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Awareness and utilization of preconception care (PCC) among pregnant women in rural Odisha, India: A community-based cross-sectional study

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Abstract

Background: Preconception care (PCC) is an essential element of the maternal, newborn, and child health continuum, aimed at identifying and modifying biomedical, behavioural, and social risk factors before conception. Although India has made notable progress in reducing maternal mortality, maternal and perinatal morbidity remain substantial, particularly in rural and socioeconomically disadvantaged populations. Existing maternal health programmes predominantly focus on antenatal and intrapartum care, with limited emphasis on the preconception period. Evidence on PCC awareness and utilisation in rural, community-based settings in India remains scarce. This study aimed to estimate the prevalence of PCC and assess related practices among pregnant women in rural Khordha district, Odisha.

Materials and Methods: A community-based cross-sectional study was conducted among pregnant women attending obstetrics and gynaecology outpatient services and Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) clinics at the Community Health Centre, Tangi, Odisha. Pregnant women with gestational age less than 28 weeks were consecutively enrolled after obtaining informed consent. Data were collected using a semi-structured questionnaire adapted from the FIGO PCC assessment tool, capturing socio-demographic characteristics, obstetric history, high-risk pregnancy factors, lifestyle behaviours, nutritional supplementation, and PCC awareness and utilisation. Data were recorded electronically and analysed using descriptive statistics.

Results: A total of 112 women participated, with a mean age of 24.6 ± 4.4 years. Nearly 60% reported planned pregnancies, while 40.2% were unplanned. High-risk pregnancies were identified in 10.7% of participants, and 85.5% of multiparous women had an inter-pregnancy interval of ≤3 years. Awareness of PCC was extremely low (3.6%), with minimal utilisation of preconception services. Only two women reported preconception folic acid supplementation, and none had undergone preconception health screening.

Conclusion: The study highlights very low awareness and utilisation of preconception care among pregnant women in rural Odisha, indicating a significant missed opportunity within the current maternal healthcare framework. Integrating PCC into routine reproductive and primary healthcare services and strengthening community-level awareness are crucial for improving maternal and neonatal outcomes in rural India.

Keywords: Preconception care, high-risk pregnancy, reproductive health, rural population, India

Introduction

Maternal and child health (MCH) has been a key public health priority globally as well as in India [1]. Over the past few decades, the implementation of various national health programmes has resulted in substantial improvements in maternal health indicators [1]. Notably, India's maternal mortality ratio (MMR) declined by nearly 70%, from 398 per 100,000 live births in 1997-98 to 99 per 100,000 live births in 2020 [1]. Despite this progress, maternal mortality remains disproportionately higher in low-income states, and the greatest burden of maternal deaths continues to be observed in the states with low income and among women aged 20-29 years, accounting for approximately 63% and 58% of maternal deaths, respectively [1].

The decline in maternal mortality can be attributed to effective efforts undertaken by the government and other stakeholders through initiatives such as the Child Survival and Safe Motherhood Programme (1992), the Reproductive and Child Health Programme (1997), and the National Health Mission (2005) [2].

National health programmes in India have primarily focused on adolescent reproductive health, menstrual health, child health, and family planning, with maternal health interventions largely emphasizing antenatal check-ups, nutritional supplementation, immunization, and institutional deliveries [3].

Preconception care (PCC) encompasses a package of promotive, preventive, and corrective interventions aimed at detecting and addressing health-related and behavioural risk factors that could negatively influence maternal health or pregnancy outcomes, implemented before conception or during the early phase of pregnancy [4]. These health promotion interventions may be delivered before a woman's first pregnancy, beginning as early as adolescence or during the interval between successive pregnancies. Preconception interventions primarily aim to enhance nutritional status, detect and manage existing medical conditions, promote healthier behaviours, address psychosocial determinants, and reduce exposure to common environmental hazards [5]. Preconception care is not confined to clinical consultations before pregnancy; rather, it encompasses improving knowledge and fostering positive changes in attitudes and behaviours related to reproductive decision-making. Moreover, preconception care extends beyond the woman alone and should also engage partners and other family members who play a role in influencing health-related behaviours [6].

Despite its importance, pregnancy planning remains inadequate, particularly among rural and urban poor populations in India. Evidence from a qualitative study conducted in India indicates that only half of all pregnancies are planned, and a majority of women lack adequate knowledge regarding the appropriate age for childbirth and optimal pre-pregnancy weight [7]. In addition, limited access to healthcare services, poor utilisation, and sociocultural factors such as viewing pregnancy as a private or secretive event, further hinder timely engagement with preconception health services. Although initiatives promoting early registration of pregnancy have facilitated early detection and antenatal interventions, awareness and perception of preconception care remain low in the Indian context [8].

In this background, the present study was undertaken to estimate the prevalence of preconception care among pregnant women in the rural areas of Khordha district, Odisha. Generating such evidence is essential to identify existing gaps, inform context-specific interventions, and support the integration of preconception care into existing maternal health programmes, thereby strengthening the continuum of care for women and children.

Materials and Methods

Study Design, Setting, and Duration

A community-based cross-sectional study was conducted in the catchment area of the Community Health Centre (CHC) in Tangi, located in the coastal district of Khordha, Odisha, India. Tangi is a revenue block in the coastal district of Khordha, and the Community Health Centre (CHC is the only public health facility in the area serving a population of around 1,80,000. The health facility is a dedicated first referral unit (FRU) with the facility of providing emergency obstetrics care. The study was carried out among pregnant women attending the obstetrics and gynaecology outpatient clinic and Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) clinics at the health facility at CHC Tangi.

Study Participants and Sampling

The study population comprised pregnant women registered for antenatal care (ANC) in the study area during the study period. Women with a gestational age of less than 28 weeks, irrespective of parity and gravidity, and willing to provide written informed consent were included in the study. Pregnant women with a gestational age of 28 weeks or more, those not consenting, and women who were healthcare professionals or whose husbands were healthcare professionals were excluded.

The sample size was estimated based on an assumed prevalence of 24.05% for the utilisation of PCC, derived from a meta-analysis by Woldeyohannes *et al.* [9], in the absence of Indian studies. Assuming a 95% confidence level and an absolute precision of 8%, the calculated sample size was 113 participants.

A consecutive sampling technique was employed, wherein all eligible pregnant women attending the OBG outpatient department and PMSMA clinics at CHC Tangi during the study period were approached consecutively and enrolled after obtaining written informed consent until the required sample size was achieved.

Data Collection and Analysis

Data were collected through face-to-face interviews conducted by the principal investigator in the local language using a semi-structured questionnaire developed with reference to the International Federation of Gynaecology and Obstetrics (FIGO) preconception care assessment tool [10]. The questionnaire captured information on socio-demographic characteristics, obstetric history, pre-existing chronic medical conditions, nutritional supplementation, lifestyle practices, vaccination status, and pregnancy intervals. Quantitative data were recorded electronically using the Epicollect5 mobile application to ensure accuracy and minimise transcription errors.

Following data collection, the datasets were exported to Microsoft Excel for data cleaning and subsequently analysed using the Jamovi Version 2.3.28. Categorical variables were summarised using frequencies and percentages, while continuous variables were expressed as mean ± standard deviation (SD). Results were presented with 95% confidence intervals, and a p-value <0.05 was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee of Neelachala Institute of Medical Sciences, Bhubaneswar, under Utkal University, Bhubaneswar, Odisha. Written informed consent was obtained from all participants before enrolment. Participant privacy, confidentiality, and anonymity were strictly maintained throughout the study.

Results

A total of 112 pregnant women were included in the study. The socio-demographic characteristics of the participants are presented in Table 1. The majority of participants belonged to the 19-25 years age group (n=68, 60.7%), followed by the 25-30 years age group (n=30, 26.8%). Seven participants (6.3%) were aged 30-35 years. With respect to age-related high-risk categories, five participants (4.5%) were teenage pregnancies, while two participants (1.8%) were aged 35 years or above. The mean age of the

participants was 24.6 ± 4.4 years. Most participants belonged to the Other Backward Classes (n=49, 43.8%), followed by the General category (n=35, 31.3%) and Scheduled Castes (n=21, 18.8%), while seven participants (6.3%) belonged to Scheduled Tribes. All participants were Hindu by religion and housewives by occupation.

Table 1: Sociodemographic characteristics of study participants

Characteristics	n (N=112)	%
Age range		
Teenage Pregnancy	5	4.5 %
19-25	68	60.7 %
25-30	30	26.8 %
30-35	7	6.3 %
35 & above	2	1.8 %
Mean age	24.6 (20.2-29.0)	
Caste		
General	35	31.3 %
OBC	49	43.8 %
ST	7	6.3 %
SC	21	18.8 %
Religion		
Hindu	112	100%
Educational status		
No formal education	4	3.6 %
Primary school	39	34.8 %
Secondary school	20	17.9 %
High School	43	38.4 %
Intermediate & above	6	5.4 %
Family income	15897 (7934-23860)	
Occupation		
Housewife	112	100%
Family type		
Joint	108	96.4 %
Nuclear	4	3.6 %
Health Insurance		
No	66	58.9 %
Yes	44	39.3 %
Don not know	2	1.8 %

Educational attainment varied among participants: 43 (38.4%) had completed high school, 39 (34.8%) had primary education, and 20 (17.9%) had attained secondary education. A smaller proportion had education above high school (n=6, 5.4%), while four participants (3.6%) reported no formal education. More than half of the participants did not have health insurance coverage (n=66, 58.9%), whereas 44 participants (39.3%) reported being insured, and two participants (1.8%) were uncertain about their insurance status.

Obstetrics characteristics of study participants are presented in Table 2. Regarding obstetric characteristics, 44 participants (38.4%) were primigravida, while 49 (43.3%) were second gravida. A smaller proportion were gravida three (n=15, 13.4%) and gravida four (n=4, 3.6%). Among participants with a previous pregnancy (n=68), 11 (16.2%) reported a history of abortion. The outcome of the most recent pregnancy resulted in live birth for 62 participants (91.2%), while six participants reported abortion as the outcome of the last conception.

Characteristics of high-risk pregnancy in the present pregnancy of study participants are presented in Table 3. The participants are designated as high-risk pregnancies as per the guidelines of the Government of India [11]. Among women with a previous childbirth, the inter-pregnancy interval was ≤3 years in the majority (n=53, 85.5%), followed by 3-5 years in seven participants (11.3%), and more than 5 years in two participants (3.2%). The most common mode of delivery during the last pregnancy was vaginal delivery with episiotomy (n=33, 53.2%), followed by vaginal delivery without episiotomy (n=24, 38.7%), while five participants (8.1%) had undergone lower segment caesarean section. Only one participant reported a home delivery, while the remaining participants had institutional deliveries. Based on birth weight during the last pregnancy, approximately one-fifth of the newborns were classified as low birth weight (<2500 g), whereas 49 participants (79.0%) reported normal birth weight babies. Pregnancy-related complications during the last pregnancy were self-reported by only one participant. None of the participants reported a history of tobacco use, alcohol consumption, or exposure to toxic chemicals. Additionally, no participant reported a history of chronic medical conditions such as diabetes mellitus, hypertension, endocrine, mental or neurological disorders, dyslipidaemia, cardiovascular disease, haemoglobinopathies, thrombotic disorders, respiratory illnesses, urinary or sexual tract infections, autoimmune diseases, or cancer. None of the participants reported the use of any chronic medications before conception.

Table 2: Obstetrics characteristics of study participants

Characteristics	n (N=112)	%
Gravida		
Primigravida	44	38.4 %
2	49	43.8 %
3	15	13.4 %
4	4	3.6 %
Number of children		
0	48	42.9 %
1	47	42.0 %
2	14	12.5 %
3	3	2.7 %
Planned pregnancy		
Yes	67	59.8 %
No	45	40.2 %
Last obstetric history (N=68)		
History of abortion (N=68)		
No	57	83.8%
Yes	11	16.2%
Fate of last pregnancy		
Delivered	62	
Abortion	06	
Years since last child birth		
>5	2	3.2%
3-5	7	11.3%
≤3	53	85.5%
Gender of child		
Male	23	37.1%
Female	39	62.9%
Mode of delivery		
Vaginal delivery without episiotomy	24	38.7%
Vaginal Delivery with episiotomy	33	53.2%
LSCS	5	8.1%
Place of delivery		
Institutional	61	98.4%
Home	1	1.6%
Weight Category		
Low Birth Weight	13	21.0%
Normal	49	79.0%
Complications		
No	61	98.4 %
Yes	1	1.6 %

Table 3: Characteristics of high-risk pregnancy of study participants (N=12)

Characteristics	N (N=12)	%
Teenage Pregnancy	5	41.67%
35 & above	2	16.67
LSCS	5	41.67%

Pre-conceptional care

Only four participants reported having heard of preconception care (PCC) in any form. Among those aware of PCC, three participants received information from ASHA/MPFW (F), while one participant obtained the information from her treating physician. Of these, one participant, who had a history of delivering a low-birth-weight infant in her previous pregnancy, sought PCC services at a health facility, accompanied by her husband, and reported the experience to be beneficial. Only two participants reported receiving folic acid supplementation, and none had undergone haemoglobin estimation during the preconception period.

Discussion

The prevalence of knowledge about PCC was found to be very low among the study participants. Only four out of 112 (3.57%) study participants knew about PCC.

A majority of the participants reported that their pregnancy was planned (59.8%), while 45 participants (40.2%) indicated that the pregnancy was unplanned. Two-fifths of the study participants had an unintended and unplanned pregnancy, suggesting that the delivery of PCC will be difficult. In a study by Phalke *et al*. in a hospital setting, the proportion of unplanned pregnancies was reported to be as high as 54% [12]. A study by Singh *et al*., analysing the trends of decreases in unintended pregnancies, revealed that the prevalence of unintended or unplanned pregnancies declined from 31.7% in the National Family Health Survey 3 (NFHS 3) to 15.87% in NFHS 5. The study also stated that rural women had a lower chance of unintended pregnancy than urban women [13].

In our study, the prevalence of teenage pregnancy was found to be 4.46% who were aged less than 18 years during conception. But as per the Prohibition of Child Marriage Act 2006 of India, the marriage of girls less than 18 years of age is strictly punishable [14]. In our study, 10.71% study population has a high-risk pregnancy in the current pregnancy. Such pregnancies at those who are most in need of PCC. In India, an estimated 20%-30% of pregnancies are classified as high risk, yet these pregnancies account for nearly 75% of perinatal morbidity and mortality [15].

The findings of our study suggest that 85.5% study population has an inter-pregnancy interval of ≤3 years. The World Health Organization and the Government of India recommend a minimum of 3 years' gap between two children, considering it appropriate birth spacing [16].

WHO and the Government of India recommend a daily extra allowance of 0.4 mg per day [17]. This dietary supplementation of folic acid should be commenced as early as possible, usually before conception, to prevent neural tube defects. In our study, only two study participants (1.8%) received folic acid supplementation in the first trimester of pregnancy. In a study conducted by Pal *et al*., among first-trimester pregnant women of the rural Raipur district, it was found that approximately 38.8% of the pregnant women reported that they had not been advised by any source to take folic acid supplementation. A substantial proportion of participants (41.6%) were unaware of the appropriate timing for initiating folic acid supplementation, and only 1.3% correctly identified that folic acid should be taken during the preconception period [18].

No systemic or chronic illness was reported among the study participants. The incidence of systemic/chronic illness in pregnancy was reported to be 3.5% in the study by Phalke *et al*. [12] According to Choudhary S *et al*., 12.24% of pregnant women were affected by one or more medical disorders. The most common were hypertensive disorders of pregnancy (42.3%), followed by haematological conditions (38.7%), with smaller proportions reporting liver disorders (5%), endocrine disorders (4.8%), epilepsy (3.8%), and HIV infection (2.6%) [19]. Timely screening and management of systemic illnesses during the preconception period have the potential to minimize adverse maternal and perinatal outcomes.

There were no reported alcohol addiction or habituation to tobacco in our study. Three per cent of study participants in the study by Phalke *et al*. had tobacco addiction [12]. The American College of Obstetricians and Gynaecologists (ACOG) emphasises that cessation of smoking during pregnancy improves outcomes for both the mother and the foetus, with optimal benefits achieved when smoking is discontinued before 15 weeks of gestation [20]. Accordingly, preconception counselling and targeted de-addiction support are essential strategies for mitigating the harmful effects of tobacco use on maternal and fetal health.

No study participant in our study reported any mental illness, and did not give any history of consuming any chronic medication. Final findings were observed in the study by Phalke *et al*., while the prevalence of 15.3% of common mental disorders was reported in a study by Jha *et al*. [12, 21].

A systematic review by Korenbrot *et al*., including 19 clinical trials, has given evidence to support the benefit of PCC on pregnancy outcomes [22]. The interventions mentioned included health screening, supplementation of folic acid, and nutritional counselling for women with chronic illnesses like diabetes and hypertension [22]. The outcome of pregnancy can be affected by multiple medical, nutritional and behavioral risk factors [23]. The most important component of PCC has been addressing the risks before conception. Stopping smoking and alcohol use, controlling and adherence to medication in chronic diseases like hypertension, diabetes, hypothyroidism, mental illness, and other medical conditions, screening and treating sexually transmitted infections [24].

Studies have reported various factors for the limited use of PCC in low and middle-income countries like India. These include entrenched patriarchal practices, women's disadvantaged social position, and restricted decision-making power over reproductive health, inadequate awareness and use of contraceptive services, and prevailing financial limitations [23]. Considering the complex interplay of biological, psychological, and social determinants affecting women's health before and during pregnancy, multicomponent preconception care (PCC) packages are likely to be more effective. The Nashik Model is gradually gaining momentum in India and is being adopted by other states as a strategy to strengthen PCC services [25].

PCC as a practice has already been implemented in various countries around the world, including the United States, the

United Kingdom, and China. China started its PCC program in 2010 to reduce congenital anomalies and deformities [23]. A systematic review published in 2022 reported that preconception care enhances women's knowledge and reduces modifiable risk factors, although evidence supporting its effectiveness among men remains limited [26]. A descriptive study from southern Mexico similarly found low levels of awareness regarding PCC [27]. Furthermore, the uptake of PCC practices was strongly linked to educational attainment and socioeconomic status, particularly among populations already vulnerable to poor maternal and child health outcomes [27].

The findings also point to important avenues for enhancement, notably embedding preconception care within current health service delivery systems and utilizing local governance platforms to expand accessibility and coverage [28]. These results emphasize the critical necessity for tailored strategies aimed at overcoming structural, sociocultural, and educational constraints to strengthen both the acceptance and impact of preconception care. Despite broad acknowledgement within the maternal health community of the importance of effective, affordable, culturally sensitive, and evidence-based preconception care programmes, a significant shortfall remains in both the execution of available guidelines and the formulation of guidelines in settings where none currently exist.

Strengths and Limitations

This community-based cross-sectional study provides important primary evidence on the status of preconception care (PCC) among pregnant women in a rural setting of Odisha, a region where data on PCC are limited. Inclusion of women in early gestation helped minimize recall bias related to preconception practices and enabled a more accurate assessment of exposures around the time of conception. The use of a structured questionnaire adapted from the FIGO preconception care assessment tool enhanced the validity and comparability of the findings, while face-to-face interviews conducted in the local language ensured better understanding and completeness of responses. However, the cross-sectional nature of the study limits causal inference between PCC and pregnancy outcomes. As the study was conducted in a single rural health facility, the findings may not be generalisable to other rural or urban populations. Information on preconception practices and health conditions was self-reported and may be subject to recall and social desirability bias. Additionally, the exclusion of women beyond 28 weeks of gestation and the absence of male partner perspectives may have resulted in the underrepresentation of certain high-risk groups and a limited understanding of partner involvement in PCC. The assessment of weight, height and nutritional status was not done in the present study, which could have helped in more pregnant females with risk factors.

Conclusion

The present study demonstrates a strikingly low level of awareness and utilisation of preconception care among pregnant women in rural Khordha district, Odisha, despite a considerable proportion of planned pregnancies and the presence of high-risk pregnancies. Essential preconception interventions, including folic acid supplementation, health screening, and counselling, were largely absent, indicating a significant missed opportunity within the existing maternal healthcare system. These findings highlight the need to move beyond an exclusive focus on antenatal care and strengthen the continuum of care by integrating preconception services into routine reproductive and primary healthcare. Enhancing community awareness, empowering frontline health workers, and implementing culturally appropriate, cost-effective PCC strategies could play a crucial role in improving maternal and neonatal health outcomes. Further longitudinal and implementation-focused research is warranted to guide the development and scale-up of sustainable preconception care models in India.

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Author's Contribution

Not available

Conflict of Interest

Not available

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