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ORIGINAL ARTICLE

Perceptions, practices, and fasting patterns of pregnant women during Ramadan: a multi-center study in Rawalpindi and Islamabad

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ABSTRACT

Objective: To assess perceptions, practices, fasting patterns, and sleeping habits of pregnant women during Ramadan in Rawalpindi and Islamabad cities of Pakistan.

Methods: A cross-sectional study was conducted during Ramadan 1444H (2023) at three private and two public hospitals. Ethical approval was obtained from Shifa International Hospital and Rawalpindi Medical University. Pregnant women with singleton, spontaneous conceptions attending antenatal clinics were included, while those with multiple pregnancies, assisted conception, or significant medical complications were excluded. Data were collected through a structured, self-administered questionnaire. Socioeconomic groups were stratified by hospital type. Data were analyzed using SPSS-21, employing chi-square, t-tests, Wilcoxon signed-rank test, and logistic regression.

Results: Of 1004 participants, 73.0% reported fasting during Ramadan, with 58.1% fasting for 21–30 days. Fasting was more prevalent among lower-income women (82.2%) compared to higher-income women (66.0%, $p<0.0001$) and among Pathan (86.9%) compared to Punjabi (75.4%) women ($p=0.004$). First-trimester women fasted more (86.3%) than third-trimester women (69.8%, $p<0.0001$). Religious sentiment was the most common reason for fasting (79.6%). Mean weight and BMI were significantly lower in fasting women. Daytime sleep increased (1.8±1.9 to 2.4±2.1 hours), whereas nighttime sleep decreased (7.0±1.8 to 5.7±2.1 hours) during Ramadan ($p<0.0001$). Logistic regression identified trimester, ethnicity, religious sentiment, and perception that women should "never fast" as significant predictors, correctly classifying 80.6% of cases.

Conclusion: Most pregnant women in Rawalpindi/Islamabad fast during Ramadan, primarily due to religious conviction, with patterns influenced by socioeconomic status, ethnicity, and trimester. These findings highlight the need for culturally sensitive counseling by healthcare providers.

Keywords: Pregnant People (MeSH); Ramadan (Non-MeSH); Pregnant Women (MeSH); Perception (MeSH); Practice (MeSH); Private Practice (MeSH); Professional Practice (MeSH); Religion (MeSH); Food (MeSH); Fasting (MeSH).

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INTRODUCTION

Ramadan, the ninth month of the Islamic lunar calendar, is a sacred period during which all adult Muslims are obliged to fast from dawn to sunset, as emphasized in the Holy Quran.[1] Exemptions are permitted under specific conditions, including pregnancy, where expectant mothers may defer fasting if they believe it could endanger their health or that of the fetus. According to a Hadith, "Allah has relieved the traveler of the obligation of fasting and half prayers, and he has relieved the pregnant and nursing women of the obligation of fasting".[2] Despite this allowance, evidence indicates that nearly three-fourths of pregnant women observe fasting during Ramadan. Globally, the proportion of pregnant Muslim women who fast ranges from 70% to 90%, as reported in countries such as Iran, England, Singapore, the United States, Gambia, Yemen, and Pakistan.[3-6] Literature suggests that prolonged periods without food may slow placental growth and predispose offspring to long-term health conditions, including cardiovascular diseases, diabetes mellitus, and hypertension.[7] Additionally, changes in dietary and sleeping patterns, accompanied by reduced rest, may adversely affect maternal and neonatal health.[3]

Nevertheless, most pregnant Muslim women continue to fast, with their decision influenced by factors such as age, body mass index, education, parity, cultural norms, and personal beliefs.[7,8] Previous studies have explored maternal perceptions and practices regarding Ramadan fasting,[8-11] including some studies conducted in Pakistan.[6,7,12] However, these were mostly single-center studies with small sample sizes and limited representation of socio-economic diversity. Furthermore, existing literature presents conflicting evidence, with reports on whether pregnant women perceive fasting as obligatory ranging from 47%[10] to 95.7%.[7]

Given these inconsistencies, there is a need for broader, multi-center research addressing diverse socio-economic groups. This study was therefore designed to assess pregnant women's perceptions, practices, fasting trends, and sleeping patterns during Ramadan in selected private and public hospitals in Islamabad and Rawalpindi cities of Pakistan. The findings are intended to guide gynecologists and general

physicians in providing culturally sensitive and evidence-based counseling to pregnant women regarding Ramadan fasting.

METHODS

This convenient, cross-sectional study was conducted during Ramadan 1444H (2023) in Islamabad and Rawalpindi. Three private hospitals, Shifa International Hospital, Islamabad; Al-Raazi Hospital, Islamabad; and Al-Raazi Hospital, Rawalpindi; and two government hospitals, Benazir Bhutto Hospital and Holy Family Hospital, Rawalpindi, both affiliated with Rawalpindi Medical University, were selected as study sites. Ethical approval was obtained from Shifa International Hospital (IRB #0103-23) and Rawalpindi Medical University (Ref. No. 336/IREF\RMU\2023). Additional permission for data collection was granted by the Al-Raazi hospitals.

All pregnant women attending these hospitals for prenatal care during Ramadan were invited to participate. Eligible participants included Pakistani women with singleton pregnancies conceived spontaneously. Women with multiple pregnancies, assisted conceptions, or known medical complications (e.g., pre-existing diabetes mellitus, chronic hypertension, intrauterine growth restriction, or intrauterine demise) were excluded. Participants were approached in the waiting areas of antenatal clinics by trained field investigators, who explained the study objectives. Those who consented were provided with a self-administered questionnaire. Participation was voluntary, and respondents were allowed to skip questions, leading to variability in the number of responses across items.

Data collected included sociodemographic characteristics, perceptions, practices, fasting patterns, reasons for fasting, and sleeping habits. Hospitals were categorized into three groups based on the socioeconomic profile of their patients:

• Group 1: Shifa International Hospital (high socioeconomic group)

• Group 2: Al-Khidmat Raazi Hospitals (middle to upper-middle socioeconomic groups, with subsidized hospital charges).

• Group 3: Rawalpindi Medical University Hospitals (low socioeconomic group, with free services)

Data were analyzed using SPSS version 21. Chi-square and independent sample t-tests were applied to compare categorical and continuous variables, respectively, between fasting and non-fasting women. The Wilcoxon signed-rank test was used to compare mean sleeping hours before and during Ramadan. Logistic regression analysis was performed to identify predictors of fasting status, and odd ratios (ORs) were calculated for categorical variables.

RESULTS

A total of 1004 pregnant women consented to participate in the study. Of these, 213 (21.2%) were from Group 1 (Shifa International Hospital), 343 (34.2%) from Group 2 (Raazi Hospitals), and 448 (44.6%) from Group 3 (government hospitals). The mean age of participants was 28.4 ± 5.1 years, and the majority (83.5%, 790/946) were housewives. The mean weight of fasting women (65.4 kg) was significantly lower than that of non-fasting women (69.1 kg) (p=0.006). Nearly three-fourths (74%) of the women reported a monthly household income of less than 50,000 Pakistani Rupees. A higher proportion of fasting women resided in rural areas (81.9%, 249/304) compared with urban areas (76.9%, 526/684).

Fifty-nine percent (582/987) of the participants indicated their qualifications were up to the matriculation. The pregnant women in the lower-income groups (< Rs. 50,000/-) fasted more (82.2%, 583/709) than the upper-income groups (> Rs. 75,000/-) of women (66.0%, 107/162) (p<0.0001). Nearly 70% (682/986) of the participants identified as Punjabi. A significantly higher proportion of Pathan women fasted (86.9%, 106/122) compared with Punjabi women (75.4%, 514/682) (p = 0.004).

Overall, 73% of participants (733/1004) reported fasting for at least one day during Ramadan. Among those who fasted, 58.1% (426/733) observed fasting for 21-30 days. The proportion of women who fasted at least one day was significantly lower at Shifa International Hospital (61.0%, 130/213) compared with Raazi Hospitals (81.0%, 278/343) and Rawalpindi Medical University hospitals (83.5%, 374/448) [Table I].

Table II shows the use of medicine and the trimesters during Ramadan. Eighty-six percent (347/402) of women who were in the first trimester fasted during Ramadan; however, 69.8% (217/311) of third-trimester pregnant women fasted during this period, and this difference was statistically significant (P<0.0001). Only the iron supplement showed significant use between fasting and non-fasting pregnant women. Sixty-one percent (479/780) of fasting women used iron supplements during pregnancy, while 68.6% (153/223) of non-fasting women used those supplements (p=0.05) [Table II].

Table III shows pregnant women's perceptions and practices regarding Ramadan fasting. A significantly higher proportion of fasting women (84.0%, 584/696) believed that healthy pregnant women should fast during Ramadan, while only 56.2% (117/208) of non-fasting women thought the same. This difference was highly significant (p<0.0001). At the same time, 79.7% (550/690) of fasting women stated that those with high-risk pregnancies should not fast. When asked about appropriate timing, approximately 15% more fasting than non-fasting women felt that pregnant women should fast in each trimester. Regarding motivations, nearly 80% (622/782) of fasting women cited "religious sentiment" as their reason for fasting, whereas only 3.8% (28/737) reported pressure from husbands, family, or society.

The average daytime sleep before Ramadan was 1.8±1.95 hours, which increased to 2.35±2.1 hours during Ramadan. The average nighttime sleep before Ramadan was 6.95±1.8 hours, reduced to 5.67±2.1 hours during Ramadan. The total sleeping hours before and during Ramadan were 8.53±2.5 hours and 7.96±2.5 hours, respectively. The Wilcoxon Signed Rank test showed that these changes were statistically significant (p<0.0001).

Table I: Demographic factors and prevalence of fasting categorized by fasting and non-fasting pregnant women

Demographic variables		Did you fast during Ramadan?			Total	Mean±SD OR percentage
		Yes	No	p-value		
Age (year)		28.26 ±5.1	28.88±5.1	0.071	989	28.4±5.1
Weight (kg)		65.4±13.6	69.1±15.6	0.0006	835	66.2±14.1
Height (cm)		158.84±11.8	159.64±7.9	0.961	643	159.0±8.9
Body Mass Index (kg/m^2)		25.84±5.4	27.64±5.9	0.003	569	26.2±5.6
Residency	Urban	526 (76.9)	159 (23.1)	0.071	685	69.3
	Rural	249 (81.9)	55 (18.1)		304	30.7
Occupation	Housewife	635 (80.4)	155 (19.6)	0.006	790	83.5
	Working	110 (70.5)	46 (29.5)		156	16.5
Education grades	Matric and lower	477 (82.0)	105 (18.0)	0.002	582	59.0
	Intermediate and bachelor	276 (72.3)	106 (27.7)		382	38.8
	Master and above	18 (81.8)	4 (18.2)		22	2.2
Monthly Income (PKR)	<25,000	274 (83.0)	56 (17.0)	<0.000	330	34.6
	25,000 – 50,000	309 (81.5)	70 (18.5)		379	39.7
	50,001 – 75,000	59 (71.1)	24 (28.9)		83	8.7
	75,001 – 100,000	50 (69.4)	22 (30.6)		72	7.5
	>100,000	57 (63.3)	33 (36.7)		90	9.4
Ethnicity	Punjabi	514 (75.4)	168 (24.6)	0.004	682	69.2
	Pathan	106(86.9)	16 (13.1)		122	12.4
	others	150 (83.3)	31 (16.7)		181	18.4
Did you fast last Ramadan?		733 (73.0)	271 (27.0)	–	1004	–
How many days?	1 – 10 days	141 (19.2)	271	<0.000	1004	–
	11 – 20 days	166 (22.6)				
	21 – 30 days	426 (58.1)				
Hospital	SIH	130 (61.0)	83 (39)	<0.000	213	21.22
	Raazi	278 (81.0)	65 (19)		343	34.16
	RUM	374 (83.5)	74 (16.5)		448	44.62

PKR: Pakistani Rupees; SIH: Shifa International Hospital; RMU: Rawalpindi Medical University Hospitals

Before applying logistic regression for the estimation model, the Spearman correlation coefficients were used to find out the variables with a significant correlation between Ramadan fasting (yes/no) and other independent variables. The variables with significant correlations came out as follows: residence (urban/rural), monthly income, education, weight, occupation, ethnicity, trimester, religious sentiment for fasting, and whether pregnant women should fast in the 1st, 2nd, or 3rd trimester or never. Logistic regression was employed to determine the model for Ramadan fasting (yes/no) as a dependent variable, with the independent variables with significant correlations mentioned above. The Forward Wald method was used to develop the model. The final model is shown in Table IV. The significant factors identified by the logistic regression between 'fasting' and 'non-fasting' women were: Pregnant women should never fast, the trimester in which pregnant women should fast, religious sentiment for fasting, and ethnicity. Pregnant women who fasted in 1st trimester were almost 4.7 times more likely to fast than those in 3rd trimester. Pregnant women who picked up 'religious sentiment' for fasting were 2.6

Table II: Medical history and use of medicine

Variables		Did you fast last Ramadan?		p-value	Total
		Yes	No		
Trimester	1st	347 (86.3)	55 (13.7)	<0.0001	402 (42.8)
	2nd	168 (74.0)	59 (26.0)		227 (24.1)
	3rd	217 (69.8)	94 (30.2)		311 (33.0)
Folic Acid		549 (70.4)	160 (71.7)	0.693	709 (70.7)
Iron		479 (61.4)	153 (68.6)	0.050	632 (63.0)
Multivitamins		362 (46.4)	106 (47.5)	0.767	468 (56.7)
Other medicines		254 (32.6)	68 (30.5)	0.559	332 (32.1)

Table III: Perception of pregnant mothers regarding Ramadan fasting

Questions and options		Fasting n (%)	Non-Fasting n (%)	p-value	Total (%)
Is fasting compulsory in pregnancy for a healthy woman?	Yes	584 (83.9)	117 (56.2)	<0.0001	701 (77.5)
	No	72 (10.3)	60 (28.8)		132 (14.6)
	Do not know	40 (5.7)	31 (14.9)		71 (7.9)
Is fasting compulsory in high-risk pregnant women?	Yes	93 (13.5)	12 (5.7)	0.005	105 (11.7)
	No	50 (79.7))	178 (84.8)		728 (80.9)
	Do not know	47 (6.8)	20 (9.5)		67 (7.4)
When should pregnant women fast?	never	45 (5.8)	49 (22.1)	<0.0001	94 (9.4)
	1st Trimester	386 (48.6)	74 (33.3)		460 (46.0)
	2nd Trimester	324(41.6)	57 (25.7)		381 (38.1)
	3rd Trimester	307 (39.4)	60 (27.0)	0.001	367 (36.7)
What are the reasons?	Religious Sentiments for fasting	622 (79.6)	128 (57.4)	<0.0001	750 (74.7)
	Pressures from husband	18 (2.3)	4 (1.8)	0.642	22 (2.2)
	Family and society's compulsion	10 (1.3)	6 (2.7)	0.139	16 (1.6)
	Difficult to complete the days of fasting after Ramadan	165 (21.2)	37 (16.6)	0.132	202 (20.2)

times more prone to fast than the women who did not pick up that option. Pathan pregnant women were 2.75 (1/0.363) times more likely to fast than Punjabi pregnant women. The computation showed that this model could correctly classify up to 80.6% with these variables. with a sensitivity (fasting yes) of 97% and a specificity (fasting no) of 19.2%.

DISCUSSION

This study is the first multi-center investigation in Pakistan to explore pregnant women's perceptions, practices, and fasting patterns during Ramadan across diverse socioeconomic groups. By including five hospitals in Rawalpindi and Islamabad, ranging from a high-end private institution to charity-based and government-funded facilities, the study ensured representation of women from high-, middle-, and low-income backgrounds. This broad sampling framework enhances the generalizability of the findings and provides a more comprehensive understanding of how socioeconomic context influences fasting practices among pregnant women in our local set up.

The average age of fasting pregnant women was approximately six months lower than that of non-fasting women. Their mean weight was nearly four kilograms lower, a difference that was statistically significant. These findings suggest that fasting women were generally younger and leaner than their non-fasting counterparts. However, several other studies have reported contrasting results.[12-15]

This study showed that 73% of pregnant women fasted at least one day during Ramadan. This percentage was slightly lower than the fasting percentage of pregnant women in Malaysia (89.7%%),[10] Lebanon (85%),[13] Thailand (87%)[15], Singapore (87%),[16] and Bangladesh (99%)[17] but higher than in Germany (43%).[18] A few studies of Pakistan[6,7] also showed higher percentages of fasting pregnant mothers than this study. However, a study of Karachi[3] showed a marginally lower percentage (68.8%). Among the fasting pregnant women, 58% fasted for 21 to 30 days. This result is comparable to the study of Shabudin,[10] Ghazal,[13] Alaeddine,[14] Saro,[15] Joosoph,[16] and Safari.[19] Pregnant women in rural areas fasted at a higher percentage than those in urban areas. Ghazal et al.[13] also showed the same trend in their study. More than eighty percent (83.5%) of the participants were housewives. This result is similar to the study of Iraq,[19] but showed a lot more than the studies of

Table IV: Logistic regression analysis of factors associated with Ramadan fasting among pregnant women

Variables		B	S.E	p-value	Odds Ratio
Constant		-0.680	0.201	<0.0001	0.375
Never (yes vs no)		-1.587	0.306	<0.0001	0.205
Trimester	1st vs 2nd	0.908	0.278	0.001	2.479
	1st vs 3rd	1.552	0.278	<0.0001	4.720
Religious Sentiment (yes vs no)		0.975	0.226	<0.0001	2.653
Ethnicity	Punjabi vs Pathan	-1.014	0.397	0.001	0.363
	Punjabi vs other than Pathan	-0.533	0.276	0.053	0.587

Sensitivity (fasting yes)=97.0%, Specificity (fasting no)=19.2%, Total correct classification=80.

Germany,[8] Malaysia,[10] Lebanon,[14] and Thailand.[15] A study in Karachi showed a much higher percentage of housewives among fasting pregnant women than this result.[3] Islamabad's standard of living is much higher than that of Karachi. Therefore, more women need to work in Islamabad to cover their household expenses than in Karachi. Eighty percent of the pregnant women who fasted during Ramadan came to Government hospitals, 81.0% of the fasting pregnant women visited the Raazi hospitals (Group 2), and 61.0% of the fasting pregnant women visited the SIH. The women with low socio-economic status (<Rs. 50,000/- or lower) fasted significantly in a higher percentage than the upper socioeconomic category (>Rs. 50,000/-). It indicates that socioeconomic status plays a significant role in the fasting of pregnant women during Ramadan. However, other studies did not show any significance of socioeconomic groups and the fasting trends.[3,9,12]

The study showed that significantly more pregnant women fasted in the first trimester than in the second and third trimesters. This trend is due to the misconception that fasting in the first trimester does not affect the fetus. However, most studies showed that the first and second trimesters are riskier than the third trimester.[3,9,16,18] An earlier short study of Karachi showed that the average weight of the newborns of the fasting mothers who fasted more than 20 days in the first trimester was 288 grams less than that of non-fasting pregnant women in the same trimester.[3]

The literature indicates that pregnant women should avoid fasting in the first and second trimesters. About 84% of pregnant women in the fasting group indicated that a healthy pregnant woman should fast. Surprisingly, 56% of the pregnant women in the non-fasting group also shared this opinion. This result is quite close to the results obtained by Masood et al[7] (95%), Shabudin (92.0%),[10] Mubeen et a (88%),[6] Selermann et al (93%),[18] Joosoph et al (83%),[16] and Saro and Saro (84%).[15] However, a few studies showed lower percentages of this perception.[9,12,19] It shows that many pregnant women believe healthy women should adhere to fasting. However, nine out of ten women believed that women should not fast if they were in the high-risk group. Safari also showed almost the same result for Iraqi pregnant women.[19] However, Saro showed that a higher percentage of Thai-Muslim women indicated that pregnant women should fast, even if they are in the high-risk group.[15] This finding suggests limited awareness of Islamic teachings among Thai women, as jurisprudence permits postponing fasting in high-risk situations. Perceptions of fasting across trimesters mirrored actual practice, showing a decline from the first to the third trimester-contrary to literature highlighting greater adverse outcomes in later pregnancy.[3,9,16] Nearly 80% cited religious sentiment as the primary reason for fasting, whereas only 3.6% reported family or societal pressure. Similar to Lebanese and Iraqi studies,[13,19] this indicates that fasting decisions are largely personal and faith-driven, countering the misconception that Muslim women fast due to compulsion from husbands or families.

This study found that average daytime sleep significantly increased during Ramadan, while nighttime sleep decreased, resulting in an overall reduction in total sleep duration. Similar patterns have been reported by Alaeddine,[14] Saro,[15] and Seiermann.[17] These changes are attributable to late-night prayers and early morning meals (Sahoor), with missed nighttime sleep partially compensated by daytime rest.

The regression model identified key predictors of fasting: the response of 'never' fasting during pregnancy, trimester, religious sentiment, and ethnicity. Among these, religious sentiment and ethnicity were the strongest indicators. Women who cited religious conviction were 2.6 times more likely to fast, while Pathan women were 2.7 times more likely to fast than Punjabi women. This greater inclination among Pathan women may reflect stronger religiosity, lower educational attainment, and poorer socioeconomic status compared with Punjabi women. Other studies have likewise highlighted spirituality as a major determinant of fasting during pregnancy.[10-12]

Strengths and weaknesses: This study's large sample size and inclusion of participants from diverse socioeconomic groups represent major strengths. However, its findings may not be generalizable to all of Pakistan, as the data were limited to Islamabad and Rawalpindi. Islamabad, being the capital city, is characterized by a higher standard of living, better infrastructure, and a larger proportion of educated government employees compared with other regions, which may influence health behaviors and religious practices. Rawalpindi, as Islamabad's twin city, is also affected by these dynamics. Data collection during Ramadan minimized recall bias, though the exclusion of women not attending antenatal clinics remains a limitation. Despite these constraints, the study provides valuable insights into pregnant women's beliefs and practices regarding fasting, enabling

physicians and gynecologists to better counsel their patients. The predictive model suggests that by asking a few targeted questions, physicians can predict with 97% accuracy whether a woman is likely to fast.

CONCLUSION

This study showed that approximately three-fourths of the pregnant women fasted at least one day, and the Pathan pregnant women are more inclined towards fasting than other racial groups. Furthermore, a significantly higher percentage of pregnant women fasted in the first trimester than in later trimesters. In addition, eight of the ten pregnant women fasted due to 'religious sentiments, and the same ratio believed that healthy pregnant women should fast during Ramadan. It was also noted that the number of hours of nighttime sleeping shifted to daytime sleep during Ramadan.

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AUTHORS' CONTRIBUTION

The Following authors have made substantial contributions to the manuscript as under:

NK: Conception, acquisition, analysis of data, drafting the manuscript, critical review approval of the final version to be published

LEK, ZH, WQ & HF: Acquisition, analysis and interpretation of data, critical review, approval of the final version to be published

MR: Analysis and interpretation of data, drafting the manuscript, approval of the final version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declared no conflict of interest, whether financial or otherwise, that could influence the integrity, objectivity, or validity of their research work.

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DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request

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