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Original article

Risk perception of medication and natural product use among pregnant women at a tertiary care hospital in India

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Abstract

Background: Pregnant women often use medications and natural products, assuming natural products are safe. However, both can carry risks, and many natural products lack proven safety during pregnancy. This study aims to assess pregnant women's risk perception and attitudes toward these products at a tertiary care hospital.

Methods: This cross-sectional study enrolled pregnant women attending the antenatal unit of a tertiary care hospital over a two-month period. Data were collected from 161 women, regardless of gestational age, using a pretested questionnaire to assess relevant factors, including sociodemographic characteristics, attitudes, and information sources.

Results: Among the participants, 61.49% were between 18 and 25 years old, with a mean age of 28.69 ± 7.38 years. A total of 88 participants (54.65%) were in their third trimester. Notably, 98.75% of the pregnant women were educated, yet 78.26% lacked knowledge about the critical timing for drug use during pregnancy. Additionally, only 6.8% considered paracetamol safe, while most viewed other analgesics and antibiotics as harmful. A significant proportion of pregnant women (92.6% and 89.05%) believed that papaya and pineapple, respectively, were harmful products to avoid during pregnancy. The risk assessment for fetal harm was low in 76.39% of participants, with an average attitude score of 15.36 (SD ± 2.14) on a scale of 5 to 20. Consequently, 90.06% of participants were categorized as having a positive attitude towards medication.

Conclusion: The results indicate that a significant percentage of women had a positive attitude towards medication. However, their risk perception regarding medication use was disappointingly low. It is critical to implement targeted educational interventions to improve health literacy and address cultural misconceptions to ensure safe medication and natural product use during pregnancy.

Keywords: Cultural Beliefs, Health Literacy, Herbal Supplements, Maternal Attitudes, Risk Perception, Natural Health Products, Pregnancy, Prescription Medications

Introduction

Pregnancy is a critical phase with major physiological changes and increased focus on maternal health. While most pregnancies are healthy, some require medical care due to conditions like preeclampsia, gestational diabetes, or pre-existing chronic diseases (1). Effective management of maternal health and medications is crucial for positive outcomes in pregnancy. Increased medication use, especially during the first trimester-a key period of fetal organ development-raises concerns about fetal safety due to potential risks and adverse effects (2,3). Belsti et al. found that about 35% of pregnant women used at least one non-supplemental medication during pregnancy, highlighting the commonality of medication use and the need to understand factors influencing these decisions (4). Studies report 4.9% to 62.4% of pregnant women use multiple medications, with 4.9% to 33.7% doing so in the first trimester, reflecting diverse medication use patterns (5).

Pregnant women's perceptions of medication risks are often influenced by cultural beliefs, personal

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experience, and healthcare advice, leading many to overestimate dangers. This can cause avoidance of beneficial treatments despite medical advances, making risk perception a key factor in medication use during pregnancy (6,7). Untreated conditions like hypertension and diabetes harm mother and baby, while underestimating medication risks can also cause fetal harm. Accurate risk assessment and informed decisions are essential during pregnancy (8). Consequently, pregnant women's evaluation of medication and herbal remedy risks is a key focus in maternal healthcare research.

Pregnant women often use herbal remedies without consulting healthcare professionals. Unlike conventional medications, the safety and efficacy of many herbal medicines during pregnancy lack strong scientific evidence, raising concerns about their potential risks to both mother and fetus (9). Many pregnant women, especially in developing countries, use herbal remedies assuming they are safe. However, some herbs pose risks, including potential birth defects when used in the first trimester. Additionally, cultural beliefs about certain foods, such as papaya and pineapple, may influence dietary practices and perceived risks during pregnancy, particularly in regions like India (8,10,11).

Media coverage and online sources play a crucial role in shaping pregnant women's perceptions of risk. Unfortunately, the information often lacks consistency and can be alarmist, thereby amplifying fears and reinforcing misconceptions (12). Unclear or inadequate communication from healthcare providers exacerbates these issues, highlighting the need for improved patient-provider interactions.

Healthcare professionals play a vital role in supporting pregnant women by providing accurate, evidence-based information and fostering trust. Approaches that promote shared decision-making and open communication between patients and providers enhance medication adherence and encourage safer health practices during pregnancy (13). Public awareness campaigns, particularly those leveraging local media and community health workers, can address cultural misconceptions and empower informed decision-making. By closing knowledge gaps, these initiatives help women navigate medication choices safely and effectively during pregnancy (14). This study aims to evaluate pregnant women's risk perceptions regarding the use of medications and natural products during pregnancy in a tertiary care hospital setting in Gujarat, providing baseline data for regional healthcare interventions.

Materials & Methods

This cross-sectional study was conducted at the Antenatal Care (ANC) Unit of a tertiary care teaching hospital located in Gandhinagar, Gujarat, India. The hospital has a capacity of 650 beds and serves as a major referral center in the region. Gandhinagar is situated approximately 23 kilometers north of Ahmedabad and lies strategically along the west-central industrial corridor connecting the megacities of Delhi and Mumbai. The tertiary care setting allowed access to a diverse population of pregnant women from urban and peri-urban areas, providing a representative sample for assessing risk perceptions related to medication and natural product use during pregnancy.

The study population included all pregnant women aged 18 years or older, at any stage of gestation, who attended the ANC unit during the two-month data collection period and consented to participate. Pregnant women with disabilities that could impair communication (such as hearing, visual, or speech impairments) or those diagnosed with psychiatric illnesses were excluded to ensure reliable data collection and comprehension of the questionnaire. Participation was entirely voluntary, and informed written consent was obtained from all eligible participants prior to enrollment.

The study protocol was reviewed and approved by the Institutional Ethics Committee of GMERS Medical College, Gandhinagar (Approval No. GMERS/MCG/IEC/11/2019). The research adhered strictly to ethical guidelines, including confidentiality of participant information, anonymity in data handling, and respect for participants' autonomy. Participants were assured that refusal to participate or withdrawal at any stage would not affect their medical care.

The sample size was calculated using Statulator.com software to ensure adequate statistical power. Assuming a 95% confidence interval (Z = 1.96), an estimated proportion of 70% for pregnant women with good risk perception about medication use, and a margin of error (d) of 6%, the minimum required sample size was determined to be 225 participants. However, only 161 participants were

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enrolled due to time constraints, which may limit generalizability.

A purposive sampling technique was employed to recruit participants conveniently during peak outpatient department (OPD) hours, maximizing the number of eligible respondents within the study timeframe. Data collection was carried out over two months by trained research assistants who conducted face-to-face interviews using printed copies of the questionnaire. This approach facilitated clarification of any doubts and ensured completeness of responses.

An anonymous, structured questionnaire consisting of 21 items was developed to capture comprehensive data on pregnant women's sociodemographic characteristics, attitudes toward medication use, risk perceptions of medications and natural products during pregnancy, and sources of information related to medication safety. The instrument was adapted from previously published and validated studies conducted internationally (8,12), ensuring relevance and reliability. The core concepts of the original questions were retained to maintain content validity. The questionnaire was translated into the local language (Gujarati) to enhance comprehension and cultural appropriateness. Back-translation was performed to verify accuracy. Two subject matter experts-a pharmacologist and a gynecologist-reviewed the questionnaire for face and content validity, ensuring that the items were clear, relevant, and appropriate for the target population. A pilot study involving 20 pregnant women was conducted to assess the clarity, understandability, and feasibility of the questionnaire in the outpatient setting. Feedback from the pilot led to minor revisions for improved clarity. To enhance depth, future studies could incorporate qualitative methods, such as focus groups, to explore cultural influences on risk perceptions.

The questionnaire was divided into four sections. The first section collected sociodemographic information through seven items, including age, education, occupation, parity, gestational age, socioeconomic status, and place of residence. The second section assessed attitudes toward medication use during pregnancy using five items measured on a 4-point Likert scale, with responses scored as Always (5 points), Sometimes (10 points), Often (15 points), and Never (20 points). The total attitude score ranged from 4 to 16, where higher scores indicated a more positive attitude toward medication use. This scoring system was reversed compared to standard Likert scales, which may cause confusion; future studies should align with conventional scoring for clarity. The third section comprised five items evaluating participants' risk perceptions regarding the use of conventional medications and herbal or natural products during pregnancy. The final section included four items that identified the sources from which participants obtained information about medication safety, such as healthcare providers, family members, media outlets, or the internet.

All collected data were anonymized and initially entered into Microsoft Office Excel 2010 for organization and cleaning. Subsequent statistical analyses were performed using GraphPad Prism version 9.4.1 for Windows, a widely used software in life sciences research that facilitates both descriptive and inferential statistics as well as high-quality graphical outputs. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were calculated to summarize the participants' sociodemographic characteristics, attitudes toward medication use, and risk perceptions related to medications and natural products during pregnancy. To explore associations between demographic variables and risk perception scores, inferential statistical tests such as chi-square tests for categorical data and t-tests for continuous variables were applied. These tests helped determine whether observed differences or relationships were statistically significant. A p-value threshold of less than 0.05 was set to indicate statistical significance, ensuring that findings reflected meaningful patterns rather than random variation. GraphPad Prism's intuitive interface and comprehensive statistical tools enabled efficient data analysis, including normality assessments and selection of appropriate tests, thereby enhancing the accuracy and reliability of the results.

Participant confidentiality was maintained throughout the study. Data were stored securely with access restricted to authorized research personnel only. No personal identifiers were included in the data analysis or reporting.

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Results

Over a two-month period, 225 pregnant women were invited to participate in the study. Of these, 161 agreed and completed the questionnaire, resulting in a response rate of 71.6%. The majority of participants (61.5%, n = 99) were between 18 and 25 years old, while 38.5% (n = 62) were aged 26 to 35 years. The participants' ages ranged from 18 to 40 years, with a mean age of 28.7 years (SD = 7.4).

Table 1. Sociodemographic characteristics (N = 161)

Variable		Frequency n (%)
Age (years)	18-25	99 (61.49)
	26-35	62 (38.51)
Marital status	Married	161 (100)
Education level	Educated	159 (98.75)
	Uneducated	2 (1.25)
Number of children (Parity)	0	69 (42.85)
	1 - 3	88 (54.66)
	> 3	4 (2.49)
History of miscarriage/ abortion	1	137 (85.09)
	≥ 1	24 (14.91)
Gestational age	1st trimester	20 (12.42)
	2nd trimester	43 (26.71)
	3rd trimester	88 (54.66)
Health problem	Yes	7 (4.35)
	No	154 (95.65)

All participants were married. Most (98.8%, n = 159) reported having received formal education, while only 1.2% (n = 2) were uneducated. Regarding parity, 42.9% (n = 69) had no previous children or pregnancies, 54.7% (n = 88) had one to three children, and 2.5% (n = 4) had more than three children. In terms of obstetric history, 14.9% (n = 24) had experienced a single miscarriage, while 85.1% (n = 137) reported two or more miscarriages.

This high miscarriage rate may reflect referral bias at a tertiary care center and warrants further investigation. At the time of data collection, 54.7% (n = 88) were in their third trimester, and 26.7% (n = 43) were in their second trimester.

Figure 1. Awareness about common drugs which can be used in pregnancy

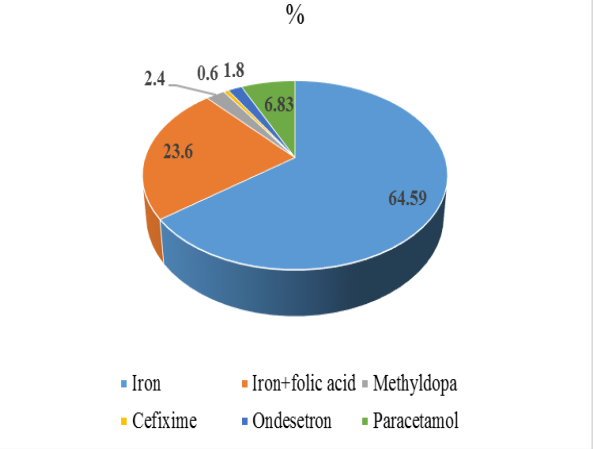
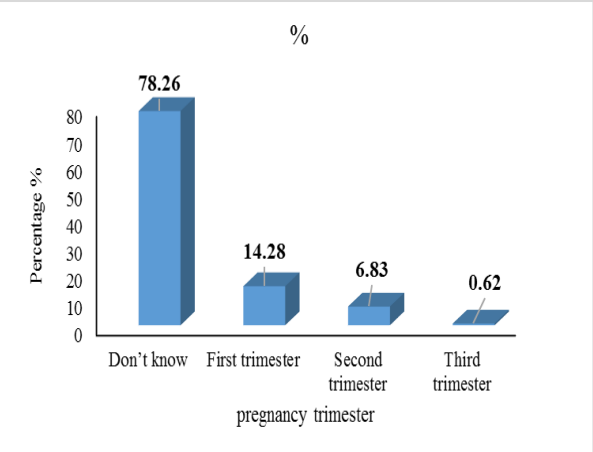


Figure 2. Critical time for drug usage during pregnancy



A substantial proportion (88. 8%) had not used any medication during previous pregnancies. However, during the current pregnancy, 64.6% reported taking iron supplements, and 23.6% used both iron and folic acid.

Only 6.8% of participants considered paracetamol safe for use in pregnancy, while most viewed other analgesics and antibiotics as unsafe. The majority were unable to name specific medications considered harmful during pregnancy.

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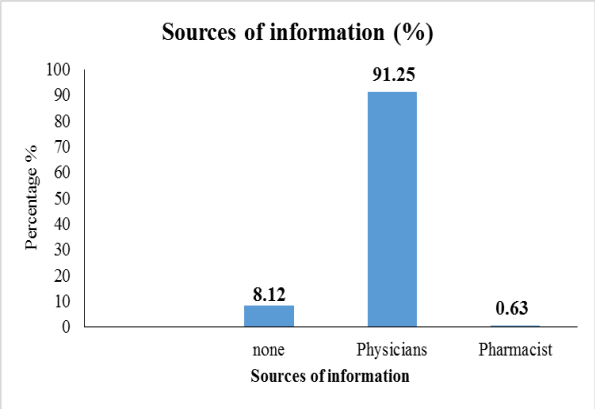
Figure 3. Sources of information



When asked about herbal medicines, 43% identified cinnamon as potentially harmful during pregnancy; awareness of other harmful herbs was limited. Dietary beliefs were notable: 92.6% believed papaya should be avoided during pregnancy, and 89.1% held the same view regarding pineapple. A small minority (5.4%) considered foods such as banana, meat, fish, eggs, black plum, and pumpkin to be harmful.

Overall, 76.4% of participants demonstrated a low level of risk awareness regarding potential harm to the fetus from medications and dietary choices, suggesting significant gaps in knowledge.

Physicians were the primary source of information for 91.3% of participants, while pharmacists were consulted by only 0.6%. Most participants (87.5%) reported having received information from a physician about the potential risks of medication use during pregnancy. Nearly all (98.2%) read the information leaflets accompanying their medications, yet 75.8% expressed a need for more information about medication use during pregnancy.

Table 2. Pregnant women's attitude towards medications use in pregnancy

Questions	Response level	Frequency n (%)	Mean ± SD
Before using any medication, do you look at the medication leaflet?	Always	2 (1.24)	2.95 ± 1.08
	Sometimes	21 (13.04)	
	Often	29 (18.01)	
	Never	108 (67.08)	
Do you stop to take your medicines on days when your normal routine is disturbed For example, when you attend a family function/ festival?	Always	2 (1.24)	2.92 ± 1.06
	Sometimes	18 (11.16)	
	Often	31 (19.25)	
	Never	110 (68.32)	
Do you skip a dose when you are feeling better?	Always	3 (1.86)	2.70 ± 0.97
	Sometimes	20 (12.42)	
	Often	11 (6.83)	
	Never	127 (78.88)	
Do you stop taking your medicines when you feel any discomfort (side effects) without consulting your doctor?	Always	3 (1.86)	2.72 ± 0.98
	Sometimes	19 (11.80)	
	Often	13 (8.07)	
	Never	126 (78.26)	
Do you modify the dosage of medicines based on home glucose monitoring without consulting your doctor?	Always	1 (0.62)	1.07 ± 0.38
	Sometimes	5 (3.11)	
	Often	0 (0.00)	
	Never	155 (96.27)	

Despite this, 67.1% never checked the medication leaflet before taking a drug, and 68.3% did not discontinue medication on days when their daily routine was disrupted. Notably, 78.9% reported adherence to prescribed regimens, not skipping doses even when feeling better. In the event of discomfort or side effects, 96.3% stated they would discontinue the medication without consulting a physician.

The average attitude score toward medication use was 15.4 (SD = 2.1; range: 5–20). Approximately 90% of participants exhibited a positive attitude toward medication use in pregnancy, with a significant positive correlation observed among women with a history of multiple miscarriages ($p < 0.0001$).

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Discussion

This study explored pregnant women's attitudes and risk perceptions about medication use, showing these views significantly affect healthcare decisions. While awareness of risks is important, misconceptions can lead to harmful outcomes, including unnecessary pregnancy termination. The findings stress the need for accurate, balanced information from healthcare providers to support informed choices during pregnancy (16–19). This study is the first in Gujarat to explore pregnant women's perceptions and attitudes toward medication use during pregnancy. The average age of participants was similar to that reported in comparable research, and the literacy rate among participants was notably high. These demographic characteristics align closely with previous studies conducted in similar populations (8).

In this study, iron supplements were the most commonly used medications among pregnant women, followed by iron with folic acid, with other drugs used less frequently. Medication use prevalence was comparable to or lower than that in many European countries, except Denmark, where it was lower. This may reflect the lower rate of chronic conditions in our participants. Overall, medication use during pregnancy appears to vary based on population health and regional factors (12,21). This discrepancy may also stem from differences in healthcare access or cultural attitudes toward medication. The findings highlight the importance of healthcare providers clearly communicating medication risks to pregnant women, especially for over-the-counter drugs.

According to the FDA, medications like iron, paracetamol, ondansetron, methyldopa, and cefixime are Category B, meaning animal studies show no fetal risk but human data are limited. Folic acid is Category A, with strong evidence of safety in pregnancy. This underscores the need for informed, personalized counseling to balance benefits and risks in medication use during pregnancy (22).

Pregnant women often have limited knowledge about which medications may pose risks during pregnancy, leading to cautious but uninformed attitudes. Enhancing education and clear communication from healthcare professionals is essential to ensure safe medication use and protect maternal and fetal health (23). These findings highlight a common lack of awareness among pregnant women about potentially harmful medications, emphasizing the need for targeted educational interventions to improve medication safety during pregnancy (16, 25). The high prevalence of cultural beliefs, such as avoiding papaya and pineapple, suggests that educational interventions should incorporate community-based approaches to address these misconceptions. While knowledge about medication safety during pregnancy is generally limited, some studies indicate that a notable proportion of pregnant women possess awareness of drugs to avoid, highlighting variability in understanding and the importance of continued education.

Our study found that only a small proportion of pregnant women believed that medications should be avoided during the first trimester. This contrasts with findings from Shah et al., where a larger percentage of women thought medications should be avoided primarily in the third trimester, followed by the second and then the first trimester (23). These differences reflect varying perceptions of medication risks at different pregnancy stages, influenced by cultural, educational, and healthcare factors. Many women view the first trimester as critical due to fetal organogenesis, yet excessive caution may lead to underuse of necessary treatments (8). Kazma et al. found that most participants believed medications could be safely used during any trimester, reflecting a more permissive attitude toward medication use in pregnancy. This highlights the variation in perceptions about medication safety and underscores the need for clear, evidence-based counseling by healthcare professionals to promote safe practices (27). Hatteb et al. highlighted that limited medication knowledge among pregnant women in some Asian countries may relate to socioeconomic factors. Similarly, our study found few mothers had adequate understanding of medication use during the vulnerable first trimester. These results stress the need for better education and communication to inform safe medication practices in pregnancy (29).

Inappropriate medication use during the first trimester can significantly affect fetal development, emphasizing the necessity for healthcare providers to engage in clear, unbiased discussions with pregnant women about the potential risks and benefits of medication use during pregnancy (16). Effective communication is vital to empower women to make safe health decisions for themselves and their fetus. Our study found that while most pregnant women have

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a positive attitude toward medication use, some remain concerned about fetal harm. This aligns with previous research showing expectant mothers generally support medication use but favor caution, highlighting the important role of healthcare providers in guiding informed discussions about medication safety during pregnancy (15, 24, 21).

Cultural beliefs significantly shape dietary practices during pregnancy in India, reflecting the country's diverse cultural landscape. For example, papaya is traditionally avoided by pregnant women due to fears of causing stomach discomfort or miscarriage. A considerable portion of women in our study believed that consuming papaya during early pregnancy could lead to miscarriage and might contribute to maternal hypertension (30). Our findings show that many pregnant women avoid papaya and pineapple, mainly due to concerns that pineapple's bromelain may soften the cervix and increase miscarriage risk, as well as fears about its high sugar content contributing to gestational diabetes. These beliefs reflect cultural practices in regions like India, where certain fruits are traditionally avoided to protect fetal health (30,31). Food taboos in pregnancy are strongly influenced by family and community, especially advice from elder female relatives. Similar patterns in regions like West Bengal highlight the importance of cultural and social factors in shaping maternal nutrition (31).

Research from India has indicated that physicians and healthcare professionals are frequently regarded as the main source of information on medication use during pregnancy (23). Similarly, our findings demonstrate that the vast majority of pregnant women consider physicians to be their primary resource for drug-related information, while the involvement of pharmacists is notably limited. This pattern is consistent with the results reported by Terfera et al. (16) and Kazma et al. (27), who also observed that healthcare providers are the predominant source of medication guidance for pregnant women. On a global scale, studies have shown that a substantial proportion of pregnant women rely on doctors for advice regarding medication use, underscoring the essential role of healthcare professionals in supporting informed medication decisions during pregnancy (8,32–34). The limited role of pharmacists suggests an opportunity to expand their involvement through targeted training and integration into antenatal care.

Physicians were identified as the primary source of information about medications, while pharmacists played a much smaller role (29). The trust placed in healthcare providers is a key factor in shaping medication adherence and dispelling misconceptions about drug safety. Pharmacists also contribute by advising on symptom management and ensuring safe medication use (34).

The study's limitations include its single-center design and relatively small sample size, which may affect the generalizability of the findings. The high miscarriage rate reported may reflect referral bias at a tertiary care center, limiting applicability to primary care settings. The short duration of data collection may also limit the ability to observe longer-term trends. Additionally, reliance on self-reported data introduces potential recall or social desirability bias. Further studies with larger and more diverse populations, as well as longer follow-up periods, are recommended to confirm and expand upon these findings. Incorporating qualitative methods, such as focus groups, could provide deeper insights into cultural influences and decision-making processes.

Conclusion

This study highlights pregnant women's generally positive attitudes toward medication use in Gujarat but also reveals significant uncertainty and limited knowledge about drug safety, especially in the first trimester. Cultural beliefs and healthcare providers, mainly physicians, strongly influence these perceptions, while pharmacists play a minor role. The findings emphasize the need for clear, evidence-based communication and targeted education to address misconceptions and support informed decision-making. Integrating pharmacists and community health workers into antenatal care and leveraging local media for public health campaigns could enhance health literacy and maternal outcomes. Further research with larger, diverse populations is needed to strengthen these insights and inform public health strategies.

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Conflicts of Interest

No declared conflicts of interest.

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