A Community based cross sectional study on preconception awareness and use among pregnant women in rural Northen India

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Abstract— **Preconception Care (PCC) is an important part of the maternal, newborn and child health (MBCH) continuum. It is based on the principles of early detection and change of biomedical, behavioral, and social risk factors that need to be addressed prior to pregnancy. Although maternal mortality rates have improved significantly in India, maternal/perinatal morbidity remains high and is a major public health problem, particularly in the rural population and those who are socio-economically disadvantaged. There are few existing maternal health programmes in India that focus on preconception, with most stressing antenatal and in-hospital care. There is limited evidence from the community on awareness and use of PCC in India's rural areas. Hence, an effort has been made to find the extent of awareness of PCC and PCC related practices of pregnant women in the rural areas of Jaipur district, Rajasthan, in this study.**

Materials and Methods: A community based cross-sectional study was conducted among the pregnant women attending OG outpatient department Community health Centre. The women recruited were those who had signed an informed consent and had a gestational age < 28 weeks. Data was obtained on the basis of a semi structured questionnaire which was created from the FIGO preconception care assessment tool. Data on socio-demographic profile, obstetric history, high risk factors in pregnancy, life style practices, nutritional supplementation, awareness and utilization to PCC services were collected using the questionnaire. Electronic data entry and descriptive statistics were used for data analysis.

Results: For the patients included in the study, there were 112 pregnant women. The mean age of the subjects was 24.6±4.4 years. About 60% of the pregnancies had been planned while 40.2% were unplanned. Ten per cent (10.7%) of the subjects had factors indicating a risk of pregnancy. Of the multiparous women, 85.5% had an inter-pregnancy interval of 1000 days or less. Prior knowledge of PCC was reported as very low with only 3.6% of the participants indicating that they had previously heard about PCC. There was also low use of preconception services. Only two women consumed folic acid preconceptually and no woman had any type of preconception health screening.

Conclusion: This study reveals that awareness and utilization of preconception care is very low in the rural areas of Rajasthan. These results revealed that there is a significant unutilized potential in the current maternal health care system. To provide better maternal and neonatal outcomes in rural India, implementing PCC in routine maternal health and family planning services, and awareness creation, is critical.

Index Terms— **Preconception care, high-risk pregnancy, reproductive health, rural population.**

I. INTRODUCTION

Maternal and child health (MCH) remains high priority areas of global and Indian public health [1]. In the last decades, there have been some national health programmes which have greatly influenced the achievements in maternal health indicators. In India, the 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 impressive improvement, maternal mortality is not

distributed evenly, with low-income states and women ages 20 - 29 years having higher maternal mortality rates (about 63% and 58% respectively of maternal deaths) [1].

This decline in maternal deaths has largely been due to ongoing efforts of the Government and other stakeholders, which includes the launch of Child Survival and Safe Motherhood Programme in 1992, the Reproductive and Child Health Program in 1997 and the National Health Mission in 2005 – [2]. National health programmes have primarily focused on matters like adolescent reproductive health, menstrual health, child health and family planning in India. The interventions in maternal health have been concentrated mainly on antenatal care, nutritional supplements, immunization and promotion of institutional deliveries [3].

Preconception care (PCC) is the most complete collection of promotive, preventive, and corrective measures that can be taken to recognize and address biomedical, behavioral, and social risk factors that could negatively impact maternal health and/or pregnancy outcomes. The interventions take place before the conception or during the first phases of pregnancy [4]. PCC can take place prior to the first pregnancy (including at a young age), or between pregnancies. Preconception activities aim to: improve nutrition status, diagnose and correct any pre-conception medical conditions, promote healthy behavior, assess psychosocial factors and reduce exposure to some of the more common environmental risks [5].

Preconception care is not restricted to note taking, or preconception counselling, prior to pregnancy. It also entails raising awareness and fostering positive attitudes and action toward reproductive planning and decision making. Additionally, PCC should not just target women but other partners and family members who also have an impact on reproductive decisions and health-seeking behaviors [6].

Although it is acknowledged as an important issue, there is inadequate pregnancy planning in India especially among the rural and urban poor. Qualitative study conducted in India indicates that approximately 50% of pregnancy are unplanned with very limited knowledge of optimum age of marriage and also pregnancy weight gain [7]. Further, low rates of service utilization, and low access to health services and sociocultural beliefs about pregnancy and birth (e.g. pregnancy is a private matter and something to be kept quiet) contribute to the problem of not reaching preconception health services in a timely way. Programmes have been introduced for early registration of pregnancies that have helped to increase both the identification and attendance at ANMs, but the awareness and perception of preconception care in the Indian context is limited [8].

In this context, the present study was undertaken for the estimation of prevalence of preconception care, among the rural pregnant women of Jaipur district, Rajasthan. Such a study can provide evidence to determine the gaps, develop context specific interventions and provide inputs towards integrating the concept of PCC in existing maternal health programmes. Embedding PCC in the health system can help establish or reinforce the continuum of care to better health for children and women.

II. MATERIALS AND METHODS

Study Design, Setting, and Duration

A cross-sectional study was conducted in the area under the catchment of the Community Health Centre (CHC), Kotkhawada, district Jaipur, Rajasthan, India. Kotkhawada is a block of Jaipur district and the only public health care facility for the population of around 120,000 in the block is the CHC. It is a designated unit called as first referral unit (FRU) and also gives the emergency obstetric care services.

The study population was pregnant women who were attending the obstetrics and gynecology outpatient department that were held at CHC Kotkhawada.

III. STUDY PARTICIPANTS AND SAMPLING

All registered pregnant women for ANC in the study area in the Study period constituted the population for the study. Women who were under 28 weeks' pregnant, regardless of parity or gravidity and who signed informed consent forms were eligible for inclusion in the study. Women who were caregivers or whose husbands were caregivers with a gestational age ≥28 weeks and women refused to participate were excluded from the study.

Since there was no evidence from India, a meta-analysis titled “Prevalence of PCC utilization by parents and carers in the UK” assumed by the authors (Woldeyohannes et al) [9] prevalence of 24.05% was taken to calculate sample size of the present study.

With a 8% absolute precision at 95% confidence, the number of participants was estimated to be 113.

A consecutive sampling method was taken. During the period of the study, all the eligible pregnant women coming to obstetrics and gynaecology outpatient room CHC Kotkhawda were contacted in turn and included into the study with the required sample size after getting the written informed consent from them.

IV. DATA COLLECTION AND ANALYSIS

The data were obtained from the principal investigator by using face-to-face interview using local language. Data collection was done using a semi-structured questionnaire, which was designed based on the International Federation of Gynaecology and Obstetrics (FIGO) preconception care assessment tool [10]. The socio-demographic profile, obstetric history, chronic medical conditions, nutritional supplementation, lifestyles, immunizations and inter-pregnancy intervals were asked.

To enhance the accuracy and minimise the risk of transcription errors, quantitative data collection was done electronically with the mobile application Epicollect. Data gathered were exported to Microsoft Excel for cleaning and validation after data collection. Data were then statistically analyzed in Jamovi (Version 2.3.28).

The data were presented in frequencies and their percentage for categorical variables and mean ± standard deviation (SD) for continuous variables. Results are presented as 95% confidence intervals and changes were assessed for statistical significance at the 0.05 level.

V. ETHICAL CONSIDERATIONS

Prior to enrolment, written informed consent was taken from each participant. The confidentiality, anonymity and privacy of the participants were respected throughout the study.

VI. RESULTS

A total of 112 pregnant women were enrolled in the study. The mean age of the participants was 24.6 ± 4.4 years. Most women were in the 19–25 years age group, accounting for 68 participants (60.7%), followed by 30 participants (26.8%) in the 25–30 years age group. Seven participants (6.3%) were aged 30–35 years. With regard to age-related high-risk pregnancy categories, five women (4.5%) were teenage pregnancies, while two women (1.8%) were aged 35 years or above. Caste-wise distribution showed that the largest proportion belonged to Other Backward Classes, comprising 49 participants (43.8%), followed by the General category with 35 participants (31.3%), Scheduled Castes with 21 participants (18.8%), and Scheduled Tribes with seven participants (6.3%). All participants were Hindu by religion and were homemakers by occupation.

Educational status varied among the study participants. Forty-three women (38.4%) had completed high school, 39 (34.8%) had received primary education, and 20 (17.9%) had attained secondary-level education. Only six participants (5.4%) had studied beyond high school, while four women (3.6%) had no formal education. The majority of participants belonged to joint families, while only a small proportion lived in nuclear families. More than half of the women, 66 participants (58.9%), did not have health insurance coverage. Forty-four participants (39.3%) reported having health insurance, whereas two participants (1.8%) were unsure about their insurance status.

Regarding obstetric characteristics, 44 participants (38.4%) were primigravida and 49 participants (43.8%) were second gravida. Fifteen women (13.4%) were gravida three, while four participants (3.6%) were gravida four. In terms of parity, 48 women (42.9%) had no living children, 47 (42.0%) had one child, 14 (12.5%) had two children, and three women (2.7%) had three children. Overall, 67 pregnancies (59.8%) were planned, whereas 45 pregnancies (40.2%) were unplanned.

Among women with a previous pregnancy, 11 participants (16.2%) reported a history of abortion. The most recent pregnancy had resulted in live birth for 62 women, while six women reported abortion as the outcome of their last conception. Among those with a previous childbirth, the inter-pregnancy interval was three years or less in the majority, observed among 53 women (85.5%). Seven participants (11.3%) had an interval of three to five years, while only two participants (3.2%) had an interval exceeding five years.

With respect to previous delivery characteristics, vaginal delivery with episiotomy was the most frequently reported mode of delivery, seen in 33

women (53.2%), followed by vaginal delivery without episiotomy among 24 women (38.7%). Five participants (8.1%) had undergone lower segment caesarean section. Nearly all previous deliveries were institutional, reported by 61 participants (98.4%), while only one woman (1.6%) reported a home delivery. Based on birth weight of the previous child, 13 newborns (21.0%) were classified as low birth weight, while 49 (79.0%) had normal birth weight. Pregnancy-related complications in the previous pregnancy were reported by only one participant.

High-risk pregnancy factors in the current pregnancy were identified among 12 participants. These included five teenage pregnancies, two pregnancies among women aged 35 years or above, and five women with a previous history of lower segment caesarean section. None of the participants reported tobacco use, alcohol consumption, or occupational/environmental exposure to toxic chemicals. Similarly, no participant reported a history of chronic medical conditions such as diabetes mellitus, hypertension, endocrine disorders, mental or neurological disorders, dyslipidaemia, cardiovascular disease, haemoglobinopathies, thrombotic disorders, respiratory illnesses, urinary or reproductive tract infections, autoimmune diseases, or cancer. None of the women reported using long-term medications before conception.

Awareness and utilisation of preconception care were found to be very low. Only four participants reported having heard of preconception care in any form. Among them, three had received information from ASHA or MPFW(F), while one had been informed by her treating physician. Of the women who were aware of PCC, only one participant reported seeking preconception care services at a health facility. This participant had a previous history of delivering a low-birth-weight infant, attended the facility with her husband, and perceived the service as beneficial. Only two women reported receiving folic acid supplementation before conception, and none had undergone haemoglobin estimation during the preconception period.

VII. DISCUSSION

A The prevalence of knowledge regarding preconception care (PCC) was markedly low among the study participants. Only four of the 112 women, representing 3.57%, had any prior awareness of PCC.

In the present study, 59.8% of the participants reported that their pregnancy was planned, whereas 40.2% stated that it was unplanned. This indicates that nearly two-fifths of the women had unintended pregnancies, which may pose challenges for the effective delivery and uptake of PCC services. Similar concerns have been reported in other studies. For example, Phalke et al. observed that the proportion of unplanned pregnancies in a hospital-based setting was as high as 54% [12]. Singh et al., in their analysis of unintended pregnancy trends, reported a decline in the prevalence of unintended pregnancies from 31.7% in NFHS-3 to 15.87% in NFHS-5. Their study also noted that rural women had a lower likelihood of unintended pregnancy compared with urban women [13].

In this study, teenage pregnancy was observed among 4.46% of participants, who were below 18 years of age at the time of conception. This finding is important in view of the Prohibition of Child Marriage Act, 2006, under which marriage of girls below 18 years of age is legally prohibited in India [14]. In addition, 10.71% of the study population was classified as having a high-risk pregnancy in the current pregnancy. These women represent a group that could particularly benefit from PCC services. In India, approximately 20%–30% of pregnancies are considered high risk, and these pregnancies contribute to nearly 75% of perinatal morbidity and mortality [15].

The findings further revealed that 85.5% of participants had an inter-pregnancy interval of three years or less. This is lower than the recommended birth spacing advised by the World Health Organization and the Government of India, both of which recommend a minimum interval of three years between two children for optimal maternal and child health outcomes [16].

Folic acid supplementation is an important component of preconception care. The World Health Organization and the Government of India recommend a daily additional intake of 0.4 mg folic acid [17]. Ideally, folic acid should be initiated before conception to reduce the risk of neural tube defects. However, in the present study, only two participants, accounting for 1.8%, had received folic acid supplementation during the first trimester. Similar gaps have been reported by Pal et al. in a study among first-trimester pregnant

women in rural Raipur district, where 38.8% of participants had not received advice from any source regarding folic acid supplementation. Additionally, 41.6% were unaware of the correct timing for starting folic acid, and only 1.3% correctly knew that it should be initiated during the preconception period [18].

No systemic or chronic illness was reported among the participants in the present study. In comparison, Phalke et al. reported a 3.5% prevalence of systemic or chronic illness during pregnancy [12]. Choudhary et al. found that 12.24% of pregnant women had one or more medical disorders, with hypertensive disorders being the most common, followed by haematological conditions, liver disorders, endocrine disorders, epilepsy, and HIV infection [19]. Early identification and appropriate management of chronic illnesses during the preconception period can help reduce adverse maternal and perinatal outcomes.

None of the participants in the present study reported alcohol use or tobacco habituation. In contrast, Phalke et al. reported tobacco addiction among 3% of their study participants [12]. The American College of Obstetricians and Gynaecologists states that smoking cessation during pregnancy improves maternal and fetal outcomes, with maximum benefit when cessation occurs before 15 weeks of gestation [20]. Therefore, preconception counselling and de-addiction support are important strategies to reduce tobacco-related risks before and during pregnancy.

No participant in this study reported a history of mental illness or use of chronic medication. Similar findings were reported by Phalke et al.; however, Jha et al. reported a 15.3% prevalence of common mental disorders among pregnant women [12,21]. Screening for mental health conditions before conception is therefore an important yet often neglected component of comprehensive PCC.

Evidence from a systematic review by Korenbrot et al., which included 19 clinical trials, supports the positive role of PCC in improving pregnancy outcomes [22]. The reviewed interventions included health screening, folic acid supplementation, and nutritional counselling, particularly for women with chronic illnesses such as diabetes and hypertension. Pregnancy outcomes may be influenced by several medical, nutritional, and behavioural risk factors [23]. Therefore, a central objective of PCC is to identify and address such risks before conception. Important components include cessation of tobacco and alcohol use, control of chronic diseases such as hypertension, diabetes, hypothyroidism, and mental illness, ensuring medication adherence, and screening and treatment of sexually transmitted infections [24].

Several barriers contribute to the limited use of PCC in low- and middle-income countries, including India. These include patriarchal social norms, limited autonomy of women in reproductive decision-making, inadequate awareness and use of contraceptive services, and financial constraints [23]. Given the interaction of biological, psychological, and social determinants affecting women's health before and during pregnancy, multicomponent PCC packages may be more effective. In India, the Nashik Model has gradually gained attention and is being adopted by other states as a strategy to strengthen preconception care services [25].

Preconception care has already been implemented in several countries, including the United States, the United Kingdom, and China. China introduced its PCC programme in 2010 with the aim of reducing congenital anomalies and birth defects [23]. A systematic review published in 2022 reported that PCC improves women's knowledge and reduces modifiable risk factors, although evidence regarding its effectiveness among men remains limited [26]. Similarly, a descriptive study from southern Mexico reported low levels of PCC awareness and found that uptake of PCC practices was strongly associated with educational status and socioeconomic position, particularly among populations already vulnerable to poor maternal and child health outcomes [27].

The present findings highlight the need to integrate preconception care into existing health service delivery platforms and to use local governance and community-based systems to improve access and coverage [28]. These results also underline the importance of context-specific strategies to address structural, sociocultural, and educational barriers that limit acceptance and utilisation of PCC. Although the value of affordable, culturally appropriate, evidence-based preconception care is widely recognised, major gaps remain in the implementation of existing guidelines and in the development of guidelines for settings where they are currently absent.

VIII. STRENGTHS AND LIMITATIONS

This cross-sectional community-based study has provided much needed primary evidence on the state of preconception care (PCC) among pregnant women in a rural part of Northen India, where evidence on PCC is limited. Early gestation enrollment of women decreased recall bias pertaining to preconception practices and provided the opportunity for more accurate assessment of exposures near the time of conception.

The study findings were made valid and comparable because of the use of a structured questionnaire based on the tool used by workloads in the preconception setting. Face-to-face interviews, also in local language, have also allowed for a better understanding of question wording and reduced any problems with question completeness.

There are however limitations to interpreting the results. The cross-sectional design limits the opportunities for determining casual connection between PCC exposure and pregnancy outcomes. The study was undertaken in a single rural health facility, so the results might not apply to other rural or urban populations. Preconception practices and other health information were self-reported and thus prone to recall and social desirability bias.

What is more, the exclusion of women with gestational age of over 28 weeks might have resulted in the under representation of some high-risk pregnancy groups. There was also a lack of information about partner involvement in preconception care because of the lack of men's perspectives. Furthermore, other anthropometric and nutritional measurements; weight, height, nutrition etc., were not carried out in the current investigation which might have given more information of risk factors among the female prenatal subjects.

IX. CONCLUSION

In the present study the level of awareness and utilization of preconception care was found to be quite low among pregnant women residing in rural district of Jaipur, Rajasthan. This was despite the high percentage of pregnancies which were planned and some women had high risk factors in pregnancy. We found that important preconception interventions like folic acid supplementation, health screening and counselling had not been widely implemented and highlighted a missed opportunity within the current preconception care system.

The conclusions suggest that maternal health services need to go beyond providing antenatal care and the continuum of care needs to be reinforced - integrating preconception care in routine reproductive and primary healthcare services. Enhancing community-level awareness, boosting the role for frontline health workers and use of culturally acceptable and affordable PCC interventions could have a substantial impact on maternal and neonatal outcomes.

There is a need for more longitudinal studies and research on implementation to inform the scale-up and development of sustainable models of pre-conception care in India.

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