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Gestational weight gain in relation to perinatal outcome

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Abstract
Pregnancy is unique and critical time in the life course of a woman. There occurs a lot of changes in mothers body and mind during pregnancy. Her body will change physiologically in order to accommodate the growing fetus. For the optimum development of the fetus, like all other factors maternal nutrition is one of the important factors. Optimum nutrition help in optimum weight gain, which has got relation with both maternal and fetal outcome. The objectives of the present study were to assess the relationship between gestational weight gain and perinatal outcome, to find out the association between gestational weight gain with selected maternal demographic variables. The study was non experimental descriptive in nature, which included 100 postnatal mothers. Demographic data and obstetrical history were collected by interviewing, self-reported pregravid weight were recorded and gestational weight gain was calculated by subtracting the pregravid weight from the weight which was recorded at the time of admission for delivery. Data regarding perinatal outcome (includes maternal outcome and neonatal outcome) was collected from the medical records of both mother and baby. Maternal socio demographic data and obstetrical history were analysed in terms of frequency and percentage. Gestational weight gain was categorized as normal, less than normal, excess on the basis of IOM guidelines. Association between gestational weight gain and perinatal outcome was analyzed by chi square test. The result of the study shown that there is significant association between gestational weight gain and mode of delivery, gestational age at birth, birth weight of the baby, size of the baby, APGAR score at 5minute<7, and development of neonatal jaundice and maternal age, monthly income of the family and type of residence(urban/rural).

Keywords: gestational weight gain, perinatal outcome, postnatal mothers, postnatal ward

Introduction
Everybody needs similar supplements, however the sums we require change as our lives change, the three most essential periods of supplement necessities that decide an individual's deep rooted wellbeing and sustenance status are pregnancy, lactation, and infancy [1]. Maternal dietary status is an imperative determinant of pregnancy results since prepregnancy underweight has been customarily viewed as a hazard consider for antagonistic incubation results.
Since both excessive gestational weight gain and less than normal weight gain during pregnancy have got adverse effect on both maternal and neonatal outcome, it is very necessary to impart measures to gain normal weight during the period of gestation. Nourishment is the main consideration which decides gestational weight pick up, which determine the maternal and fetal result [1]. Maternal dietary status is an imperative determinant of pregnancy results since prepregnancy underweight has been customarily viewed as a hazard consider for adverse pregnancy outcomes. Obese women additionally expands pregnancy confusions, for example, gestational diabetes, hypertensive issue, and perinatal complications and mortality [3].
Various reviews in India have demonstrated that in constantly undernourished ladies subsisting on unaltered dietary admission in pregnancy and lactation adversely affect maternal nourishing status. ICMR district nutrition overview 1999-2000 revealed commonness of anemia as 84.2 % with 13.1 % with serious anemia in pregnancy [4]. Maternal under/nourishment is related with low birth weight and all its attendant unfavorable outcomes [2]. Epidemiological reviews from India archived the extent and antagonistic results of chronic energy deficiency (CED) on the mother child.
Nutrition assumes a noteworthy part in maternal and child health. Poor maternal nourishing status has been identified with poor birth results. The relationship between maternal sustenance and birth result is mind boggling and is affected by numerous biologic, financial, and statistic factors, which change generally in various population. Understanding the connection between maternal nourishment and birth results may give a premise to creating nutritious intercessions that will enhance birth results and long haul personal satisfaction and diminish mortality, morbidity and medicinal services costs. [8]

Materials and Methods
The study was approved by institute ethical committee and hospital ethical committee. This descriptive co relational study selected 100 postnatal mothers within 48 hours of delivery conveniently. Self-structured tool which was validated by seven experts was used to collect data from the samples. The reliability of the tool was estimated by using Chronbach alpha formula.

Data collection procedure
All the mothers who had normal vaginal delivery, assisted vaginal delivery, and caesarean section were included in the study, and mothers whose babies with chromosomal abnormalities and twin delivery are excluded from the study.

Demographic data and obstetrical history were collected by interviewing, self-reported pregravid weight were recorded and gestational weight gain was calculated by subtracting the pregravid weight from the weight which was recorded at the time of admission for delivery. Data regarding perinatal outcome (includes maternal outcome and neonatal outcome) was collected from the medical records of both mother and baby.

Results

Maternal socio demographic data and obstetrical history were analyzed in terms of Frequency and percentage. Gestational weight gain was categorized as normal, less than normal, excess on the basis of IOM guidelines. Association between gestational weight gain and perinatal outcome was analysed by chi square test.

Table 1: Frequency percentage distribution of samples according to socio demographic profile (N-100)

S. No.	Variable		Frequency	Percentage
1	Age	16-20yrs	7	7%
		21-25 yrs	34	34%
		26-30 yrs	33	33%
		>30yrs	26	26%
2	Level of education	No formal	2	2%
		Primary	29	29%
		Secondary	35	35%
		College	34	34%
3	Monthly income	<5000rs	0	-
		5000-10000 rs	14	14%
		10001-20000 rs	37	37%
		>20000 rs	49	49%
4	Type of residence	Urban	38	38%
		Rural	62	62%
5	Occupation	House wife	86	86%
		Employed	14	14%
6	h/o any substance abuse	yes	2	2%
		no	98	98%

Demographic characteristics of the samples shows that majority (34%)of the samples were in the age group of 21-25 years, majority (35%)had secondary level education, 49% had monthly income more than Rs 20000, majority (62%) were belong to urban area. majority (86%)were house wife, only 2% had history of substance abuse.

Table 2: Frequency, percentage distribution of samples based on their obstetrical history (N -100)

S. No	Variable		Frequency	Percentage
1	Parity	Primi	54	54%
		Multi	45	45%
		Grand multi	1	1%
2	Pre gravid weight	41-50	25	25%
		51-60	46	46%
		61-70	25	25%
		71-80	4	4%
3	Height of mother	141-150	12	12%
		151-160	64	64%
		161-170	24	24%
4	BMI	<18.5	6	6%
		18.5-24.9	68	68%
		25-29.9	26	26%
		30 OR MORE	0	_
5	Gestational Weight Gain	Less Than Normal Weight Gain	31	31%
		Normal Weight Gain	45	45%
		More Than Normal Weight Gain	24	24%
6	Initiation Of ANC	1—3 Months	100	100%
		4 –6 Months	0	-
		7—9 Months	0	-
		Reported At Delivery	0	-
7	No of antenatal visits	<3 visit	3	3%
		4 visit	11	11%
		>4 visit	86	86%
8	Use of multivitamin supplementation and iron folates	Yes	96	96%
		No	1	1%
		Irregular	3	3%
9.	Pre-existing medical condition	Yes	11	11%
		No	89	89%

On assessing the obstetrical history of the samples shows that pre gestational BMI, out of 100, 68% were in the normal BMI range, 26% were obese and 6% mothers were under weight. 45% of the samples had normal gestational weight gain with respect to the IOM guidelines, 31% had gestational weight gain less than recommended, 24% of the samples gained excess weight than recommended. 100% of the samples initiated their antenatal visit with in first 3 months of gestation, 86% of the samples had >4 antenatal visit, 96% of the samples had taken multivitamin tablets as per guidelines.11% of the samples had pre-existing medical condition out of which 10% had hypothyroidism and 1% had hypertension.

Table 3: Frequency, percentage distribution of samples according to maternal pregnancy outcome (N -100)

S. No	Variable		Frequency	Percentage
1.	Mode of Onset of Labor	Spontaneous	89	89%
		Induced	11	11%
2.	Mode of Delivery	Normal Vaginal Delivery	37	37%
		Assisted Delivery	5	5%
		Caesarean Section	58	58%
3.	Presence of Post-Partum Complications	Retained Placenta	0	0
		Post-Partum Hemorrhage	2	2%
		Perineal Trauma	6	6%
		No Complications	92	92%
4.	Presence of Anemia	Yes	12	12%
		No	88	88%
5.	Presence of Pregnancy Induced Hypertension	No	81	81%
		Yes	19	19%
6.	Gestational Diabetes Mellitus	No	95	95%
		Yes	5	5%
7.	Development Of Oedema	No	88	88%
		Yes	12	12%

Table-3 reveals that out of hundred samples 89% of the mothers had spontaneous onset of labour. Majority (58%) of the samples had caesarean delivery, 37% had normal vaginal delivery and 5% had assisted delivery. majority (92%)of the samples did not had any postpartum complications, 6% of the samples had perineal trauma, 2% had postpartum haemorrhage. Among hundred 12 % of them developed anaemia, 19 % of the samples developed pregnancy induced hypertension,

Table 4: Frequency, percentage distribution of samples according to neonatal outcome (N -100)

S. No	Variable		Frequency	Percentage
1.	Gestational age at delivery	<34 wks	17	17%
		34 -37wks	21	21%
		37wks -40wks	50	50%
		Post term	12	12%
2.	Birth weight of the baby	1001 – 1499 gm	17	17%
		1500 -2499 gm	20	20%
		2500- 4000 gm	49	49%
		>4000 gm	14	14%
3.	Size of baby	SGA	33	33%
		AGA	63	63%
		LGA	4	4%
4.	APGAR score at 5 min<7	No	80	80%
		Yes	20	20%
5.	Development of neonatal jaundice	Yes	22	22%
		No	78	78%
6.	NICU admission	Yes	34	34%
		No	66	66%

Table 4 shows that on assessing the neonatal outcome it was found that 50% of the babies had term birth, 12% were post term, 38% were preterm, 49% of the babies had normal range of birth weight, 37% had less than normal birth weight, 17% of the babies had excess birth weight.20% of the babies had APGAR SCORE <7 at 5 minute, 22% babies developed neonatal jaundice and 34% babies had NICU admission.

Table 5: Association between gestational weight gain and perinatal outcome (N-100)

Variables→ ↓	gestational weight gain		
	Chi square	df	P value
Mode of delivery	13.20	6	0.0382*
Mode of onset of labour	2.02	3	0.5662
Postpartum complications	9.72	6	0.1365
Development of Anaemia	6.46	3	0.0909
Development of PIH	4.78	6	0.8535
Development of GDM	3.40	3	0.3326
Development of hydramnios	3.18	3	0.3632

*significant

On assessing the association between gestational weight gain and maternal outcome, it shows that there was significant association between gestational weight gain and mode of delivery (caesarean section/normal vaginal delivery`) with df 6 at P value0.03822.

Table 6: Association between gestational weight gain and neonatal outcome N -100

Variables→ ↓	gestational weight gain		
	Chi square	df	p value
Gestational age at delivery	169.84	9	0.00001*
Birth weight of baby	164.81	6	0.0002*
Size of the baby	27.54	6	0.0001*
APGAR score at 5min	16.32545	3	0.0009*
Development of neonatal jaundice	8.405548	3	0.0383*
NICU admission	2.339548	3	0.5049

*significant

Table 7: Association between gestational weight gain with demographic variables N -100

Variables → ↓	Gestational weight gain		
	Chi square	Df	P value
Age of the mother	18.55837	9	0.0292*
Monthly income of the family	122.0353	9	0.0012*
Type of residence	167.4	3	0.0079*
Level of education	13.09	3	0.1585
Occupation	2.09	3	0.5352
Substance abuse	5.24	3	0.1545

*significant

The association between gestational weight gain and neonatal outcome shows that there was significant association between gestational weight gain and neonatal outcome such as gestational age at delivery(p value 0.00001), birth weight of the baby(p value-0.002), size of the baby(p value0.0001), APGAR score at 5minute<7(p value-0.0009),development of neonatal jaundice (p value-0.0383). The result also depicts that there is significant association between gestational weight gain and maternal age, monthly income of the family, and type of residence (urban/rural)

Discussion

The main aim of the study was to assess the correlation between gestational weight gain and perinatal outcome (maternal and neonatal outcome). Pregnancy is the life time where various changes occur in the mother's body as a result of the physiological changes for the development of the fetus. For the optimum development of the foetus maternal nutrition is the one of the most important factors. The present research outcome shown that there is significant association between gestational weight gain and mode of delivery

This result support the study done by Lu Liu, Zhongxin Hong & Lihong Zhang (2015) on Associations of prepregnancy body mass index and gestational weight gain with pregnancy outcomes in nulliparous women [16] the result was Compared to adequate Gestational weight gain, excessive gestational weight gain was associated with increased the incidence of cesarean section, preterm delivery, preeclampsia and macrosomia. The result was also supported by another study which was conducted by Chao Xiong etal on association of pre-pregnancy body mass index, gestational weight gain with caesarean section [17], which shows that there was significant association between excessive gestational weight gain with caesarean section across all pre- pregnancy BMI categories.

The present study also shows that gestational weight gain had significant association between gestational weight gain and neonatal outcome such as gestational age at delivery, birth weight of the baby, The result is supported by a study conducted by Shrestha I etal on correlation between maternal weight gain and with birth weight of the infant [18] the study result shows that there is positive linear relationship birth weight of the baby.

The present study also shows that there is significant association between gestational weight gain and size of the baby, APGAR score at 5minute<7, these results are supported by the study done by Naomi E Stotland (2006) in their retrospective cohort study on gestational weight gain and adverse neonatal outcome among term infants [19], the result of the study was Gestational weight gain above IOM guidelines was associated with low 5 minute APGAR score, seizure, hypoglycaemia, meconeum aspiration syndrome and large for gestational age compared with women within weight gain guidelines. Gestational weight gain below guidelines was associated with decreased odds of neonatal intensive care unit admission and increased odds of small for gestational age.

The present study also shows that there is significant association between gestational weight and development of neonatal jaundice this finding was supported by a study conducted by Hedderson etal on pregnancy weight gain and risk of neonatal complications: macrosomia, hypoglycaemia and hyperbilirubinemia [20], which revealed that women who gained excess gestational weight were three times more likely to have newborn with hyper bilubinemia than women gained normal gestational weight.

Conclusion

Gestational weight gain has significant association between mode of delivery, gestational age at delivery (term/preterm/post term), birth weight of the baby, size of the baby, APGAR score at 5minute <7, development of neonatal jaundice. These results points to the importance of adequate

weight gain during pregnancy for a 'safe' Perinatal outcome.

Limitation

The study result cannot be generalised due to study is limited to small sample size

Ethical consideration

Ethical clearance &Permission was obtained from the research ethical committee. Appropriate permission was obtained from HOD of O&G department & in charge of postnatal ward to conduct study. Written consent was obtained from the samples. Privacy, confidentiality and anonymity was guarded.

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