weeks, previous history of preterm birth, type of pregnancy, sign of true labor pain, previous history of PROM, presentation, Gestational Diabetes mellitus.
- **Observational Variables**:- Amniotic fluid Index, colour of amniotic fluid

DATA ANALYSIS

For data analysis, IBM SPSS Version 20 software was utilized. Descriptive statistics was used to determine the frequency and percentage distribution of socio-demographic variables, Obstetrical variables and the associated risk factors contributing to PPROM. Inferential statistics was used to determine the association and relationship of the variables.The Fisher's Exact test was used to establish the relationship between Prevalence of PPROM with selected Demographic Variables, Obstetrical Variables and with the associated risk factors contributing to PPROM. Fisher's Exact test P value was used to evaluate the level of significance.

ETHICAL CONSIDERATION

This study was ethically approved by Institutional ethical committee KIMS/KIIT/IEC/897/2022, Kalinga Institute of Medical Sciences (KIMS), PBMH on 22/04/2022 after commencement of required enquiry and discussions at its board meeting. Approval was obtained from selected hospital authorities for conduction of study in that selected health institutions. Informed consent was received from mothers prior to collection of the data. Confidentiality and anonymity was maintained in recording and storage of data throughout the study.

RESULT

1. **Socio-demographic variables of the respondents:-**

This study included a total of 446 study participants with a 100% response rate. Of these participants, majority of the participants in the study 145 (32.5%) were in the age between 26 – 30 years. Participants who were in the age

between 36-40 years were 71 (15.9 %).Educational status of the participants in this study depict, that majority 163 (36.5 %) were with secondary education. Others were 72 (16.1 %). Occupational status of the study participants were distributed as follows, majority of the participants 236 (52.9 %) were home makers and others were 38 (8.5%). According to the habits, all the participants 139 (100.0 %) in the study had no habits such as smoking and alcohol. Mode of admission, majority of the participants 255 (57.1 %) were admitted directly and others 191 (42.8%) were admitted through referral admission (**Table-1**).

Table-1: frequency and percentage distribution of participants according to socio-demographic variables(n = 446)

S. No	Socio- Demographic variables		Frequency	Percentage
1	**Age (in years)**	21 – 25	112	25.1
		26 – 30	145	32.5
		31 – 35	118	26.4
		36 – 40	71	15.9
2	**Educational status**	Primary education	100	22.4
		Secondary education	163	36.5
		Graduate	111	24.8
		Others	72	16.1
3	**Occupational status**	Govt. employee	47	10.5
		Private employee	125	28.0
		Homemaker	236	52.9
		Others	38	8.5
4	**Habit**	Smoking	0	0
		Alcohol	0	0
		None	0	0
		Others	446	100
5	**Mode of admission**	Direct	255	57.1
		Referral	191	42.8

2. Obstetrical variables of the respondents:-

Parity of the participants shows that, majority of the participants 220 (49.3 %) were primi parity. Grand multi parity participants were 85 (19.0 %).Gestational weeks of the study participant's reveals, that majority 261 (58.5%) had 29 – 33 weeks of gestation. Others in the study 185 (41.4%) were in the gestational weeks of 34 – 36 weeks. Previous history of pre-term birth majority 297 (66.5 %) had no history of pre-term baby. Others in the study 149 (33.4%) had pre-term birth.Type of pregnancy, among the study participants depict that majority 349 (78.2 %) had singleton pregnancy and others in the study 97 (21.7 %) had multiple pregnancy. With regard to the amniotic fluid index as per USG in cm reveals, that majority 326 (73.0 %) had more and others who had less amniotic fluid were 120 (26.9 %). Color of the amniotic fluid of the study participants depict that majority 404 (90.5 %) had colorless. Slight red and dark green color amniotic fluid were present among 12 (2.6%) of the participants. Previous history of PROM depict, that majority of the participants 414 (92.8%) were with no PROM. Participants in the study who had PROM were 32 (7.17%).Presentation of the participants in the study depict, that majority 395 (88.5 %) had cephalic and others in the study who had shoulder presentations were 4 (0.8 %). Gestational diabetes among study participants, majority 398 (89.2%) were had no gestational diabetes mellitus. 48 (10.7%) mothers had gestational diabetes mellitus **(Table-2).**

Table-2: Frequency and percentage distribution of participants according to obstetric variables(n = 446)

S.No	Obstetrical variables	Frequency	Percentage

1	**Parity**	Primi	220	49.3
		Multi	141	31.6
		Grand multi	85	19.0
2	**Gestational weeks**	29–33 weeks	261	58.5
		34–36 weeks	185	41.4
3	**Previous history of preterm birth**	Yes	149	33.4
		No	297	66.5
4	**Type of pregnancy**	Singleton	349	78.2
		Multiple	97	21.7
5	**Amniotic Fluid Index as per USG (in cm)**	More	326	73.0
		Less	120	26.9
6	**Colour of amniotic fluid**	Colourless	404	90.5
		Slight red	12	2.6
		Bright yellow	18	4.0
		Dark green	12	2.6
7	**Sign of true Labour pain**	**Not Applicable**		
8	**Previous history of PROM**	Yes	32	7.17
		No	414	92.8
9	**Presentation**	Cephalic	395	88.5
		Breech	47	10.5
		Shoulder	4	0.8
10	**Gestational Diabetes mellitus**	Present	48	10.7
		Absent	398	89.2

3. Find out the associated risk factors contributing to PPROM of the respondents:-

The participants in this study 2 (33.3%) had no any history of accident fall. Others in the study 4 (66.6%) had accident fall. Lifting of heavy object as the factor for causing PPROM was seen among 5 (83.3 %).Participants who had no PPROM due to lifting heavy object was 1 (16.6 %). Participants who had urinary tract infection as the factor for causing PPROM reveals that 3 (0.67 %) had no UTI. Participants who were with UTI was seen among 3 (50 %). Anemia was seen among 3 (50 %) of the participants and the participants who had no anemia 3 (50 %). Type of vaginal discharge were reveals that 5 (83.3 %) of participants had clear vaginal discharge and the participants who had not clear vaginal discharge 1 (16.6 %). Participants who had white vaginal discharge were 3 (50%) and who had yellow color discharge were 3 (50%) (**Table-3).**

Table-3: Find out the risk factors contributing to preterm premature rupture of membrane among pregnant women (n= 6)

Associated Risk factors		Frequency	%
Accidental fall	**Yes**	4	66.6
	No	2	33.3
Lifting of heavy object	**Yes**	5	83.3
	No	1	16.6
Urinary tract infection	**Yes**	3	50
	No	3	50
Anaemia	**Yes**	3	50
	No	3	50
Types of vaginal discharge	**Clear**	5	83.3
	Not clear	1	16.6
Abnormal vaginal discharge	**White**	3	50
	Yellow	3	50
	Brown	0	0
	No abnormal discharge	0	0

4. The prevalence rate of PPROM among participants in the selected hospital. After screening among 446 mothers, 6 mothers were having PPROM and the prevalence rate was **1.34% (Table-4).**

Table-4:- Shows the prevalence rate of PPROM in the selected hospital

Cases	Number of Mothers	Formula to Calculate Point Prevalence Rate	PPROM Prevalence Rate
PPROM Present	6	(Number of cases present at a time / Total Number of Persons in a defined population at a same point in a time) x 100	**1.34 %**
PPROM Absent	440		
Total cases attended the clinic	446		

5. Level of association between prevalence of PPROM with selected demographic variables.

Table shows the level of association between **prevalence of PPROM with selected Demographic Variables**.

Hence, there were no any statistically significant association with prevalence of PPROM with the selected demographic variables like age, educational status, occupational status and mode of admission.

Table-5: level of association between prevalence of PPROM with selected demographic variables.

S. No	Socio-Demographic Variables		PRETERM PREMATURE RUPTURE OF MEMBRANE (PPROM)				Fisher's Exact Test	'P' Value
			PPROM Present		PPROM Absent			
			Frequency	%	Frequency	%		
1	**Age**	**21 – 25**	2	33.3	110	25	**4.08**	**0.73^{NS}**
		26 – 30	3	50	142	32.2		
		31 – 35	1	16.7	117	26.5		
		36 – 40	0	0	71	16.1		
2	**Educational status**	**Primary Education**	3	50	97	22.0	**2.46**	**0.49^{NS}**
		Secondary Education	2	33.3	161	36.5		
		Graduate	1	16.7	110	25		
		Others			72	16.3		
3	**Occupational status**	**Govt. employee**	2	33.3	45	10.2	**3.40**	**0.28 ^{NS}**
		Private employee	2	33.3	123	27.9		
		Home maker	2	33.3	234	53.1		
		Others			38	8.6		
4	**Mode of admission**	**Direct**	4	66.7	251	57.0	**1.00**	**0.48^{NS}**
		Referral	2	33.3	189	42.9		

Level of significance at the 'P' Value less than 0.05, NS = Not Significant, S*=Significant

6. Level of association between prevalence of PPROM and associated risk factors.

Shows the level of association between **prevalence of PPROM with associated risk factors**

Hence, there was a statistically significant link with prevalence of PPROM with the associated risk factors for PPROM like Accidental fall (Fishers exact test =0.01 and P value 0.01), Lifting of heavy objects (Fishers exact test =0.01 and P value 0.0), Urinary tract infection (Fishers exact test =0.01 and P value 0.01), Anemia (Fishers exact test =0.02 and P value 0.02), Type of vaginal discharge (Fishers exact test =0.04 and P value 0.04) and Abnormal vaginal discharge (Fishers exact test =14.63 and P value 0.02) **Table-6**

Table-6: level of association between prevalence of PPROM and associated risk factors.

S. No	Associated Risk Factors of PPROM		PRETERM PREMATURE RUPTURE OF MEMBRANE (PPROM)				Fisher's Exact Test	'P' Value
			PPROM Present		PPROM Absent			
			Frequency	%	Frequency	%		
1	**Accidental fall**	**Yes**	4	0.89	6	1.36	**0.01**	**0.01^{S*}**
		No	2	0.44	434	98.6		
3	**Lifting of Heavy Objects**	**Yes**	5	1.12	20	4.54	**0.01**	**0.01^{S*}**
		No	1	0.22	420	95.4		
2		**Yes**	3	0.67	8	1.81		**0.01^{S*}**

	Urinary Tract Infection	**No**	3	0.67	432	98.1	**0.01**	
3	**Anaemia**	**Yes**	3	0.67	18	4.09	**0.02**	**0.02^{S*}**
		No	3	0.67	422	95.9		
4	**Type of vaginal discharge**	**Not clear**	5	1.12	104	23.6	**0.04**	**0.04^{S*}**
		Clear	1	0.22	336	76.3		
5	**Abnormal vaginal discharge**	**White**	3	0.67	316	71.8	**14.63**	**0.02^{S*}**
		Yellow	3	0.67	13	2.95		
		Brown	0	0	8	1.81		
		No abnormal discharge	0	0	103			

Level of significance at the 'P' Value less than 0.05, NS = Not Significant, S*=Significant

7. Level of Association between PPROM with obstetrical variables

Shows the level of association between **prevalence of PPROM with Obstetrical characteristics**
Hence, there was a statistically significant link with prevalence of PPROM with the selected obstetrical characteristics like gestational weeks (Fishers exact test =11.01 and P value 0.002),amniotic fluid index as per USG (Fishers exact test =10.55 and P value 0.02),color of amniotic fluid (Fishers exact test =28.43 and P value 0.01), sign of true labor pain (Fishers exact test =15.61 and P value 0.01), presentation (Fishers exact test = 36.10 and P value 0.001) and gestational diabetes mellitus (Fishers exact test =19.97 and P value 0.01).
And there will be no association between prevalence of PPROM with obstetrical variables such as parity, previous history of preterm birth and type of pregnancy **(Table-7)**

Table-7: Level of association between PPROM with Obstetrical variables.

S. No	**Obstetrical Variables**		**PRETERM PREMATURE RUPTURE OF MEMBRANE (PPROM)**				**Fishers Exact Test**	**'P' Value**
			PPROM Present		**PPROM Absent**			
			Frequency	**%**	**Frequency**	**%**		
1	**Parity**	**Primi**	4	66.6	216	49.0	**1.12**	**0.75^{NS}**
		Multi	2	33.3	139	31.5		
		Grand Multi	0	0	85	19.3		
2	**Gestational weeks**	**29 – 33**	2	33.3	259	58.8	**11.01**	**0.002^{S*}**
		34 – 36	4	44.6	181	41.1		
3	**Previous history of preterm birth**	**Yes**	1	16.6	148	33.6	**2.12**	**0.84NS**
		No	5	83.3	292	66.3		
4	**Type of pregnancy**	**Single**	5	83.3	344	78.1	**3.61**	**0.20^{NS}**
		Multiple	1	16.6	96	21.8		
5	**Amniotic Fluid Index as per USG (in cm)**	**More**	4	66.6	322	73.1	**10.55**	**0.04^{S*}**
		Less	2	33.3	118	26.8		

6	**Colour of amniotic fluid**	**Colourless**	4	66.6	400	90.9	**28.43**	**0.01^{S*}**
		Slight red	0	0	12	2.72		
		Bright Yellow	0	0	18	4.0		
		Dark Green	2	33.3	10	2.27		
7	**Sign of true Labor pain**	**Present**	3	50	319	72.5	**15.61**	**0.01^{S*}**
		Absent	3	50	121	27.5		
8	**Presentation**	**Cephalic**	2	33.3	393	89.3	**36.10**	**0.01^{S*}**
		Breech	4	66.6	43	9.7		
		Shoulder	0	0	4	0.90		
9	**Gestational Diabetes mellitus**	**Present**	3	50	45	10.2	**19.97**	**0.01^{S*}**
		Absent	3	50	395	89.7		

DISCUSSION:-

A descriptive study "**Prevalence of preterm premature rupture of membrane and its associated factors among the pregnant women in the selected tertiary care hospital, Bhubaneswar, Odisha**" was conducted where 466 mothers recruited.

The study's goal to assess the prevalence of PPROM and to identify associated risk factors among pregnant mothers

In the present study 446 mothers were screened & 6 **(1.34%)** mothers were diagnosed as PPROM.

This study is supported by a similar descriptive cross sectional study in the department of Obstetrics and Gynecology, Regional Institute of Medical Sciences, Imphal, India which determined the incidence rate of PPROM. Out of 15,969 pregnant mothers, 358 were PPROM mothers. The prevalence rate of PPROM was 2.2% [9].

In the present study the identified risk factors of PPROM are accidental fall, lifting of heavy objects, UTI, anemia, type of vaginal discharge and abnormal vaginal discharge.

This study is supported by a prospective study performedin the Department of Obstetrics and Gynaecology, Institute of Medical Sciences and Sum Odisha, India which evaluated the incidence and etiology of PPROM. The prevalence rate of PPROM was 3.08%. Early PPROM was caused by, UTI, anemia, accidental fall, PCOD, and other factors [9].

In the present study there was a significant association between **Obstetrical variables** i.e. gestational weeks, sign of true labor pain, presentation, color of amniotic fluid and GDM and **Risk factors.**

This study is supported by a similar descriptive cross sectional study in the department of Obstetrics and Gynecology, Regional Institute of Medical Sciences, Imphal, India which determined the incidence rate of PPROM. There was significant association between Obstetrical variables i.e. mal-presentation, GDM, previous history of PROM, etc and risk factors were UTI, anemia, etc[10].

CONCLUSION:-

PPROM is a significant obstetric problem. The overall prevalence of preterm premature rupture of membrane was 1.34%, which is lower than the National prevalence of 3-4%, according to WHO. PPROM is one of the primary reasons of preterm births and may increase both maternal and perinatal morbidity and mortality. As a result, extensive prenatal monitoring is required during antenatal care as well as early screening, diagnosis, and therapy to decrease the PPROM.

IMPLICATIONS OF THE STUDY:-

The implications derived from the researcher's study could be the essential paradigm for the fields of nursing practice, nursing education, nursing administration, and nursing research.

NURSING EDUCATION:-

- The study's key conclusions will improve and update midwives' knowledge of PPROM prevention through continuing education.
- The health care expert will be able to teach the mother on PPROM prevention.

NURSING PRACTICE:-

- Midwives, who play a vital role in maternity care, should regularly apply evidence-based care policies, transformative techniques, and be trained.
- Nursing care is more important in preventing premature membrane rupture at birth. During the antenatal period, nurses should teach mothers about the hazard elements for preterm premature rupture of membranes, such as avoiding heavy lifting, maintaining adequate cleanliness to prevent infection, not smoking or drinking alcohol, and so on.

NURSING ADMINISTRATION

- As nursing advances and new difficulties emerge, the nurse administrator is responsible for providing substantial, qualitative, and on-going education to midwives.
- The PPROM awareness programme begins in the hospital.

NURSING RESEARCH

- Nurses who come across lots of mothers who have PPROM are the ideal person to perform research on different care modalities and prevention.
- The findings of the study can be disseminated through print journals as well as e-journal.
- The outcomes of the study can be distributed to inform future practice.

RECOMMENDATION

Based on the current study's findings, the researcher makes the following recommendations:-

- ❖ A comparative study could be under taken in Government and Private hospitals
- ❖ A study could be under taken to assess the prevalence rate of PROM & its associated risk factors
- ❖ An evaluation of obstetrical care is required to identify the causes of preterm premature membrane of rupture.

LIMITATION

- Several mothers were not cooperative during data collection period.
- The prevalence was too less to identify the risk factors to generalize.

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