ORIGINAL RESEARCH ARTICLE

Birth Preparedness & Complication Readiness Among Pregnant Women in A Rural Area of Karnataka, Southern India

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ABSTRACT

Introduction: Globally, approximately 810 women die daily from preventable causes related to pregnancy and childbirth. Birth Preparedness and Complication Readiness improves the use and effectiveness of key maternal and newborn health services, by reducing the phases of delays in receiving these services. This study assessed the knowledge, attitude & practice regarding BPCR among rural antenatal women in Belagavi.

Material & Methods: A community - based cross – sectional study was conducted from 1st January to 31st December 2019 among 400 pregnant women in the rural field practice area of a Primary Health Centre, Belagavi. Pre – validated and tested questionnaire from Johns Hopkins Program for International Education in Gynecology and Obstetrics (JHPIEGO) was used for the interview. Data was analyzed using SPSS 25.0 trial version.

Results: The BPCR index was 47.1 %. Positive association with being well prepared were found among women from upper and middle socio-economic status, multigravida, those ≥ 34 weeks of gestational age and those who availed their first antenatal care in the first trimester.

Conclusion: Nearly three – fourth of the rural pregnant women were well prepared for birth, highlighting the need for continued efforts to enhance BPCR among diverse groups.

Keywords: BPCR, Danger signs, Rural pregnant women, Attitude and Perception

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INTRODUCTION

Pregnancy is an important event in every woman's life which needs special attention from the time of conception to the postnatal stage. They are vulnerable to developing unexpected life - threatening complications which might lead to maternal morbidity, mortality and affect the health of the newborn.[1]

Globally, around 810 women die daily from preventable pregnancy and childbirth causes. In 2017, 295,000 women died from related complications, with 94% occurring in low and lower-middle-income countries.[2] In India, a mother dies every 20 minutes due to these causes, with a Maternal Mortality Ratio (MMR) of 122 per 100,000 live births in 2015-17.[3] According to Sample Registration System (SRS) India's MMR was 97 per 100,000 in 2018 – 20 and Karnataka's MMR was 69 per 100,000 in 2018-20.[4]

Most of the maternal deaths occur during labour, childbirth / delivery & within 24 hours post-partum.[5] One-third of neonatal deaths occur on the first day of life.[6] Most of these deaths are preventable through effective, affordable, timely and quality services.[1] According to Thaddeus and Maine, the three obstetric delays contributing to maternal mortality are delays in seeking care, reaching a medical facility, and receiving adequate & appropriate treatment.[7] A safe & healthy childbirth experience is essential for maternal and newborn well-being. Therefore, the WHO recommends 'Birth Preparedness and Complication Readiness' (BPCR) as a fundamental component of antenatal care programs.[8]

Birth Preparedness reduces the first two phases of obstetric delays by providing skilled care of all births by motivating people to plan for it and encourages decision making before the onset of labour and thus seek care before the onset of any potential complications during childbirth. Complication Readiness increases awareness of danger signs and thus improves problem recognition and reduces the delay in deciding to seek care.[7]

BPCR encourages women, households, and communities to plan by identifying transport, saving money, finding a birth companion, and identifying a blood donor to facilitate rapid decision-making and reduce delays in emergencies.[9] Evidence from a meta-analysis of 14 randomized studies showed BPCR interventions effectively reduce maternal and neonatal mortality in low-resource settings.[10] Timely management and treatment of complications can be life-saving.[2] Most previous studies among antenatal women have not assessed attitudes and perceptions regarding BPCR. This study aims to include these aspects, along with knowledge and personal experience during pregnancy, among pregnant women in a rural Primary Health Centre, Belagavi.

METHODOLOGY

A community - based cross – sectional study was conducted among the pregnant women residing in the rural field practice area of a Primary Health Centre, Belagavi, Karnataka from 1st January 2019 to 31st December 2019. Based on a study done at Delhi by Acharya AS et al., it has been noted that the BPCR index was 41%.[11] In the present study, expecting similar results, with 95 % confidence level and 5 % absolute precision, using the formula $n = 4pq/d^2$, taking the prevalence (p) as 41 %, the estimated sample size was 387 and was rounded off to 400.

The rural field practice area of the Primary Health Centre had nine sub - centres with a mid – year population of 73,474. The total number of ANCs registered in the year 2017 – 2018 was 1,494. Population proportionate sampling was done to select the number of study participants from each sub - centre.

Ethical clearance was obtained from the Institutional Ethics Committee for Human Subjects' Research of the Medical College. Written informed consent was obtained from all the study participants before the data collection.

Permanent residents of the study area (residing at least one year preceding the survey) and registered antenatal women who were at more than 28 weeks of gestational age were included. Those who did not respond after three consecutive attempts/visits by the investigator were excluded.

Data collection was done through antenatal checkup camps conducted at each sub – centre and through house - to - house visits for those who did not attend the camp. Pre – validated and tested questionnaire regarding knowledge, attitude and perception and practice of BPCR from Safe Motherhood Population – Based Survey Questionnaire on monitoring of BPCR from the Johns Hopkins Program for International Education in Gynecology and Obstetrics (JHPIEGO) was used for the personal interview. The questions were taken from the Prototype Safe Motherhood Questionnaire – Woman under Part Two: Surveying Women, Husbands/Partners and the Community. The questionnaire is attached as Research Material.[12]

BPCR index: The BPCR index was calculated using 12 indicators which included their knowledge and practice. The index was calculated by taking the average of the percentages of the indicators.[7] To categorize BPCR as well prepared and less prepared, knowledge of at least eight key danger signs during pregnancy, labour & childbirth, first two days after delivery and in the newborn (first seven days) was considered as one of the indicators (for BPCR index calculation, they were considered as separate indicators).[13] Hence, a total of 9 indicators was used to categorize BPCR as "well prepared" and "less prepared". The participants who fulfilled at least five of the BPCR indicators were considered as "well prepared" and those who fulfilled less than five BPCR indicators were considered as "less prepared".[14]

Knowledge and practice about BPCR: To obtain the total knowledge score, each of the nine elements

were given a score "1" if the response was YES and a score "zero" if the response was NO or DON'T KNOW. The total score was nine. Scores ≤ three was considered as "poor" knowledge, score in the range of four to six was considered as "moderate" knowledge and score > six was considered as "good" knowledge about BPCR.[15] Similarly, the total BPCR practice score was five. If the participants scored at least three out of five, they were considered under "good" BPCR practice and those who scored < three were considered under "poor" BPCR practice.[16]

Attitude and Perceptions towards BPCR: There were eight statements under this section. For positive statements, the scores given were four, three, two, one and zero for strongly agree, agree, disagree, strongly disagree, and don't know respectively. For negative statements, the scores given were four, three, two, one and zero for strongly disagree, disagree, agree, strongly agree, and don't know respectively. The scoring was done without grouping the choices. The total score was 32. Score ≤ 16 was considered as a negative attitude towards BPCR and score > 16 was considered as positive attitude towards BPCR.[17]

Data analysis: IBM SPSS 25.0 trial version was used to analyze the data. Descriptive statistics were calculated. Knowledge, attitude, and practice scores were calculated and graded into different levels. BPCR index was calculated and used to categorize the study participants as "well prepared" and "less prepared". Logistic regression analysis was done to find the association between independent variables and level of BPCR/attitude regarding BPCR. Pearson's correlation coefficient was used to find the relationship between knowledge, attitude, and practice scores.

RESULTS

In the present study, the mean age was 24.3 ± 3.6 years. The age of the participants ranged from 18 – 40 years. Among the total study participants, 242 (60.5 %) were multigravida and 264 (66 %) were at less than 34 weeks of gestation **(Table 1)**.

Among the 400 study participants, 232 (58.0 %) were aware of at least three serious health problems of pregnancy and 192 (48.0 %) were aware of at least two serious health problems of labour and childbirth. Around 119 (29.7 %) were aware of at least three serious health problems during the first two days after delivery and 177 (44.3 %) were aware of at least three serious health problems in the newborn during the first 7 days after delivery. However, 212 (53.0 %) were aware of at least two basic cares for the newborn immediately after birth.

Knowledge & Practice: As shown in **Table 2** 168 (42 %) pregnant women had moderate knowledge regarding BPCR and 262 (65.5 %) were found to have good BPCR practice.

Table 1: Distribution of study participants based on socio – demographic details (n = 400)

Socio – demographic details	Participants (%)
Age (in years)	
18 – 20	54 (13.5)
20 – 25	210 (52.5)
25 – 30	115 (28.8)
>30	21 (5.2)
Religion	
Hindu	362 (90.5)
Muslim	34 (8.5)
Christian	4 (1.0)
Education	
Illiterate	20 (5.0)
Primary (1 – 5th)	32 (8.0)
Secondary (6 – 10th)	195 (48.8)
PUC / ITI (11 – 12th)	97 (24.2)
Graduate	52 (13.1)
Postgraduate	4 (1.0)
Occupation	
Homemaker	389 (97.2)
Self – employed	7 (1.8)
Non – government employee	4 (1.0)
Socio – economic status (Modified BG Prasad Classification 2019)[18]	
Class I	29 (7.2)
Class II	84 (21.0)
Class III	117 (29.3)
Class IV	133 (33.3)
Class V	37 (9.2)
Gestational age (in weeks)	
28 – 30	120 (30.0)
30 – 33	144 (36.0)
33 – 36	71 (17.8)
>36	65 (16.2)

Table 2: Distribution of participants based on level of knowledge and practice of BPCR (n= 400)

Variables	Participants (%)
Level of knowledge	
Poor	157 (39.2)
Moderate	168 (42)
Good	75 (18.8)
Level of practice	
Poor	138 (34.5)
Good	262 (65.5)

Attitude & Perception: Eight statements were used to assess the attitude and perception about BPCR as shown in **Table 3**. Out of 400 antenatal women in the study, 288 (72 %) had a positive attitude and 112 (28 %) had a negative attitude towards BPCR.

The mean BPCR knowledge score, attitude and perception score and practice score were 4.27 ± 2.25, 19.43 ± 4.61 and 2.24 ± 1.08 respectively.

Personal experience with current pregnancy: All the 400 (100 %) pregnant women had seen a healthcare worker or doctor for antenatal care. The mean and standard deviation of the number of antenatal care visits was 5.4 ± 1.8. The BPCR practice included five elements: identify transport, save money, identify blood donors, identify skilled providers and health care facilities for delivery (**Table 4)**.

Table 3: Distribution of study participants based on attitude & perception about BPCR (n = 400)

Attitude & Perception	SA* (%)	A* (%)	D* (%)	SD* (%)	DK* (%)
"A woman should plan ahead of time where she will give birth to her baby"	90 (22.5)	181 (45.3)	19 (4.7)	0 (0)	110 (27.5)
"A woman should plan ahead of time how she will get to the place where she will give birth"	115 (28.8)	218 (54.5)	6 (1.5)	0 (0.0)	61 (15.2)
"It is not necessary for husband to accompany his wife to ANC visits"	8 (2.0)	155 (38.7)	140 (35.0)	95 (23.8)	2 (0.5)
"When women don't go to a health facility to give birth, it's mainly because it's too expensive"	18 (4.5)	154 (38.5)	140 (35.0)	7 (1.8)	81 (20.2)
"When women do not go to a health facility to give birth, it is mainly because it is too difficult to get there"	95 (23.8)	158 (39.5)	117 (29.2)	2 (0.5)	28 (7.0)
"When women do not go to a health facility to give birth, it is mainly because the staffs there do not treat women respectfully"	1 (0.2)	14 (3.5)	269 (67.3)	30 (7.5)	86 (21.5)
"It is not necessary for a husband to accompany his wife when she is giving birth"	38 (9.5)	200 (50.0)	74 (18.5)	81 (20.2)	7 (1.8)
"Giving birth is mostly a woman's matter. Husbands have little to contribute"	7 (1.7)	165 (41.3)	150 (37.5)	73 (18.2)	5 (1.3)

*SA – Strongly Agree; A – Agree; D – Disagree; SD – Strongly Disagree; DK – Don't Know

Table 4: Distribution of study participants according to their personal experience with current pregnancy / practice (n = 400)

Characteristic	Participants (%)
First Antenatal care	
I Trimester	339 (84.7)
II Trimester	61 (15.3)
Prior Arrangements	
Yes	388 (97)
No	12 (3)
Arrangements (Multiple responses)	
Identify transport	229 (57.2)
Save money	259 (64.7)
Identify blood donor	53 (13.2)
Identify skilled provider	356 (89)
Planned health care facility for delivery	
Government hospital	155 (38.7)
Government Health Centre	47 (11.8)
Private hospital	138 (34.5)
Maternity / Nursing home	18 (4.5)
Not yet decided	42 (10.5)
Planned health care facility for postnatal care	
Government hospital	166 (41.5)
Government Health Centre	36 (9)
Private hospital	138 (34.5)
Maternity / Nursing home	18 (4.5)
Not yet decided	42 (10.5)

BPCR Index: Twelve indicators related to BPCR knowledge and practice were included to calculate the BPCR index (as shown in **Figure 1**). The average of the percentages of the twelve indicators was calculated to estimate the BPCR index. The BPCR index was found to be 47.1 % which was due to low level of knowledge regarding the key danger signs.

Based on the indicators, 296 (74.0 %) pregnant women were found to be well prepared and 104 (26.0 %) were less prepared with respect to BPCR. The significant factors associated with being well prepared and having a positive attitude towards BPCR are shown in **Table 5** and **Table 6** respectively.

The study results showed that there was a weak positive correlation between knowledge & attitude (r = 0.333), knowledge & practice (r = 0.321) and attitude & practice (r = 0.333) of the study participants regarding BPCR which were statistically significant (p <0.001) at 0.01 level of significance.

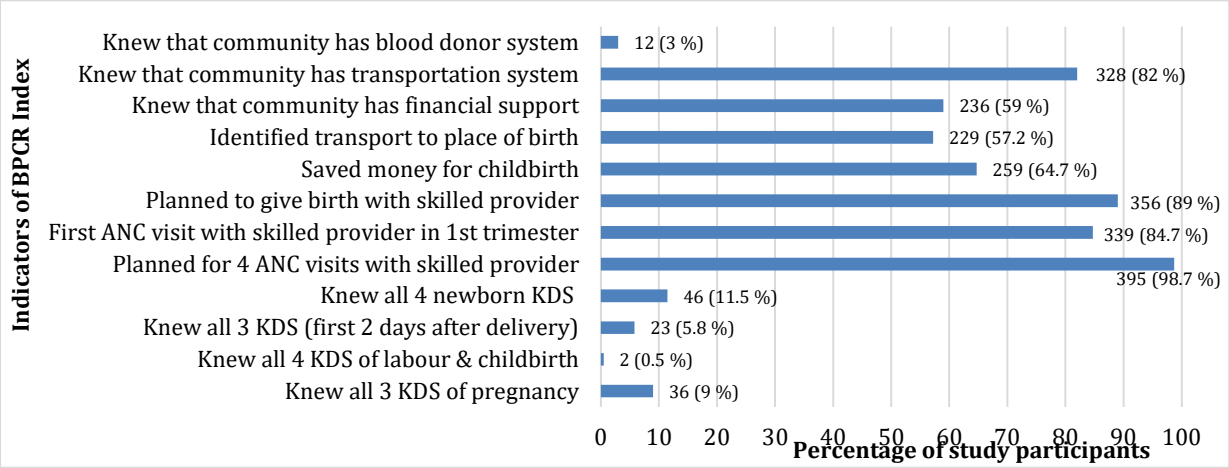

Figure 1: Distribution of study participants according to indicators of BPCR index (n = 400)

KDS – Key Danger Signs; ANC – Antenatal Care; Out of the 12 indicators, from bottom to top – first four are related to knowledge of key danger signs, next five are related to service use and planning actions: intentions and behaviors and last three are related to knowledge of community resources.

Table 5: Association between socio – demographic details and level of BPCR (n = 400)

Variable	WP (%)	LP (%)	cOR	95 % CI	p value	AOR	95 % CI	p value
Age (in years)								
<25	152 (51.4)	70 (67.3)	1			1		
≥25	144 (48.6)	34 (32.7)	1.950	1.220 – 3.117	**0.005***	1.310	0.757 – 2.269	0.335
Education								
Illiterate	15 (5.1)	5 (4.8)	1			1		
Literate	281 (94.9)	99 (95.2)	0.946	0.335 – 2.671	0.916	1.103	0.327 – 3.716	0.875
Occupation								
Homemaker	286 (96.6)	103 (99)	1			1		
Employed	10 (3.4)	1 (1)	3.601	0.455 – 28.481	0.302	3.550	0.404 – 31.191	0.253
SES								
Upper & Middle	179 (60.5)	51 (49)	1.590	1.014 – 4.356	**0.043***	1.777	1.059 – 2.980	**0.029***
Lower	117 (39.5)	53 (51)	1			1		
Gravida								
Primigravida	98 (33.1)	60 (57.7)	1			1		
Multigravida	198 (66.9)	44 (42.3)	2.755	1.742 – 4.356	**< 0.001***	2.986	1.746 – 5.104	**< 0.001***
Gestational age								
< 34 weeks	181 (61.1)	83 (79.8)	1			1		
≥ 34 weeks	115 (38.9)	21 (20.2)	2.511	1.474 – 4.278	**< 0.001***	3.027	1.680 – 5.455	**< 0.001***
First ANC visit								
First trimester	270 (91.2)	69 (66.3)	5.268	2.972 – 9.335*	**< 0.001***	6.708	3.533 – 12.739	**< 0.001***
Second trimester	26 (8.8)	35 (33.7)	1			1		

*Statistically significant – p < 0.05; WP – Well prepared (n = 296), LP – Less prepared (n = 104); OR – Odds ratio; cOR – Crude Odds Ratio; AOR – Adjusted Odds ratio – Adjusted for age, education, occupation, Socio-economic status (SES), gravida, gestational age and trimester at which first ANC visit was done.

Table 6: Association between socio – demographic details & attitude towards BPCR (n = 400)

Variable	PA (%)	NA (%)	cOR	95 % CI	p value	AOR	95 % CI	p value
Age (in years)								
< 25	138 (47.9)	84 (75)	1			1		
≥ 25	150 (52.1)	28 (25)	3.261	2.005 – 5.302	**< 0.001***	2.659	1.593 – 4.438	**<0.001***
Education								
Illiterate	15 (5.2)	5 (4.5)	1			1		
Literate	273 (94.8)	107 (95.5)	0.850	0.302 – 2.398	0.759	1.370	0.455 – 4.126	0.576
Occupation								
Homemaker	278 (96.5)	111 (99.1)	1			1		
Employed	10 (3.5)	1 (0.9)	3.993	0.505 – 31.559	0.304	3.500	0.429 – 28.568	0.242
SES								
Upper & Middle	170 (59)	60 (53.6)	1.249	0.805 – 1.937	0.322	1.101	0.689 – 1.759	0.688
Lower	118 (41)	52 (46.4)	1			1		
Gravida								
Primigravida	95 (33)	63 (56.3)	1			1		
Multigravida	193 (67)	49 (43.8)	2.612	1.671 – 4.084*	**< 0.001***	2.075	1.288 – 3.344	**0.003***
Gestational age								
< 34 weeks	184 (63.9)	80 (71.4)	1			1		
≥ 34 weeks	104 (36.1)	32 (28.6)	1.413	0.879 – 2.273	0.153	1.364	0.827 – 2.249	0.224
First ANC visit								
First trimester	247 (85.8)	92 (82.1)	1.310	0.729 – 2.353	0.366	1.318	0.708 – 2.454	0.383
Second trimester	41 (14.2))	20 (17.9)	1			1		

*Statistically significant – P < 0.05; PA – Positive attitude (n = 288), NA – Negative attitude (n = 112); OR – Odds ratio; cOR – Crude Odds Ratio; AOR – Adjusted Odds ratio – Adjusted for age, education, occupation, Socio-economic status (SES), gravida, gestational age and trimester at which first ANC visit was done.

DISCUSSION

The present community - based cross – sectional study conducted among 400 pregnant women in the rural field practice area of a Primary Health Centre, Belagavi, Karnataka found that the BPCR index was 47.1 %. This finding aligned with a Mumbai, Maharashtra based study conducted in 2018 among 126 pregnant women, which showed a BPCR index of 51 %.[19] Whereas, in a study conducted in Chhattisgarh in 2017 among 110 antenatal women, the BPCR index was found to be 27.8 %, which was lower compared to the present study. The reasons for the difference could be because of low education levels of the pregnant women, their unemployed working status, dependency on family, low socio-economic status, ignorance and poor communication between health care workers and the community.[20]

Our study observed that 58 % pregnant women were aware of at least three danger signs during pregnancy and 44.3 % antenatal women were aware of at least three newborn danger signs. This was higher

compared to a study conducted in 2012 – 2014 at Hyderabad, Telangana among 600 pregnant women where 20 % were aware of at least three danger signs during pregnancy and 12 % were aware of at least three newborn danger signs. This disparity could be because the pregnant women in the study at Hyderabad probably believed that everything would be normal and did not want to anticipate any undesirable events in pregnancy.[21]

This study found that 42 % had moderate knowledge, 39.2 % had poor knowledge and 18.8 % had good knowledge about BPCR. However, in a study conducted in 2017 among 384 antenatal women in Belagavi, Karnataka, 77.1 % had moderate knowledge, 17.2 % had poor knowledge and 5.7 % had good knowledge about BPCR. The knowledge was better than our study, probably because it was facility-based study and majority of the pregnant women had visited antenatal clinic for approximately 6 to 10 times.[15]

With respect to attitude towards BPCR, 72 % pregnant women had a positive attitude according to our study. This was lower than a Nigerian study conducted in 2012 among 252 pregnant women, where 94.4 % of them had a positive attitude towards BPCR. This discrepancy was probably due to different study setting, high antenatal registration, and better availability of health care services.[22]

In this study, 388 pregnant women had made some arrangements for the birth of the child. Among the 388 pregnant women, 91.7 % had identified a skilled provider for delivery, 66.7 % had saved money to meet the delivery expenses, 59 % pregnant women had identified transport for emergency / delivery and 13.6 % had identified a blood donor for emergency / delivery.

Whereas, in a study conducted in 2015 among 305 pregnant women in Udupi taluk, Karnataka, 51 % had good BPCR practice like our study. The study showed that 100 % had arranged transport which was high compared to the present study probably because of higher literacy rate and 99 % had identified a skilled birth attendant for delivery like the present study. It was also observed that 26.2 % of pregnant women had saved money to meet delivery expenses and 1 % had identified a blood donor which was low compared to the present study. The reason for not saving money was probably because the majority had obtained help from parents, relatives during emergencies, free delivery services in the government hospitals and did not feel the need to save money for pregnancy as it can be utilized for other purposes. Identifying blood donor was neglected and could be due to lack of sufficient knowledge regarding the complications of blood loss during pregnancy or delivery time and their previous pregnancy / delivery did not require blood transfusion. [16]

Among our study participants, 74 % were well prepared with respect to BPCR which was high compared to an Odisha study, where 16.7 % were well prepared. This was probably because of lack of educational activities regarding BPCR by the grass root level workers.[23]

Our study found that socio – economic status, gravida status, gestational age, and trimester at first antenatal care were significant factors associated with being well prepared. Those who belonged to upper and middle SES (AOR: 1.795, 95 % CI: 1.070 – 3.014, p = 0.027), multigravida (AOR: 2.989, 95 % CI: 1.751 – 5.103, p < 0.001), those who were at ≥ 34 weeks of gestational age (AOR: 3.098, 95 % CI: 1.717 – 5.588, p < 0.001) and those who availed their first antenatal care in their first trimester (AOR: 6.641, 95 % CI: 3.507 – 12.576, p < 0.001) were positively associated with being well prepared.

Age and gravida status were significant factors associated with positive attitude towards BPCR. Those who were ≥ 25 years of age (AOR: 2.507, 95 % CI: 1.509 – 4.164, p < 0.001) and multigravida (AOR: 2.047, 95 % CI: 1.276 – 3.283, p = 0.003) were associated with positive attitude towards BPCR.

The strengths of this study are that it was a community – based cross - sectional study conducted among 400 rural antenatal women. A standard validated questionnaire from Johns Hopkins Program for International Education in Gynecology and Obstetrics (JHPIEGO) was used for the personal interview with standard cut off scores. Hence, the study results can be generalized. It is one of the very few studies which included many aspects of BPCR including knowledge, attitudes & perception, and personal experience during the current pregnancy. The limitation of this study is that it included only antenatal women and not the postnatal women. Hence, there would have been a lower level of knowledge about key danger signs during pregnancy, labour and childbirth and newborn danger signs.

Conclusion

Four out of ten rural pregnant women had moderate knowledge about BPCR, while seven out of ten observed a positive attitude towards it. Additionally, over half of the women practiced BPCR effectively. Nearly three – fourth of the pregnant women were well prepared for childbirth. Pregnant women of upper and middle socioeconomic status, who were multigravida, at or beyond 34 weeks of gestation, and initiated antenatal care during their first trimester, showed a high level of preparedness for childbirth and potential complications. Multigravida and above 25-year-old pregnant women had a more positive attitude towards BPCR.

Recommendations

The present study observed a significant gap in awareness among pregnant women regarding key

danger signs during pregnancy, childbirth, the first two days post-delivery, and in newborn. Additionally, it was observed that fewer than one-fourth of the pregnant women had identified potential blood donors in advance. To address these issues, it is recommended that grassroots health workers receive enhanced training to recognize the key danger signs outlined in the BPCR (Birth Preparedness and Complication Readiness) framework. These workers should also provide comprehensive health education to pregnant women and her family members on identifying these signs. Furthermore, the prior identification of 2–3 voluntary compatible blood donors, along with their contact information, should be strongly encouraged among the family members to mitigate delays in receiving timely and appropriate care during emergencies. While pregnant women showed a positive attitude towards BPCR, there was a notable deficiency in their knowledge and practices. Thus, it is crucial to implement targeted behavior change communication strategies to bridge this gap and improve overall preparedness for childbirth. BPCR should be integrated with RMNCAH and Nutrition Program.

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