

## ORIGINAL ARTICLE

# EFFECT OF RAMADAN FASTING ON PREGNANT WOMEN ON THE WEIGHT AND OTHER DEMOGRAPHICS OF NEWBORNS

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## ABSTRACT

**Background:** Literature suggests that the environment during pregnancy has a significant influence on the physical and mental health of newborns. The study aimed to determine the effect of Ramadan fasting on pregnant women on the weight and size of newborn babies, as well as on their sleeping patterns.

**Materials & Methods:** This prospective cohort study was conducted in three private (Raazi Hospital, Rawalpindi; Raazi Hospital, Islamabad; and Shifa International Hospital, Islamabad) and two government hospitals (Holy Family Hospital, Rawalpindi; and Benazir Bhutto Hospital, Rawalpindi) in Holy Family Hospital, Rawalpindi; and Benazir Bhutto Hospital, Rawalpindi. All pregnant women visiting the prenatal clinics during Ramadan were enrolled in the study. The pre-designed questionnaire collected participants' demographic information, diet and sleep patterns, knowledge, and perceptions regarding Ramadan fasting. The information about the newborns was collected after the delivery of the enrolled participants.

**Results:** Six hundred and eight (608) pregnant women were followed up to the delivery. The weight, height, head-circumference, and mid-arm circumference of the newborns were not statistically significant in terms of the number of days of fasting, and trimester during the Ramadan between fasting and non-fasting mothers. However, the mean weight of newborns from mothers in middle socio-economic groups was significantly higher than that of newborns from mothers in lower socio-economic groups. Seventy percent of women include Roti or Paratha in Sahaor, and almost all the women were consuming the fruits in Iftar. There was also no significant association between newborns' gender. However, APGAR score showed significantly higher mean value for fasting mothers.

**Conclusions:** The study concludes that Ramadan fasting in pregnant women does not have any effect on the weight, height, or gender of newborns.

**KEY WORDS:** Birthweight; Fasting; Newborn; Pregnancy; Ramadan.

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## INTRODUCTION

Literature suggests that the environment during pregnancy has a significant influence on the physical and mental health of newborns. Gynecological facilities,

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dietary habits, and a stress-free environment play a significant role in a healthy baby. Limited nutritional habits and a shorter period of rest can significantly impact the health of newborns. A lesser amount of food for pregnant women not only produces low-weight babies but also increases the probability of cardiovascular diseases in later life. Prolonged periods of fasting without food intake in pregnancy are associated with an increase in the level of maternal corticotropin releasing hormone concentration, which is linked with maternal and fetal health consequences. The release of increased maternal corticotropin is also associated with preterm labor in both human studies and animal studies.<sup>1-3</sup>

The ninth month of Islamic calendar is the month

of Ramadan. Every adult man and woman must fast from dawn to sunset in this whole month as proclaimed in the Holy Quran.<sup>4</sup> However, it could be exempted or postponed under certain conditions. One of them is pregnancy. The expectant mothers may postpone fasting during Ramadan, if they feel that fasting may affect their health and/or their fetus, as indicated in the saying of the *Prophet Muhammad (PBUH) that Allah has relieved pregnant and nursing women of the obligation to fast.*<sup>5</sup> Nearly three-fourths of all pregnancies worldwide, of over 2 billion Muslims, overlap the Ramadan period.<sup>6</sup> A noteworthy fraction of Muslim women, all over the world, decide to fast, even though they are exempt from fasting, mainly due to spiritual attachment and avoiding the feeling of guilt.<sup>5,7</sup> The frequency of fasting among Muslim women were 70%-90% in Iran, England, Singapore, the United States of America, Gambia, Yemen, and Pakistan.<sup>1,8</sup> Several large-scale studies have been conducted in the USA and Europe, showing conflicting results regarding the birth weight of newborns among mothers who fasted.<sup>8-11</sup>

In those studies, there was either no significant difference in the size and /or weight of newborns from fasting mothers compared to non-fasting mothers. Most of these studies are either uni-centered/or have a low sample size. Therefore, there was a need to conduct a multi-center, large sample prospective study to observe the effects of Ramadan fasting on expectant mothers and their newborns. In the absence of such a study, no proper guidelines are available for Gynecologists and expectant mothers. Hence, this study would help to prepare guidelines for the pregnant women regarding fasting during the month of Ramadan. Because without these proper guidelines, based on a large-size study, doctors have a problem of giving proper guidelines.

The objective of the study was to determine the effect of Ramadan fasting on pregnant women on the weight and size of newborn babies, as well as complications during pregnancy and delivery

## MATERIALS AND METHODS

This prospective cohort study was conducted in three private and two government hospitals in Rawalpindi and Islamabad areas. They were Shifa International Hospital, Islamabad (SIH); Al-Raazi Hospital, Islamabad (ARH-I); Al-Raazi Hospital, Rawalpindi (ARH-R); Benazir Bhutto Hospital, Rawalpindi (BBH), and Holy Family Hospital, Rawalpindi (HFH). ARH-I and ARH-R are under the umbrella of Al-Razi Hospital (ARH), and BBH and HRH are the teaching hospitals of Rawalpindi Medical University (RMU). The sample size was calculated using the outcome values of Kana with a 99% confidence interval, 90% power of the test, and a ratio of fasting and non-fasting mothers of 4:1, using Openepi.<sup>12</sup> The mean weight of newborns of fasting and non-fasting mothers in Kana was 3006( $\pm$ 473)

gm and 3207( $\pm$ 515) gm, respectively, and the ratio of the fasting and the non-fasting mother was 4:1 in Khan's study.<sup>1,14</sup> The sample size came out as 428 and 107 for fasting and non-fasting mothers.

Pregnant women visiting these hospitals for antenatal care during the month of Ramadan 1444 H (March-April 2023 AD) were included in the study. The mean duration of fasting in these city areas was about 14 hours. Average temperature in these two cities in March-April is usually 21°C during daytime and 9°C during nighttime. A pre-designed proforma was used to collect demographic data, obstetric details, food consumed in the previous two days, information on knowledge, perception, and practices related to Ramadan, including reasons for fasting and sleeping hours. MIK, SF, JG, and KB supervised the data collection in their respective hospitals. Hospitals were grouped into three categories:

**Group 1:** Shifa International Hospital, serving patients from higher socio-economic backgrounds.

**Group 2:** AlKhidmat Raazi Hospitals, offering affordable care to middle and upper-middle socio-economic classes.

**Group 3:** Benazir Bhutto and Holy Family Hospitals, government-run institutions providing free healthcare to low-income populations.

Six hundred and eight (608) pregnant women were followed up to their delivery. The demographics of the newborn, complications, APGAR score, and days of fasting of the mother were recorded after the delivery. Data were entered and analyzed using SPSS version 21. The Chi-square test and independent-samples t-test were employed to compare categorical and continuous variables, respectively, between fasting and non-fasting mothers. The Wilcoxon signed-rank test was used to assess changes in average sleeping hours before and during Ramadan.

## RESULTS

The mean age and weight of 608 pregnant women was 28.66( $\pm$ 5.0) year, and 66.7 ( $\pm$ 13.6) kg, respectively at the initial visit. Table 1 shows the demographic characteristics of the responding mothers at the time of Ramadan's visit. Seventy-seven percent (468/608) of the respondents fasted at least one-day. A higher percentage of women with lower education (matric and lower) and those with higher education (master's and above) fasted more than those with intermediate education ( $p < 0.0001$ ). The housewives fasted at a higher percentage (79.9%) than the working women (65.9%) ( $p=0.004$ ). The Pathan women showed a higher percentage (86.8%) in the fasting group compared to the Punjabi fasting women (74.6%) ( $p = 0.033$ ). The women from the rural areas indicated a higher percentage (84.1%) of practicing fasting than the urban women (74.3%) ( $p=0.006$ ). The rate of fasting was significantly inversely proportional to the income groups, ranging from 83.2% to 56%

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corresponding to Rs.  $\leq 25,000$  to Rs.  $\geq 100,000$ , respectively ( $p < 0.0001$ ). The mean age of the fasting women ( $28.5 \pm 5.0$  years) was significantly lower than the mean age of the non-fasting mothers ( $29.1 \pm 5.1$  years) ( $p = 0.009$ ). Consequently, the Body Mass Index (BMI) of fasting mothers was significantly lower than that of non-fasting mothers ( $p = 0.013$ ).

The sleeping hours during the day and at night were not significantly different before the Ramadan period

( $p > 0.05$ ). However, the sleeping time during the day was significantly increased for fasting mothers compared to non-fasting mothers ( $p = 0.006$ ) during the Ramadan days. Conversely, the sleeping time of fasting mothers significantly reduced at night as compared to non-fasting mothers during Ramadan ( $p = 0.026$ ). The sleeping time decreased significantly for all women during Ramadan (7.8 hours) as compared to before Ramadan (8.3 hours) ( $p < 0.0001$ ).

**Table 1: Demographics of expectant mothers, categorized by fasting and non-fasting**

Mothers' demographics	Fasting (n=468)	Not-fasting (n=140)	p-value	Total
<b>Education level</b>				
Matric and lower	311 (82.5)	66 (17.5)	<0.0001	377 (63.0)
Intermediate and Bachelor	141 (67.8)	67 (32.2)		208 (34.7)
Master and above	12 (85.7)	2 (14.3)		14 (2.3)
<b>Occupation</b>				
Housewife	394 (79.9)	99 (20.1)	0.004	493 (85.7)
Working	54 (65.9)	28 (34.1)		82 (14.3)
<b>Ethnicity</b>				
Punjabi	315 (74.6)	107 (25.4)	0.033	422 (70.7)
Pathan	66 (86.8)	10 (13.2)		76 (12.7)
Others	81 (81.8)	18 (18.2)		99 (16.6)
<b>Residency</b>				
Urban	292 (74.3)	101 (25.7)	0.006	393 (65.5)
Rural	174 (84.1)	33 (15.9)		207 (34.5)
<b>Monthly Income</b>				
$\leq 25,000$	193 (83.2)	39 (16.8)	<0.0001	232 (40.3)
25,001 – 50,000	168 (82.4)	36 (17.6)		204 (35.4)
50,001 – 75,000	31 (64.6)	17 (35.4)		48 (8.3)
75,001 – 100,000	29 (69.0)	13 (31.0)		42 (7.3)
$\geq 100,001$	28 (56.0)	22 (44.0)		50 (8.7)
<b>Trimester</b>				
First	211 (85.4)	36 (14.6)	<0.0001	247 (42.3)
Second	113 (75.8)	36 (24.2)		149 (25.5)
Third	125 (66.5)	63 (33.5)		188 (32.2)
Age	$28.5 \pm 5.0$	$29.1 \pm 5.1$	0.252	$28.66 \pm 5.0$
Weight	$65.9 \pm 13.4$	$69.4 \pm 14.0$	0.009	$66.65 \pm 13.6$
Height	$158.3 \pm 12.3$	$159.9 \pm 8.4$	0.541	$158.6 \pm 11.6$
BMI	$26.0 \pm 5.4$	$27.5 \pm 5.4$	0.013	$26.31 \pm 5.48$
Day sleeping time before Ramadan	$1.7 \pm 1.7$	$1.4 \pm 1.5$	0.064	$1.64 \pm 1.69$
Night sleeping time before Ramadan	$6.8 \pm 1.8$	$6.8 \pm 2.1$	0.804	$6.81 \pm 1.85$
Day sleeping time during Ramadan	$2.4 \pm 1.8$	$2.0 \pm 2.0$	0.006	$2.28 \pm 1.88$
Night sleeping time during Ramadan	$5.5 \pm 2.1$	$6.0 \pm 2.4$	0.026	$5.61 \pm 2.14$
Number of days of fasting				
1-10	124 (20.4)			
11-20	92 (15.1)			
21-30	252 (41.4)			

Major food items consumed during Sahoor, Iftar and dinner by the participants are shown in Figure 1. Almost 40% women responded that they use *Roti*, and about 30% indicated the *Paratha* as one of the items in *Sahoor*. Only 12.8% indicated that they use meat curry as one of the other items. Fruit and fried items, like *Pakora*, are the main items in the *Iftar* meal. *Roti* and Juices are also significant items. Sixty-seven women indicated that they use *Roti*, 30% indicated the meat as one of the items in Dinner. It should be noted that only 55% eat dinner after Iftar. (Figure 1)

The demographics and related parameters of the newborns are shown in Table 2. Weight, height, head circumference, and mid-arm circumference of the newborns did not show any statistical significance difference between fasting and non-fasting mothers ( $p > 0.05$ ). However, the APGAR score showed borderline significance between those two groups. Furthermore, the height, weight, head circumference, and mid-arm circumference of newborns delivered in RMU hospitals showed significantly lower either from SIH or ARH (Figure 2).

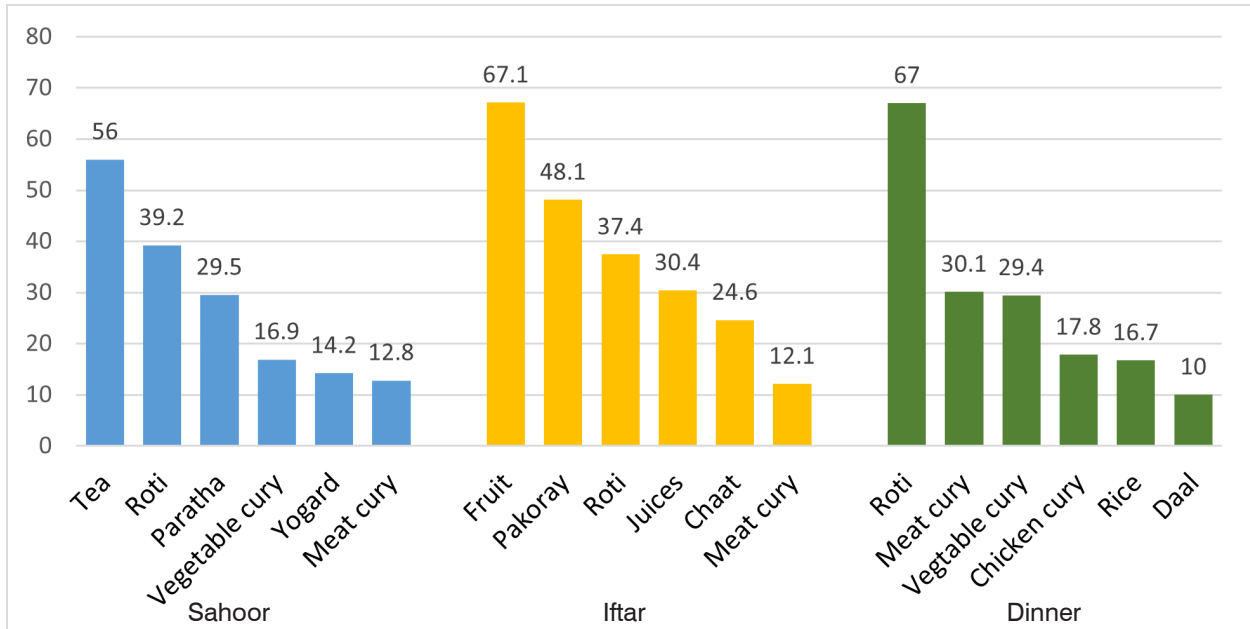


Figure 1: Major food items and drinks consumed in Ramadan

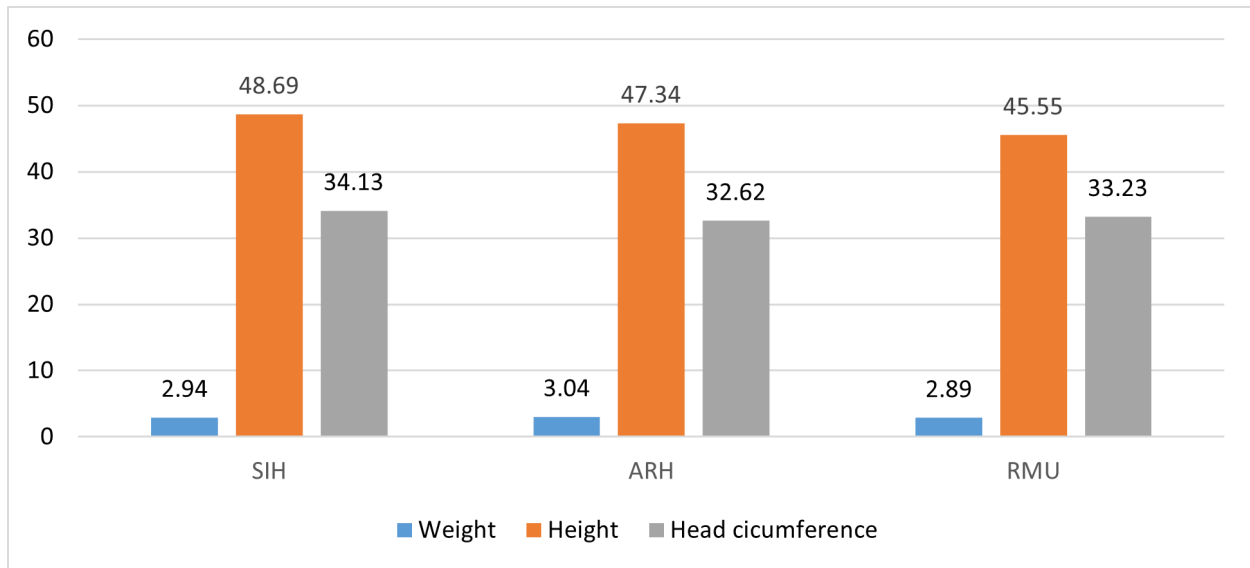


Figure 2: Mean weight, height, and head circumference of newborns

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Data were further analyzed after categorization of the fasting days into the intervals of ten days (1-10, 11-20, 21-30). These three fasting groups, along with the no-fasting group, also did not show any statistically significance for weight, height, head circumference,

and mid-arm circumference. After categorization into the trimesters, the data also did not show any significant difference in weight, height, head circumference, and mid-arm circumference of the newborns between fasting and non-fasting mothers.

**Table 2: Demographics of newborns, categorized by fasting and non-fasting mothers**

		Fasting mothers		Non-fasting mothers		p-value	Total	
		n	mean±SD	n	mean±SD		n	mean±SD
Weight		468	2.92±0.47	140	2.94±0.5	0.809	608	2.92±0.47
Height		359	46.13±4.34	109	46.62±3.8	0.126	468	46.25±4.22
Head Circumference		361	33.3±2.82	108	33.54±2.8	0.232	469	33.36±2.81
Mid-arm circumference		300	8.89±1.27	59	9.23±1.61	0.180	359	8.95±1.34
APGAR score		386	7.96±0.0.8	117	7.85±0.72	0.045	503	7.92±0.84
Weight Days of fasting	1-10	124	2.94±0.472	140	2.94±0.5	0.809		
	11-20	92	2.96±0.47					
	21-30	252	2.89±0.47					
Height	1-10	93	46.5±3.17	109	46.62±3.8	0.132		
	11-20	71	46.6±7.3					
	21-30	195	45.8±3.3					
Head Circumference	1-10	93	33.18±3.23	108	33.54±2.78	0.137		
	11-20	73	33.91±2.51					
	21-30	19	33.14±2.71					
Mid-arm Circumference	1-10	75	8.87±1.25	59	9.23±1.61	0.052		
	11-20	60	9.23±1.34					
	21-30	165	8.78±1.24					
APGAR score	1-10	103	7.86±0.78	117	7.85±0.72			
	11-20	69	8.14±0.55					
	21-30	214	7.95±0.81					
Weight Trimester	1 <sup>st</sup>	211	2.90±0.47	36	2.90±0.40	0.989	247	2.90±0.46
	2 <sup>nd</sup>	113	2.92±3.31	36	2.95±0.44	0.671	149	2.93±0.42
	3 <sup>rd</sup>	125	2.92±0.51	63	2.90±0.55	0.825	188	2.91±0.52
Height Trimester	1 <sup>st</sup>	175	46.16±3.31	28	47.21±3.0	0.117	203	46.31±3.29
	2 <sup>nd</sup>	91	47.09±6.03	27	46.98±3.61	0.926	118	47.07±5.53
	3 <sup>rd</sup>	88	44.95±3.90	49	45.86±4.0	0.203	137	45.28±3.97
Head Circumference Trimester	1 <sup>st</sup>	175	33.5±2.61	28	32.89±2.69	0.255	203	33.42±2.63
	2 <sup>nd</sup>	90	33.22±3.37	27	33.52±2.65	0.676	117	33.29±3.21
	3 <sup>rd</sup>	89	33.0±2.62	49	33.81±2.96	0.104	138	33.29±2.77
Mid-arm Circumference Trimester	1 <sup>st</sup>	151	8.75±1.04	15	8.6±1.39	0.586	166	8.74±1.07
	2 <sup>nd</sup>	73	8.75±1.45	11	9.27±1.69	0.278	84	8.82±1.49
	3 <sup>rd</sup>	72	9.31±1.43	30	9.32±1.59	0.990	102	9.31±1.48
APGAR score Trimester	1 <sup>st</sup>	184	7.9±0.73	31	7.77±0.72	0.368	215	7.88±0.73
	2 <sup>nd</sup>	91	8.02±0.54	29	7.72±0.65	0.015	120	7.95±0.58
	3 <sup>rd</sup>	101	8.02±0.96	53	8.0±0.76	0.896	154	8.01±0.89
Gender	Male		185 (41.2)		56 (42.7)	0.752		241 (41.6)
	Female		264 (58.8)		75 (57.3)			339 (58.4)

## DISCUSSION

This study was conducted in five hospitals in two cities. These hospitals covered five different socio-economic groups of the population. Economically stable groups usually prefer to visit Shifa International Hospital, a premium private hospital in Islamabad. The medium socio-economic group typically visits Al-Raazi hospitals in Rawalpindi and Islamabad, the charity hospitals administered by the Al Khidmat Foundation. The lower socio-economic group of people usually visit the government-operated hospitals (Banizer Bhutto hospital and Holy family hospital), which provide most of the services free of cost. Therefore, this study covered a diversified socio-economic group of pregnant women. The sample size of this study exceeded 600, which is quite large and makes the study significant.

The present study investigated the effect of Ramadan fasting on pregnant women and its association with the weight, height, and overall demographics of their newborns across five hospitals in Rawalpindi and Islamabad. Our findings indicate that Ramadan fasting during pregnancy does not significantly affect the weight, length, or head circumference of newborns. These results are consistent with several previous studies from Pakistan and abroad, which also reported no significant differences in birth outcomes between fasting and non-fasting mothers.<sup>1,2,7,8, 13,14</sup> However, some studies showed under-weight children of the fasting mothers.<sup>15,16</sup>

The lack of association between fasting and neonatal outcomes may be explained by the cultural and dietary adaptations during Ramadan. Most pregnant women tend to increase calorie-dense meals during Sahoor and Iftar, compensating for the daytime fasting hours. Thirty percent of the pregnant women reported that they use Paratha in Sahoor and meat in the dinner time. Moreover, the duration of fasting in Pakistan during the study period averaged 14 hours, which may not have been long enough to cause maternal undernutrition severe enough to affect fetal growth. Furthermore, the average temperature in these two cities are moderate in March-April. Previous studies conducted in countries with longer fasting hours, and low temperature (e.g., northern Europe, USA) have shown more variable results, suggesting that geographical and dietary factors may play a modifying role, with lower weight of newborns.<sup>16,17</sup>

Interestingly, our study revealed that socio-economic status and maternal education were more strongly associated with fasting and non-fasting mothers. Mothers belonging to middle and higher socio-economic groups belonged to non-fasting group as compared to fasting group. Kana<sup>11</sup> and Pardella<sup>15</sup> agreed with these results and showed that the mothers with lower food intake/lower socio-economic status are comparatively belonged to fasting group and delivered the babies of lower weight as compare to non-fasting mothers. These finding underscores the established role of maternal

nutrition, healthcare access, and socio-environmental conditions in influencing fetal growth, and may overshadow the short-term effects of Ramadan fasting.

In terms of maternal lifestyle, our study confirmed significant alterations in sleeping patterns during Ramadan. Fasting mothers reported reduced nighttime sleep and increased daytime napping compared to non-fasting mothers. Although the total sleeping hours decreased slightly during Ramadan, the impact on neonatal outcomes was not significant. However, the sleeping disturbance during pregnancy has been associated with adverse birth outcomes in some studies, yet our results suggest that the degree of alteration observed during Ramadan may not be sufficient to affect neonatal anthropometry. However, Pradella<sup>16</sup> also showed that even more fasting mothers indicated a reduced sleeping time during Ramadan, but it did not effect on the newborns. No significant difference in gender of newborns were observed, which is in agreement with all the previous studies.<sup>2,13,14,18</sup>

However, some limitations should be acknowledged. First, the study did not include detailed nutritional assessments, such as daily caloric or micronutrient intake, which could help explain subtle differences between fasting and non-fasting mothers. Second, the study primarily assessed neonatal anthropometry; longer-term outcomes such as cognitive development, metabolic health, or growth trajectories were not evaluated. Third, although self-reported fasting practices and dietary patterns were carefully recorded, recall bias could not be fully eliminated.

As mentioned earlier, the major strengths of the study are the large sample size and covering diverse socio-economic groups. Nevertheless, these results may not be generalizable to all the population of Pakistan, as the sample were restricted to only two cities. Islamabad and Rawalpindi. Islamabad, being the capital city, is categorized on the higher standard of living area. A better infrastructure, and a larger proportion of educated government bureaucrats differs this city with other regions, which may influence health behaviors and religious practices. Rawalpindi, as Islamabad's city, is also affected by these dynamics. Despite these limitations, our findings carry important clinical implications. Gynecologists and healthcare providers can reassure pregnant women that Ramadan fasting, when accompanied by adequate nutrition at Sahoor and Iftar, is unlikely to adversely affect neonatal weight or size. However, attention should be directed toward improving maternal nutrition in low socio-economic groups, as this remains a stronger determinant of birth outcomes than fasting status. A country-wide study should be planned to cover all the ethnical and socio-economic groups to prepare some guidelines for Gynecologists and General Practitioners to advice the pregnant women regarding dietary changes and other aspects of Fasting. Furthermore, longitudinal studies should be planned to the observe the cognitive and physical

effects on the children born from the fasting mothers.

## CONCLUSIONS

The study concludes that Ramadan fasting in pregnant women does not have any effect on the weight, height, or gender of newborns. Furthermore, neither the days of fasting or trimester during Ramadan showed any significant effect on the newborns. Further longitudinal studies examining maternal nutrition, metabolic changes, and long-term child health are warranted to establish comprehensive guidelines for fasting during pregnancy.

## REFERENCES

1. Khan N, Hassan SM, Sohail H, Rafat Z, Iftikhar A. Effect of fasting of expectant mothers on birth weight of newborn in a tertiary care hospital of Karachi. *Pak J Med Res.* 2023;62(1):19-23.
2. Jamil R, Mughal S, Sohail S, Hossain N. Effects of Ramadan fasting during the third trimester on Doppler indices, non-stress test of fetus, and perinatal outcomes. *Pak J Med Sci.* 2025;41(5):1423. <https://doi.org/10.12669/pjms.41.5.11529>
3. Lindsay RS, Lindsay RM, Waddell BJ Jr. Prenatal glucocorticoid exposure leads to offspring hyperglycaemia in the rat: studies with the 11 beta-hydroxysteroid dehydrogenase inhibitor carbenoxolone. *Diabetologia.* 1996;39:1299-305.
4. Al-Quran. Surah Al-Baqarah, verses 183-187.
5. Hadith books: Abu Dawud (2408), Al-Tirmidhi (715), An-Nassal (2275), Ibn Majah (1667).
6. Muslim population by country 2026 [Internet]. World Population Review. [cited 2026 Jan 20]. Available from: <https://worldpopulationreview.com/country-rankings/muslim-population-by-country>
7. Khan N, Kahloon LE, Hussain Z, Rahim M, Qasim M, Fatima H. Perceptions, practices, and fasting patterns of pregnant women during Ramadan: a multi-center study in Rawalpindi and Islamabad. *Khyber Med Univ J.* 2025;17(3):251-7. <https://doi.org/10.35845/kmuj.2025.23906>
8. Savitri AI, Painter RC, Lindeboom M, Roseboom TJ, Van Ewijk RJ. Ramadan exposure and birth outcomes: a population-based study from the Netherlands. *J Dev Orig Health Dis.* 2020;11(6):664-71. <https://doi.org/10.1017/S2040174419000837>
9. Jürges H. Ramadan fasting, sex-ratio at birth, and birth weight: no effects on Muslim infants born in Germany. *Econ Lett.* 2015;137:13-6. <https://doi.org/10.1016/j.econlet.2015.10.015>
10. Lee S, Nam M, Jeong D, Lee W. Does Ramadan harm infant health? Evidence from Ethiopia. *Int Econ J.* 2020;34(4):613-33. <https://doi.org/10.1080/10168737.2020.1811750>
11. Shahri HA. Ramadan and infants health outcomes. arXiv preprint. 2021 Jan 9. arXiv:2101.03259.
12. Kana MA, Usman B, Mohammed-Durosinlorun A, Ahmed J, Abubakar HH, Abdulmalik Y, et al. Ramadan during pregnancy and the role of dietary intake for neonatal health in Kaduna, Northwestern Nigeria: a cross-sectional study. *BMC Pregnancy Childbirth.* 2025;25(1):59. <https://doi.org/10.1186/s12884-025-07158-2>
13. Abdullah S, Mughal S, Samuel M, Hossain N. Maternal and perinatal outcome of Ramadan fasting in women with gestational diabetes. *Pak J Med Sci.* 2023;39(2):323. <https://doi.org/10.12669/pjms.39.2.7332>
14. Hossain N, Samuel M, Mughal S, Shafique K. Ramadan fasting: perception and maternal outcomes during pregnancy. *Pak J Med Sci.* 2021;37(5):1262. <https://doi.org/10.12669/pjms.39.2.7332>
15. Chaudhry TT, Mir A. The impact of prenatal exposure to Ramadan on child anthropometric outcomes in Pakistan. *Matern Child Health J.* 2021;25(7):1136-46. <https://doi.org/10.1007/s10995-021-03154-y>
16. Fayyaz N, Sajjad R, Naqvi SB, Hameed MT, Fayyaz A, Nawaz Q, Rehman M. Impact of fasting on maternal and fetal well-being in comparison with non-fasting mothers. *Indus J Biosci Res.* 2025;3(7):679-83.
17. Pradella F, Leimer B, Fruth A, Queißer-Wahrendorf A, van Ewijk RJ. Ramadan during pregnancy and neonatal health-fasting, dietary composition and sleep patterns. *PLoS One.* 2023;18(2):e0281051. <https://doi.org/10.1371/journal.pone.0281051>
18. Seiermann AU, Al-Mufti H, Waid JL, Wendt AS, Sobhan S, Gabrysch S. Women's fasting habits and dietary diversity during Ramadan in rural Bangladesh. *Matern Child Nutr.* 2021;17(3):e13135. <https://doi.org/10.1111/mcn.13135>

### CONFLICT OF INTEREST

Authors declare no conflict of interest.  
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### AUTHORS' CONTRIBUTION

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

Conception or Design: NK, MIK  
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All the 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.



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