

A Study on Maternal Weight Gain in Pregnancy and its Consequences on Maternal Complications and Pregnancy Outcome

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Abstract: ***Background:** Objective: To observe the maternal complications and perinatal outcome in relation to maternal weight gain in pregnancy. **Material & Methods:** The study is a prospective study based on total 100 pregnant women, observed at the antenatal clinic and after admission in the maternity ward, after fulfilled the inclusion criteria of the study. We considered weight of pregnant mother 1st time attended in antenatal clinic at 1st trimester as booking weight in place of pre-pregnancy weight in our study, as most of women were unaware their pre-pregnancy weight accurately. The health status of mother was assessed from recognized biochemical and haematological parameters. **Result:** Maximum range of booking weight 45 to 49.99 kg. Highest 46% of mothers weight gain is in the range of 5 kg to 9.99kg. There is definite correlation between the birth weight of the newborn and maternal booking wt. In pregnant mother with low booking wt. (<40 kg), the mean birth wt. is found to be low 2.43 kg and these with high booking wt. (>60 kg), mean birth wt. is found to be high 4.16 kg, significant correlation between the birth wt. of newborn and maternal wt. gain during pregnancy, incidence of low birth wt. (<2.5 kg) both IUGR and pre-maturity is high among low booking wt. group (<40 kg), incidence of low birth wt. (both IUGR & pre-maturity) is significantly high 33.33% and 16.66% respectively, when maternal wt gain in pregnancy is low (<5 kg). Its incidence is reduced with increase of weight gain and it is nil when wt. gain is 15 kg or more. The gain in wt. in pregnant mother has definite impact in pre-eclampsia, foetal distress, increased rate of instrumental delivery and Caesarean section. **Conclusion:** The most important predictors of maternal weight gain is age of mother in the first trimester, pre-pregnancy body mass and parity in second trimester & age and parity in third trimester. Weight gain less than 90%, the IMO's recommendation in the third trimester may serve as an indicator for identifying women at risk of delivery in pterm. Perinatal and maternal outcome can be improved by advising pregnant women to gain optimal weight.*

Keywords: Body weight, BMI (body mass index), IOM (Institute of medicine)

1. Introduction

Maternal weight gain during pregnancy is one of the important parameter which gives us the clue regarding maternal complications and foetal outcome. Routine weight measurement of pregnant women has now become accepted as one of the important tools of prenatal care in modern obstetrics, the importance of which first enlightened by Gasser in 1962. The women are weighed at their first antenatal visit to note the booking weight and then at every subsequent visits. The difference of weight between two visits is the weight gained in that particular period and the difference of weight between the last visit and the booking visit is the total weight gained in that pregnancy. Maternal weight gain estimated routinely in antenatal clinics since 1941 (Scott and Benjamin 1948) when it was introduced to monitor maternal nutrition. There is little evidence that maternal weight gain is an effective antenatal screening test for SGA (small for gestational age) infants (Gordon et al 1978; Elder et al 1979) although studies have shown a positive association between maternal weight gain and infant birth weight. The researchers are working on the body mass for long times and many articles has been written about it. Abnormal BMI (body mass index) in mother plays very important role on the future fertility. Prevalence of overweight in women varies from 7-46%. Unfortunately, the incidence of overweight is increasing which is due to change in life style and socio economic condition. Different figures are available about the prevalence of underweight women which varies from 0.2-22%. In India, overall prevalence of

underweight women reduced gradually. The purpose of antenatal care is to have a healthy neonate and healthy mother. She should have a normal BMI before pregnancy. Women with BMI<18.50, BMI 18.50 to 24.99 and BMI>25 are considered as under-weight, normal weight and overweight respectively. BMI 30 is classified as obesity which is further subdivided into obese class I, obese class II and obese class III when BMI is 30 to 34.99, 35 to 39.99 and > 40 respectively.

In fact, net weight gain in underweight women is strongly related to birth weight of newborn, whereas in overweight women net weight gain is only marginally related¹⁻².

Complications of overweight women are insufficient weight gain, hypertension, pre-eclampsia, gestational diabetes, multi-foetal pregnancy, macrosomia, increased rate of caesarean section, mal-presentation, obstetric bleeding, postpartum thrombophlebitis, UTI, dysfunctional labour, shoulder dystocia, foetal birth asphyxia and increased maternal morbidity due to increased operative delivery. There is also increased risk of sepsis and delayed healing of wound^{3, 4, 5-7}.

Here is the importance of regular weighing of pregnant mother in the antenatal period. If we keep the weight of mother down when she is heavy, we can avoid almost all these complications.

Complications related to underweight mothers are anemia, preterm premature rupture of membrane, low birth weight

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baby, low Apgar score delivery and increased perinatal mortality^{8, 1, 9-13}

To promote improved pregnancy outcome, underweight women should be encouraged to obtain their ideal weight for height by proper diet. When they are found to be overweight at their first antenatal visit (booking weight), outcome can be improved by avoiding them to gain adequate weight during pregnancy by proper diet which will reduce incidence of IUGR and preterm labour.

Though there are some controversial reports about the effects of pre-pregnancy weight on outcome of pregnancy¹³, antenatal recording of weight plays important role in preventing complications and improving pregnancy outcome both in overweight and underweight women.

Normally, a woman should gain 9-11 kg during her pregnancy. Ideally after the first trimester, a pregnant woman gains around 2 kg every month (K. Park, 24th edition, 560 page) A woman who has a high or low weight at antenatal booking needs investigation for a possible organic or psychiatric cause. In absence of either of these, referral to the dietician should be considered⁹. If the diet is not adequate, i. e. if the woman is taking less than the required amount of calories, she might gain only 5-6 kg during her pregnancy. An inadequate dietary intake can be suspected if the woman gains less than 2 kg per month. She needs to be put on food supplementation.

By watching the weight of pregnant mother over a long period, or it became apparent that the most of the mother who gained excessive weight or gained weight too rapidly has more complications than those who gained weight only moderately. Rapid weight gain in short period is more significant than excessive total weight gain. Weight gain more than one pound (1b) in a week or more than five lbs (2.27kg) in a month is ominous.

Mean maternal weight gain from the time of booking until delivery is not linear. Maximum rate of weight gain seen between 20th and 24 weeks of gestation¹⁴. There is slower rate of weight gain before 16 weeks and significant fall in rate of weight gain towards term in normal pregnancies. Wide variation in maternal weight gain is seen in women with a normal outcome¹⁴.

The average total weight gain during pregnancy is 24 lbs (11 kg) within a range of 20 lbs to 25 lbs (9 kg to 11.5 kg) as per recommendations of maternal nutrition and the course of pregnancy by National Academy of Sciences¹⁵. The increase of weight is mostly accounted for an increase in total body water [about 7.5 kg (16.4 lbs) when no oedema present] body fat mass [about 2.2 kg to 3.5 kg (5.0 lbs to 7.7 lbs)]¹⁶⁻¹⁷. The remainder, approximately 0.9 kg (2 lbs). is due to a rise in protein content, half of which is foetal¹⁸.

It has been suggested that optional weight gain in terms of minimum perinatal mortality is 7.3 kg (16 lbs) for overweight women, 9.1 kg (20 lbs) for women with normal weight and 13.6 kg (30 lbs) for under-weight women³³. In fact most favourable outcome of pregnancy in terms of low birth weight infants and perinatal death is associated with a

moderate rate of weight gain. This can be achieved by recording her weight in her each antenatal visit and regulating her diet and therapeutic supplement as required. Health status of the women has strong correlation with her weight gain in pregnancy.

Therefore, when considering the relationship of maternal weight gain in pregnancy with obstetric outcome health evaluation is done by measuring some haematological and biochemical parameters in prenatal period as a part of antenatal check-up.

The parameters used there are-

- 1) Urine for routine examination.
- 2) Haemoglobin estimation
- 3) Haematocrit estimation
- 4) VDRL test
- 5) Blood for ABO grouping and Rh typing
- 6) Blood sugar fasting and PP
- 7) HIV-I and HIV-II
- 8) (8) HbsAg
- 9) Lipid profile
- 10) Ultra-sonography for foeto-placental profile

2. Materials and Methods

2.1 Materials

The present study is a prospective study based on a total 100 pregnant women, observed at the antenatal clinic and after admission in the maternity ward, department of Obstetrics & Gynaecology, MR Bangur Hospital. Kolkata, west Bengal, India.

Aims and Objectives

- 1) To observe the maternal complications during pregnancy in relation to weight gain.
- 2) To observe the perinatal outcome in terms of birth weight of infants, mode of delivery, foetal distress etc. in relation to maternal weight gain.
- 3) To find out pattern of weight gain in pregnancy.
- 4) To determine the weight of placenta in relation to maternal weight Gain.

*Inclusion criteria of present study:

- 1) Pregnant mothers booked in 1st trimester
- 2) Pregnancies continued beyond 28 weeks of gestation.
- 3) Singleton pregnancy.
- 4) Maternal age 18-35 years.

*Short stature and excessive tall patients were excluded. All patients were between 140cm to 160cm.

In general we have included the pregnancy terminated prematurely, in our study, as it will help us to study the relationship of incidence of premature labour with maternal booking weight and total weight gain. The cases which have been excluded are diabetes, multiple pregnancy, hydramnios, intra-uterine foetal deaths. Diabetic mothers were excluded because the disease process itself has got influence on the baby weight and thus influence the study of relationship of maternal weight gain to birth weight of baby. For the same reason multiple pregnancy, hydramnios, still birth are excluded. Pregnant women with other systemic

disorder like kidney, lung, heart, thyroid disease etc. are also excluded from the study for the same reason.

The pregnant women came for antenatal care at antenatal clinic of Obstetrics and Gynaecology Dept. of M R Bangur Hospital at or before 12 weeks of gestation were taken. Subsequent check up is done at monthly intervals upto 28wks, fortnightly upto 36wks and weekly till term.

History was taken (Identification, Gravida, Parity, Marital history, Education history, Socio-economic history, Social history, Medical & surgical history (past and present), Menstrual history, Contraceptive history, Obstetric history, Dietetic history, Family history, Personal history) and Findings (General examination, detailed of present pregnancy, Routine antenatal lab profile, Mode of delivery, Complication during delivery, Birth weight of baby, Weight of placenta) elicited were recorded.

2.2 Methods

As most of pregnant women were unaware and most of them failed to state their pre-pregnancy weight accurately on which one can rely upon, we considered weight of pregnant mother, attending antenatal clinic at their 1st visit in 1st trimester, as booking weight in place of pre-pregnancy weight in our study. Maternal weight gain was calculated by subtracting wt. at the booking visit from all weights recorded during pregnancy. Total wt. gain in pregnancy estimated by subtracting the weight at booking from the last measured weight before delivery.

It has been observed by many workers that BMI of pregnant mother recorded before pregnancy has got impact in pregnancy outcome but we are not able to calculate the BMI of our subjects as there is no provision of pre pregnancy clinic or the subjects are aware to record their weight before pregnancy. We rather give emphasis on the body weight recording throughout all trimesters of pregnancy.

Pregnant women were weighed in kilogram in light clothes with no shoes on.

By repeated check-up we could detect any pregnancy complications like pre eclampsia, ante-partum haemorrhage, IUGR etc. Those normotensive patients who developed hypertension after 20wks of gestation, B. P-140/90 mm Hg with or without oedema and/or proteinuria were considered to be pre-eclamptic.

Foetal growth was assessed regularly specially in second half of pregnancy. .

Pregnancy terminated before 37 wks, were recorded as premature labour. Any complication during pregnancy was detected & treated, whenever needed after admitting in ward.

Delivery was conducted in labour room of M R Bangur Hospital. Any complication during labour and just after was detected and managed accordingly.

Birth weight of baby was recorded and weight of placenta also by weighing machine specially designed for this. Before weighing the placenta the cord was trimmed to 2 cm. in length and amnion was removed.

In order to study the relationship in maternal baseline body-weight or booking weight to birth-weight of the baby, pregnancy complications and mode of delivery expectant mothers were divided into 6 groups:

<40kg: 40kg to 44.99kg: 45kg to 49.99kg: 50kg to 54.99kg: 55kg to 59.99kg: >60kg.

<40kg group was considered as underweight and ≥ 60 kg group was considered as overweight.

To study the relationship of maternal weight gain in pregnancy over birth weight of the infant, pregnancy complications and mode of delivery, the mothers are divided into 4 groups with different weight gain during pregnancy:

<5kg; 5kg to 9.99kg; 10kg to 14.99kg; 15kg.

<5kg was considered as low weight gain, ≥ 15 kg weight gain was considered as excessive weight gain.

The health status of the mother was assessed from recognized biochemical and haematological parameters. Laboratory investigations done here are:

- 1) Hb% estimation at each antenatal visit starting from 8th to 40th week of gestation.
- 2) Haematocrit value (venous) was estimated at 12th, 24th and 36th week of gestation.
- 3) Plasma protein value (Total, Alb, and Glob.) on 12th, 24th and 36th week.
- 4) FBS and PPBS on 12th, 24 to 28th week.
- 5) Total serum Lipid, Cholesterol and Triglyceride at 20th and 36th week.

3. Result and Analysis

Observations were tabulated as follows.

Table I: Distribution of Cases according to Maternal Age

Maternal age in yrs.	No. of cases (n)	Percentage (%)
<20yrs.	23	23%
21-25	50	50%
26-30	20	20%
31-35	7	7%
Total	100	100%

Table 2: Distribution of Cases according to Parity

No. of cases	Primi-gravida		Multi-gravida	
	No (n)	%	No (n)	%
100	58	58%	42	42%

Table 3: Distribution of Cases according to Booking weight of Mothers

Booking wt. in kg.	No. (n)	Percentage (%)
<40kg	10	10%
40-44.99	24	24%
45-49.99	35	35%
50-54.99	16	16%
55-59.99	11	11%
>60kg	4	4%
Total	100	100%

Table-4: Distribution of Cases according to Total Weight gain of Pregnant Mothers.

Weight gain in kg	No. (n)	Percentage (%)
<5kg	6	6%
5-9.99	46	46%
10-14.99	42	42%
> 15kg	6	6%
Total	100	100%

3.5-3.99	10	10%
>4kg	5	5%
Total	100	100%

Table 5: Distribution of Cases According to Birth Weight of Baby

Birth weight in kg	No. (n)	Percentage (%)
<2.5kg	9	9%
2.5-2.99	46	46%
3.0 – 3.49	30	30%

Table 6: Association between Maternal Booking Wt. and Mean Birth Wt. of Baby

Maternal booking weight in kg.	No. (n)	Mean birth wt. in kg
<40kg	10	2.43
40-44.99	24	2.68
45-49.99	35	2.95
50-54.99	16	3.25
55-59.99	11	3.34
>60kg	4	4.16
Total	100	

Table 7: Association between Wt. Gain of Mother in Pregnancy and B. Wt. of Baby

Weight gain of mother in kg	Birth Weight of Newborn in kg.										Total
	<2.5		2.5-2.99		3-3.49		3.5-3.99				
	No. (n)	%	No. (n)	%	No. (n)	%	No. (n)	%	No. (n)	%	
	4	66.66	2	33.33	0	0	0	0	0	0	6
5 -9.99	3	6.52	24	52.17	15	32.6	3	6.52	1	2.17	46
10-14.99	2	4.76	19	45.24	13	30.95	6	14.28	2	4.76	42
>15	0	0		16.66	2	33.33		16.66	2	33.33	6
Total	9		46		30		10		5		100

Table 8: Association between maternal wt. Gain and mean wt. of new born

Maternal Weight gain in kg.	No. (n)	Mean birth weight in kg.
<5kg	6	2.208
5-9.99	46	2.716
10-14.99	42	3.249
>15kg	6	4.041
Total	100	2.98

Table 9: Complications during pregnancy as a consequence of total wt. Gain in pregnancy.

Complication	Maternal weight gain in kg.							
	<5		5 - 9.99		10 14.99		>15	
	Total No. 6		Total No. 46		Total No. 42		Total No. 6	
	No	%	No	%	No	%	No	%
1. Preeclampsia	0	0%	5	10.86%	7	16.66%	2	33.33%
2. IUGR	2	33.33%	3	6.52%	3	7.14%	0	0%
3. Pre-term labour	1	16.66%	2	4.39%	1	2.38%	0	0%
4. Foetal Distress	2	33.33%	3	6.52%	3	7.14%	0	0%

Table 10: Mode of Delivery in Relation to Maternal Wt. Gain in Pregnancy

Mode of delivery	Maternal weight gain in kg.							
			5-9.99		10-14.99		>15	
	Total No.6		Total No.46		Total No.42		Total No.6	
	No	%	No	%	No	%	No	%
Normal Delivery	3	50%	39	84.78%	33	78.57%	3	50%
Forceps Delivery	1	16.66%	2	4.39%	3	7.14%	1	16.66%
L. S. C. S.	2	33.33%	5	10.87%	6	14.28%	2	33.33%

Table 11 (a): Pattern of Weight Gain in Pregnancy in Relation to booking Wt.

Maternal booking weight in Kg	No. of cases	Mean Maternal wt. gain in kg.
<40kg	10	7.838
40-44.99	24	9.158
45-49.99	35	10.844
50-54.99	16	11.871
55-59.99	11	12.581
>60kg	4	14.975

Table 11(b): Pattern of Weight Gain in Pregnancy in Relation to Maternal Age

Maternal Age in yrs.	No. of cases	Mean Maternal wt. gain in kg.
<20yrs	23	9.686
21-25	50	10.526
26-30	20	11.117
31-35	7	13.621

Table 11 (c): Pattern of Weight Gain (Kg) in Different Gestation period (Wk)

Gestational Period in wt.	Mean Maternal wt. in kg.
From booking to 16 wks	1.108
20- 24	2.116
24- 28	1.1364
32- 36	1.579
37- term	1.228

Table 11 (d): Pattern of Mean Maternal Wt Gain from 37 Wks to term in Relation to Maternal Age

Maternal age in yrs.	No. (n)	%	Mean wt. gain in kg.
<20yrs	23	23%	1.12
21-25	50	50%	1.18
26-30	20	20%	1.24
31-35	7	7%	1.34

Table 11 (e): Pattern of Wt. Gain in Relation to Parity/Gravida after 37 Wks till Delivery

Parity/ Gravida	No. of cases	Mean maternal wt. gain after 37 wks till delivery
PRIMIGRAVIDA	58	1.321
MULTIGRAVIDA	42	1.288

Table 12 (a): Weight of Placenta in Relation to Maternal Weight gain

Weight gain kg.	No. of cases (%)	Mean weight of placenta in gms.
<5kg	6 (6%)	375
5-9.99	46 (46%)	419.53
10-14.99	42 (42%)	480.14
> 15kg	6 (6%)	555

Table 12(b): Weight of Placenta in Relation to Parity/Gravida

Parity/Gravida	No. of cases	Mean weight of placenta in gms.
PRIMI GRAVIDA	58	447.68
MULTI GRAVIDA	42	448.72

Table 12 (c): Weight of placenta in relation to maternal booking weight in kg.

Booking wt. in kg.	No. of cases (%)	Mean weight of placenta in gms.
<40kg	10 (10%)	415.05
40-44.99	24 (24%)	417.5
45-49.99	35 (35%)	460.1
50-54.99	16 (16%)	481.25
55-59.99	11 (11%)	507.72
>60kg	4 (4%)	567.5

4. Analysis

In our study, most of the women (73%) belong to age group under 25 yrs. This is because of early marriage and early child bearing among women in our society (TABLE-1). There are 58% primigravida and 42% multipara and majority belongs to low or low middle economic groups (TABLE-2). Maternal booking weight under 50kg is found in 69% cases and above 60kg in only 4% cases. This shows that incidence of low booking weight is quite high and incidence of high booking weight is quite low in our country. This is probably the effect of environment and poor nutrition in our country (TABLE-3). Majority of cases 46% falls in 5kg to 9.99kg weight gain group (TABLE-4). Mean maternal weight gain is 10.65 kg in present series. It has

been observed that incidence of low birth wt. is 9% and of mean birth at is 2.98 in present series. In our study maternal booking wt. was found to be directly related to the weight of the newborn (TABLE-6). In TABLE-7, the incidence of low birth weight is 66.66% when weight gain is less than 5kg. The incidence declines gradually as weight gain increases. It is only 4.76% among those with wt. gain of 10kg to 14.99kg. There is no LBW baby in the group where wt. gain is 15kg or more. It is observed that there is a definite correlation between maternal weight gain to birth weight of new born, (TABLE-8) low weight gain related to low birth weight and high weight gain to high birth weight.

One might argue that the weight gain and birth weight relationship is a reflection of pre-pregnancy weight, maternal age, parity or some other variables. Pre-pregnancy weight is positively related to birth wt. as already shown. incidence of foetal distress is high (33.33%) among low wt. gain group kg (<5kg) and low (7.14%) among relatively higher weight gain group (10kg 14.99kg) (TABLE-9).

In this study, the incidence of pre-eclampsia raised with increase in wt gain (TABLE-9).

Incidence of both forceps delivery (16.66%) and caesarean section (33.33%) is high among low wt gain mothers. It is again high (16.66% and 33.33%) when wt. gain is higher (TABLE-10).

Thus it has been found that irrespective of basic weight of the mother (pre pregnancy weight), the low weight gain or excessive weight gain in antenatal period both are associated with greater risk than average and need special care and more surgical intervention is required in both types.

In table-11A shows that mean maternal wt gain is least (9.686kg) in young women and it gradually increases with advanced maternal age Highest wt gain (13.621kg) is found in the age group of 31 yrs to 35 yrs. Table 11B shows that there was no significant correlation between booking body wt. of mother and their wt. gain in pregnancy. In our study it is shown that the rate of maternal wt. gain is maximum in 20wks to 24wks of gestation (2.11 kg) and the slower rate of wt. gain is observed before 16 wks and after 37 wks (1.108 kg and 1.228 kg respectively) TABLE-11C. The reason is attributed to improved morning sickness, increased appetite and good amount of intake of food.

In present series, mean maternal weight gain after 37 wks is slightly lower (1.12kg) among younger women (<20 yr) than (1.34 kg) among older age group (31-35 yrs) TABLE-11D.

It is shown that mean placental wt gradually increases as the mean maternal wt. gain is raised. The placental wt. is least 375.00 gm when the mean maternal weight gain in pregnancy is < 5 kg and it is highest 555.00 gm when the wt. gain in pregnancy is more than 15 kg. (TABLE-12A). It is also shown (Table-12B) that maternal booking wt. in pregnancy is directly related to mean placental wt. Mean placental weight is least (415.05 gm) when the booking wt. is less than 40kg and it is highest 567.50 gm when booking wt. is maximum (≥ 60 kg).

5. Discussion

A series of 100 cases are studied to observe whether any relation exists between maternal booking wt. and wt. gain during pregnancy on the birth wt. of the baby, pregnancy complications, mode of delivery and weight of placenta.

- 1) There is definite correlation between the birth weight of the newborn and maternal booking wt. In pregnant mother with low booking wt. (<40 kg), the mean birth wt. is found to be low 2.43 kg and these with high booking wt. (>60 kg), mean birth wt. is found to be high 4.16 kg. (TABLE-6).
- 2) There is significant correlation between the birth wt. of newborn and maternal wt gain during pregnancy. It has been observed that increasing gain in wt. during pregnancy also lead to increase weight of the newborn. (TABLE-7 & 8).
- 3) Incidence of low birth wt. (<2.5 kg) both IUGR and pre-maturity is high among low booking wt. group (<40 kg) (TABLE-9).
- 4) Incidence of low birth wt. (both IUGR & pre-maturity) is significantly high 33.33% and 16.66 % respectively, when maternal wt. gain in pregnancy is low (<5 kg). Its incidence is reduced with increase of weight gain and it is nil when wt. gain is 15 kg or more (TABLE-9).
- 5) The gain in wt. in pregnant mother has definite impact in pre-eclamptic toxemia. Rapid increase in wt. gain resulted in higher incidence of pre-eclampsia (TABLE-9).
- 6) In present series, incidence of foetal distress is higher among low wt. gain group than high wt. gain group. It is 33.33% with <5 kg wt. gain group in contrast to 7.14% when gain is 10-14kg. (TABLE-9).
- 7) Forceps delivery and caesarean section rate is high in both low wt. gain (<5 kg) and high wt gain (15 kg) group than those who have average wt. gain (TABLE-10).
- 8) In present series, there is a significant correlation is found between maternal booking wt. and gain in wt. during pregnancy. Maternal weight gain in pregnancy increases with maternal booking weight (TABEL 11A).
- 9) In present series, it has been found that maximum rate of wt. gain occurs in 20 to 24 wks of gestation (2.11 kg). It is least before 16 wks. and after 37 wks 1.108kg & 1.228 kg respectively (TABLE-11C). This is due to improved appetite with increased food intake during 20-24 weeks.
- 10) After 37 wks of gestation till term young women gain slight less wt. than older women (TABLE-II D).
- 11) Wt. of placenta is directly related to wt. gain of mother in pregnancy and maternal booking wt. It is higher as the maternal booking wt. and wt. gain in pregnancy is higher and vice-versa. (TABLE-12A, B & C).

6. Conclusion

Weight monitoring during antenatal period continues to have clinical application for prediction of poor birth outcomes. There is a positive correlation between maternal wt. gain and birth wt. of newborn regardless of maternal age and parity¹⁹.

Pre-pregnancy wt. and wt. gain during pregnancy have direct impact on the maternal complications also²⁰. Mean infant

birth wt. is a function of maternal wt. before pregnancy and weight gain in pregnancy. Women who gain little wt. in pregnancy are at increased risk of having low birth wt. baby; women of low pre-pregnancy (booking) weight experiencing little weight gain during pregnancy are more likely to give birth to a low birth wt. baby than over-weight women having a similar net wt. gain during pregnancy. In fact, net weight gain in under wt. women is strongly related to birth wt., whereas in over wt women net wt. gain is only marginally related to birth wt^{1, 2}. Increase in maternal weight gain in pregnancy results in higher frequency of foetal macrosomia which in turn lead to increased rates of caesarean section and other major maternal and foetal complications.

Mean maternal weight gain from the time of booking until delivery is not linear¹⁹. it is lowest during first trimester, peak during second trimester and slowed slightly during third trimester²¹. The most important predictors of maternal weight gain is age of mother in the first trimester, pre-pregnancy body mass and parity in second trimester & age and parity in third trimester²¹. The weight gain in young women is less than that seen in older women from 37 wk till term. The weight gain in parous women is less than in primigravida from 37 wk till term²¹.

Weight gain less than 90%, the IOM's recommendation in the third trimester may serve as an indicator for identifying women at risk of delivery in preterm. Pregnancy weight gain within the IOM's recommendation is associated with best outcome for both mother and infants. However, weight gain in most pregnant women is not with the IOM's ranges²². So, a randomized controlled study is required to determine if perinatal and maternal outcome can be improved by advising pregnant women to gain optimal weight rather than the IOM's recommendations²³.

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