

Assessment of Birth Preparedness and Complication Readiness among Pregnant Women: A Cross-sectional Study

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ABSTRACT

Introduction: Maternal deaths are a significant cause of death in women in the 15-49 years of age group, and they make up a larger proportion of all causes of death in the rural areas of poorer states, compared to other regions of India. Birth Preparedness and Complication Readiness (BPACR) is an overarching program to improve the use and effectiveness of maternal and newborn health services, based on the premise that preparing for birth and being ready for complications reduces all three phases of delays in receiving services.

Aim: To assess the level of BPACR among pregnant women.

Materials and Methods: This was a cross-sectional study conducted among 360 antenatal women admitted at Indira Gandhi Medical College and Research Institute, Puducherry, India, over three months. A modified Johns Hopkins Program for International Education in Gynaecology and Obstetrics (JHPIEGO) questionnaire was used for data collection. BPACR steps include arranging a mode of transport, saving money for pregnancy and childbirth, identifying an institute for delivery

and arranging a blood donor. Among these participants, those who followed ≤ 2 practices were considered less prepared, and more were considered well prepared. The Chi-square test was used to demonstrate the difference between study subject characteristics, and the level of significance set at $p \leq 0.05$.

Results: Of the 360 participants, 49 (13.6%) had good knowledge about antenatal danger signs, and a significant association was observed with educational status (p -value=0.023), occupational status (p -value=0.072), and number of Antenatal Care (ANC) visits (p -value=0.046). A good knowledge of childbirth danger signs was seen in 19 women, with a significant association observed with education (p -value <0.001), working women (p -value=0.014).

Conclusion: This study revealed that a very small portion of the participants had good knowledge of obstetrical danger signs. Hence, more effort needs to be employed to educate women and motivate them about the importance of regular ANC visits and create awareness about the complications.

Keywords: Awareness, Interview, Maternal mortality, Obstetric danger signs, Pregnancy

INTRODUCTION

Pregnancy, although a physiological process, carries with it certain risks for the mother. Unfortunately, many women are either unaware of such risks or fail to appreciate their gravity of the risks [1]. As per the World Health Organisation (WHO), "Maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes" [2]. Maternal deaths are a significant cause of death in women in the 15-49 years age group [3]. Maternal Mortality Ratio (MMR) is 97 per 100,000 live births for the period 2018-2020, as reported by the Sample Registration System (SRS) reported by Registrar General of India (RGI) [4].

Nearly 2/3rd of all maternal deaths are due to severe bleeding (47%), infections (12%), high blood pressure during pregnancy (7%), and unsafe abortions [5]. If these conditions are managed and treated promptly and adequately, maternal deaths can be reduced. Maternal death occurs because circumstances have prevented quick and adequate care for mothers. Such circumstances include ignorance about the danger signs, unwillingness to seek appropriate medical assistance in time, cultural constraints, and the absence of adequate transport in certain areas to reach the appropriate health facility in time [6].

Delays can occur at three different levels that influence the outcome of any pregnancy:

- (1) Delay in decision to seek care;
- (2) Delay in identifying and reaching the appropriate facility; and
- (3) Delay in receiving adequate and appropriate care in the facility [7].

The reasons for the first delay may be late recognition of the problem, lack of awareness, fear of the hospital, lack of money, or lack of an available decision-maker. The second delay is usually caused by difficulty in transport, long distance from a health facility, and multiple referrals. The third delay is often due to difficulty in getting blood supplies, equipment, and operation theatre [7]. The concept of BPACR came into existence with the introduction of Safe Motherhood initiative; however, it is still new in India. The BPACR tool has been developed by the John Hopkins Bloomberg School of Public Health [8]. BPACR is defined as an overarching program approach to improve the use and effectiveness of key maternal and newborn health services, preparing for birth and being ready for its complications [8]. Improving awareness among pregnant women about the danger signs would be an important strategy to reduce morbidity and prevent mortality, as the women would recognise the problem and seek prompt care, resulting in early detection and prompt institution of treatment [9].

The first target for the third Sustainable Development Goal (SDG) is to reduce the global Maternal Mortality Ratio (MMR) to less than 70 per 100,000 live births by 2030 [10]. Improving the pregnant women's knowledge of BPACR is a key [11]. With the above background, the study was conducted to assess the knowledge of BPACR among pregnant women. The knowledge of pregnant

women about the obstetrical danger signs during antenatal period and during childbirth was also assessed. The various socio-demographic factors influencing the knowledge of pregnant women about the obstetrical danger signs were compared.

MATERIALS AND METHODS

This was a cross-sectional study conducted among 360 antenatal women visiting the Outpatient Department (OPD) and wards of Obstetrics and Gynaecology at Indira Gandhi Medical College Hospital and Research Institute, a tertiary care teaching hospital in Pondicherry, India from April 2023 to June 2023. Institute Research Committee (IRC) and Institutional Ethics Committee (IEC) approval (NO. 455/IEC-37/IGMC&RI/PP-6/2023) were obtained for conducting the study. Written informed consent was obtained from all the eligible participants before data collecting, and strict confidentiality was maintained throughout the study.

Inclusion criteria: Antenatal women who were attending OBG-OPD and in wards at the time of data collection and who gave consent were included in the study.

Exclusion criteria: Non-pregnant women attending OPD, antenatal women who did not show enough willingness and interest to participate in the study were excluded from the study.

Sample size: The sample size was calculated based on the study done by Bhilwar M et al., [12]. Considering that 37.13% of the beneficiaries are aware of BPACR, with an absolute precision of 5%, at 95% confidence intervals and 80% power, sample size was calculated as 359. The study respondents were selected using a systematic random sampling method, where every 3rd client was chosen until the required sample size was obtained.

The selected antenatal mothers were approached and explained about the study. A structured interview was used to collect the necessary data, which comprised three parts:

Part 1: Socio-demographic details, included age, religion, type of family, number of family members, education of the participant and occupation of participant. Socio-economic status was calculated using the BG Prasad Scale [13].

Part 2: Obstetric characteristics, such as gravidity, parity, abortions, antenatal follow-up and presence of any complications.

Part 3: Awareness about danger signs and birth preparedness.

BPACR steps include [8]- Arranging a mode of transport, saving money for pregnancy and childbirth, identifying an institution for delivery, and arranging a blood donor. Based on the number of practices followed, the they are grouped as follows:

- Well-prepared mothers: followed >2 BPACR practices.
- Less prepared mothers: followed ≤2 BPACR practices [7].

The knowledge of antenatal women about the danger signs of illness during pregnancy and childbirth were documented. Among the participants, those who identified ≥3 danger signs were considered to have good knowledge of the antenatal and childbirth danger signs, while the rest of the participants who identified <3 were considered to have poor knowledge [7].

The 10 components based on indicators mentioned by JHPIEGO are as follows:

1. Knowledge of at least three or more danger signs of pregnancy;
2. Knowledge of at least three or more danger signs of labour and childbirth;
3. First ANC check-up done in first trimester;
4. Knowledge about minimum four ANC check-up during pregnancy;
5. Knowledge about Government Financial Assistance for pregnant women;

6. Knowledge about Government ambulance service for pregnant and delivered women;
7. Identifying a doctor/health facility for delivery;
8. Saving/saved money for expenses during delivery;
9. Arranged a transport for reaching the place of delivery;
10. Number of women who identified a matched blood donor;

With the help of the above components of BPACR, the BPACR indices were calculated as percentages for a total of 360 participants [8].

STATISTICAL ANALYSIS

Statistical analysis was performed using MS Office Excel and Statistical Package for the Social Sciences (SPSS) software version 21.0. The data were analysed using descriptive statistics. The Chi-square test was used to demonstrate the difference between study subject characteristics, and level of significance was set at $p \leq 0.05$.

RESULTS

The mean age of the participants was 25.25 ± 4.9 years, ranging from 17 to 40 years. Around 231 (64.2%) women were in the 21-30 years age group. Of all the respondents, 6 (1.7%) were in first trimester, 21 (5.8%) in second trimester, and 333 (92.5%) in third trimester, as described in [Table/Fig-1].

Parameters		n (%)
Age (years)	15-20	73 (20.3)
	21-25	113 (31.4)
	26-30	118 (32.8)
	31-35	44 (12.2)
	36-40	12 (3.3)
Level of education	Illiterate	4 (1.1)
	Primary	41 (11.4)
	Secondary	213 (59.2)
	University or more	102 (28.3)
Occupation	House wife	259 (71.9)
	Working	101 (28.1)
Socio-economic status	Class II	32 (8.9)
	Class III	267 (74.2)
	Class IV	61 (16.9)
Gravidity	Once	169 (46.9)
	Twice	123 (34.2)
	Thrice	45 (12.5)
	>3	23 (6.4)
Parity	None	177 (49.2)
	Once	135 (37.5)
	Twice	44 (12.2)
	Thrice	4 (1.1)
Period of gestation	I Trimester	6 (1.7)
	II Trimester	21 (5.8)
	III Trimester	333 (92.5)

[Table/Fig-1]: Socio-demographic data of the participants.

Awareness about danger signs of pregnancy: The respondents were asked to identify the danger signs during pregnancy. About 22 (6.1%) participants did not identify any danger sign, while 179 (49.7%) were able to identify at least one danger sign. While 110 (30.5%) participants identified two danger signs, 42 (11.7%) participants identified three danger signs, and only seven (2.0%) participants identified >3 danger signs. Hence total of 49 (13.6%) participants had good knowledge about antenatal danger signs. Excessive bleeding per vagina (84.7%) was the most commonly identified

antenatal danger sign, followed by severe abdominal pain (29.7%) [Table/Fig-2]. The knowledge of antenatal danger signs showed a significant association with educational status (p-value=0.023) and number of ANC visits (p-value=0.046) [Table/Fig-3].

Danger signs	n (%)
Bleeding per vagina	305 (84.7)
Severe headache	12 (3.3)
Severe abdominal pain	107 (29.7)
Blurred vision	11 (3.1)
Convulsion	20 (5.6)
Swollen feet, hand and face	10 (2.8)
Difficulty in breathing	49 (13.6)
Water breaks without labour	11 (3.1)
Decreased/accelerated foetal movements	8 (2.2)
High fever	11 (3.1)
Severe weakness	5 (1.4)
Loss of consciousness	6 (1.7)

[Table/Fig-2]: Knowledge of antenatal danger signs.

	Category	Awareness of AN danger signs		Awareness of danger signs of child birth	
		Poor knowledge	Good knowledge	Poor knowledge	Good knowledge
Education	Illiterate	2	2	4	0
	Primary	37	4	41	0
	Secondary	190	23	213	0
	University or more	82	20	83	19
		$\chi^2=9.576$, df=3, p=0.023		$\chi^2=50.737$, df=3, p<0.001	
Occupation	House wife	229	30	250	9
	Working	82	19	91	10
		$\chi^2=3.229$, df=1, p=0.072		$\chi^2=6.002$, df=1, p=0.014	
Number of ANC visits	<4	12	6	18	0
	5-8	164	19	176	7
	9-12	100	17	108	9
	>12	35	7	39	3
		$\chi^2=7.994$, df=3, p=0.046		$\chi^2=3.432$, df=3, p=0.330	
Gravidity	Once	148	21	165	12
	Twice	103	20	128	7
	Thrice	39	6	44	0
	>3	21	2	4	0
		$\chi^2=1.411$, df=3, p=0.703		$\chi^2=4.954$, df=3, p=0.175	
Socio-economic status	Class II	28	4	30	2
	Class III	233	34	253	14
	Class IV	50	11	58	3
		$\chi^2=1.223$, df=2, p=0.543		$\chi^2=0.077$, df=2, p=0.962	

[Table/Fig-3]: Association between knowledge of antenatal and child birth danger signs and various demographic factors.
df: Degree of freedom, χ^2 : Chi-square

Awareness about danger signs during childbirth: About 137 (38.1%) participants did not identify any danger signs during childbirth. Meanwhile, 176 (48.9%) and 28 (7.8%) participants were able to identify one and two danger signs, respectively. While 19 (5.3%) participants had good knowledge of danger signs during childbirth, i.e., identified ≥ 3 danger signs. After analysis with all the socio-demographic factors, educated, working women participants had good knowledge of danger signs of childbirth [Table/Fig-3], with significance levels of p-value <0.001, p-value=0.014, respectively. Severe bleeding per vagina (60.3%) was the most commonly identified danger sign of childbirth [Table/Fig-4].

Danger signs	n (%)
Severe bleeding	217 (60.3)
Convulsions	6 (1.7)
Severe headache	0 (0)
High fever	34 (9.4)
Loss of consciousness	29 (8.1)
Labour lasting for >12 hours	3 (0.8)
Placenta not delivered 30 minutes after delivery	1 (0.3)

[Table/Fig-4]: Knowledge of antenatal danger signs.

BPACR attitude and practice: Only 64 (17.8%) participants had heard about BPACR. The majority of the women 241 (66.9%) saved money for their delivery. Thirty women (8.3%) identified a skilled provider for delivery, and 50 (13.9%) identified either personal or government modes of transport to reach a health facility during delivery, as shown in [Table/Fig-5].

Steps of birth and complication preparedness	n (%)
Identifying a mode of transport in times of obstetrical emergency and childbirth	50 (13.9)
Saving money for childbirth	241 (66.9)
Identifying a matched blood donor	9 (2.5)
Identifying a skilled provider	30 (8.3)

[Table/Fig-5]: Knowledge of Birth Preparedness and Complication Readiness (BPACR).
The total cannot be 360. Because in this table the proportion of the total women who identified these birth preparedness were only mentioned in percentage and frequency

A total of 51 (14.2%) participants were well prepared for their birth, while the rest, 215 (59.7%), were less prepared, and 94 (26.1%) women were totally unprepared. In the analysis [Table/Fig-6], a significant association of BPACR with level of education (p-value <0.001) and occupation (p-value=0.024) was found. The various indicators used to evaluate the preparedness level of individuals for delivery and its complications are calculated and given in [Table/Fig-7].

DISCUSSION

BPACR is a matrix of shared responsibility of expecting mother, her family, and the community. It is an essential tool to ensure safe motherhood by improving the health-seeking behaviour and

	Category	BPCR	
		Less prepared	Well prepared
Education	Illiterate	4	0
	Primary	36	5
	Secondary	194	19
	University or more	75	27
		$\chi^2=18.312$, df=3, p<0.001	
Occupation	House wife	229	30
	Working	80	21
		$\chi^2=5.068$, df=1, p=0.024	
Religion	Hindu	268	44
	Muslim	29	6
	Christian	12	1
		$\chi^2=0.704$, df=2, p=0.703	
Parity	None	157	20
	Once	116	19
	Twice	33	11
	Thrice	3	1
		$\chi^2=5.830$, df=3, p=0.120	
Type of family	Nuclear family	182	25
	Joint family	127	26
		$\chi^2=1.749$, df=1, p=0.186	

Socio-economic status	Class II	27	5
	Class III	225	42
	Class IV	57	4
	$\chi^2=3.498, df=2, p=0.174$		

[Table/Fig-6]: Analysis of Birth Preparedness and Complication Readiness (BPACR) and socio-demographic factors.

Indicators	n (%)
Knowledge of at least three or more danger signs of pregnancy	49 (13.6)
Knowledge of at least three or more danger signs of labour and child birth	19 (5.3)
First ANC check-up done in first trimester	267 (74.16)
Knowledge about minimum 4 ANC check-up during pregnancy	357 (99)
Knowledge about government financial assistance for pregnant women	313 (86.9)
Knowledge about government ambulance service for pregnant and delivered women	202 (56.1)
Identifying a doctor/health facility for delivery	357 (99.16)
Saving/saved money for expenses during delivery	241 (66.9)
Arranged a transport for reaching the place of delivery	50 (13.8)
Number of women who identified a matched blood donor	9 (2.5)

[Table/Fig-7]: Indicators to evaluate the preparedness level of individual for delivery and its complications.

individual preparedness for emergencies during pregnancy and childbirth. The mean age of the respondents was 25.25 ± 4.9 years, which was very close to 25.2 ± 4 years in a study by Kamineni V et al., [14]. The majority of the participants were aged between 21-25 years (31.4%), and half of the study participants (59.2%) had completed secondary-level education, which was comparable to a study conducted by Patil AA et al., in Shivamoga district of Karnataka, where 37.2% of women were between 20-24 years and 58% had completed secondary-level education [15]. This finding reflects a good promotion of education for all by various government programs.

The current study found that 13.6% and 5.3% of women had good knowledge of danger signs during antenatal care and childbirth, respectively. This was low compared to studies like Bhilwar M et al., which showed 27.8% and 6.7%, and Karir DS et al., which showed 30.6% and 10.8% for danger signs during antenatal care and childbirth [12,16]. This low awareness could be due to less age at first pregnancy and less number of ANC visits. The involvement of family, peers, mass media, and effective communication by health providers to propagate the danger signs could be of utmost importance in improving awareness, thereby helping pregnant women identify obstetric emergencies and seek medical care as early as possible.

Of the BPCR practices, only 14.2% were found to be well prepared, which was less compared to the study by Patil AA et al., showing 38% [15]. The most commonly followed practice in the present study was saving money, followed by identifying modes of transport, while the least common practice was identifying a matched blood donor. The percentage of women who saved money was observed by other studies was 58% by Bhilwar M et al., 44% by Patil AA et al., and 50% by Sulekha T et al., [12,15,17]. The awareness about blood donor in other studies were 7.5% according to Bhilwar M et al., 4% in Patil AA et al., and (11%), the highest, reported by Kamineni V et al., [12,14,15].

The BPCR indices were evaluated at the individual level. The overall BPCR index was calculated as 51.76%. A Chi-square test examining the association between BPCR and socio-demographic

factors found a significant association with education level and occupation, with p-values <0.001 and 0.024 , respectively. Similarly, a positive association with good education and occupation was found in studies conducted by Bhilwar M et al., Patil AA et al., and Sulekha T et al., [12,15,17]. The knowledge related to pregnancy is gained through experience, which is supported by the finding of good knowledge among women with high gravidity scores.

Limitation(s)

The study was a cross-sectional study; therefore, authors were not able to follow-up the delivery outcome of the patients based on their performance in BPACR.

CONCLUSION(S)

The study revealed that a very small portion of the participants had good knowledge of antenatal and childbirth danger signs. BPCR was very low among the participants. Hence, more effort needs to be employed to educate women and motivate them about the importance of regular ANC visits and to create awareness about the complications. Thus this will lead to a reduction of maternal mortality and morbidity.

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