

PATTERN OF WEIGHT GAIN IN NORMAL PREGNANCY

by

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The disparity in the pattern of weight gain in normal pregnancy in different countries has drawn the attention of the research workers and the clinicians alike. The maximum average weight gain in normal pregnancy was 37.4 pounds as reported by Plass and Yoakam (1929). The minimum average weight gain was 12.7 pounds as reported by Venkatachalam (1966). Pregnancy is considered an anabolic process and there is a weight gain even of non-reproductive tissues. The foetus, placenta and the liquor account for two thirds of the total weight gain in pregnancy. Nutrition significantly affects the weight gain in pregnancy. Pregnant women with poor nutrition put on less weight than those who get a balanced and adequate diet.

The risk of excessive weight gain to the mother and the foetus are well recognised and even emphasised in standard text books. We feel, however, that enough emphasis is not given to the risks of poor weight gain in normal pregnancy. The object of the present study was to establish a pattern of weight gain in

average hospital class of patients and correlate the factors that influence the weight gain and its effect on the foetus.

Any longitudinal study of weight gain presupposes the facilities of proper antenatal records. The problem in developing countries becomes more acute because pregnant women do not attend the antenatal clinic regularly. The first visit is rarely made in the first trimester. The spasmodic and irregular visits hardly give an opportunity to study the pattern of weight gain. Those who are aware of the difficulties in such longitudinal studies would appreciate why the present authors took nearly three years to collect the complete data of 100 pregnant women. Out of 400 pregnant women selected there were 300 fall outs because of irregular visits, not coming for delivery to the hospital, development of toxæmia or premature labor.

Material and Methods

The women who were less than 10 weeks' pregnant at the time of first antenatal visit were selected. The other criteria were the same as recommended by Humphreys (1954). At each visit over and above the routine check up, weight was recorded under identical conditions using the same weighing machine based

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on lever principle. The presence of oedema was recorded. If the woman developed toxæmia of pregnancy, she was dropped from the study. These women represent the average hospital class of patients. The average monthly income varied from 50-200 Rupees. All patients were vegetarians. No instructions were given about diet but were allowed to take their normal diet.

Analysis

The average weight gain from 10 weeks to full term was 7 kg. (15.4 lbs.). This works out as 17 per cent over the initial weight. The weight gain pattern from different centres is summarised in Table I. The three studies from India show fair degree of correlation. The weight gain is less in series reported by Venkatachalam because as he points out the patients were poor class women

employed on tea plantations. The patients in Devi's and our series are of slightly better nutrition. The break up of the weight gain pattern shows that more weight is gained from 21-30 weeks than at other times (Table II). The weight gain in the last 10 weeks is minimal. Not only was the rate of gain substantially less but many more failed to gain or even lost weight in the last 10 weeks. Mosley (1958), Clements (1961), Gopalan (1960), Venkatachalam (1966) have come to similar conclusions.

There is no agreement about the effect of parity on weight gain. Most of the records suggest more weight gain in primigravidae than multiparous women. Humphreys found a difference of 2 pounds in the weight gain of primigravidae and multiparae. Our study does not suggest significant difference in the weight gain pattern in relation to parity

TABLE I
Weight Gain Pattern Reported by Other Workers

Name	Year	Country	Numbers	Wt. gain in lbs.
Davis	1923	U.S.A.	150	21
Kuo	1941	China	200	22.34
Kerr	1943	U.S.A.	500	22.9
Scott	1948	U.K.	360	21.53
Tompkins	1951	U.S.A.	60	24
Dickman	1952	U.S.A.	23847	20.2
Thomson & Billewicz	1957	U.K.	2868	25.1
Venkatachalam	1960	India	48	12.7
Devi, P. K.	1963	India	156	15.7
Bhatt, R. V.	1970	India	100	15.4

TABLE II
Weight Gain in Normal Pregnancy in Kilograms

Wt. upto 10 weeks preg.	Weeks			Total	Average baby Wt.
	11-20	21-30	31-40		
40 kg.	2.58	2.86	1.56	7	2.66
Percentage Wt. gain	37	41	22		

Table III. There is a correlation between weight gain and height. Tall women gain more weight than short women Table IV. The weight gain of women less than 140 cms. in height is 24 per cent less than the average; whereas the weight gain in women more than 156 cms. in height is 16 per cent above average. Even the initial weight upto 10 weeks pregnancy is more in tall women than in short women. The baby weights also increase with the height of the mother.

Chesley (1944) found that younger women put more weight during pregnancy than older women. Thomson and Billewicz (1957) found small difference between the weight gain in young and old women during pregnancy. Our conclusions are at variance from other

studies. We find that older women gain more weight than younger women Table V. However, there is no correlation between age and baby weights.

There is correlation between the baby weight and the maternal weight gain Table VI. The baby weight increases with the increase in the maternal weight gain upto a limit and then if there is further weight gain in the mother the baby weight is reduced. The baby weights are low if the maternal weight gain is less than 7 kg; whereas weight gain of 8 kg. or more is associated with heavier babies. Table VII compares the prematurity rate (baby weight less than 2500 G) in relation to maternal weight gain. When the mother gained less than 4 kg. all the babies were premature and only 12 per cent of the

TABLE III
Weight Gain and Parity in Kg.

Parity	Wt. upto 10 weeks	11-20	21-30	31-40	Total	Baby Wt.
Primi (31)	39.3	2.52	3.20	1.33	7.05	2602
2nd, para (19)	40.2	2.70	3.15	1.70	7.55	2754
3rd, para (17)	38.2	2.36	2.70	1.53	6.59	2838
4th, para (15)	40	2.65	2.90	1.52	7.07	2810
5th & + (18)	42.4	2.67	2.35	1.72	6.74	2840

TABLE IV
Weight Gain and Height in Kg.

Height in cms.	Wt. upto 10 weeks	11-20	21-30	31-40	Total	Baby Wt.
upto 140	36.3	1.42	2.75	1.15	5.32	2270
141-145	41.4	2.62	2.18	1.90	6.70	2247
146-150	39.2	2.80	3	1.94	7.74	2520
151-155	42.45	2.85	3.05	1.21	7.11	2603
156+	43.7	3.21	3.32	1.60	8.13	2651

TABLE V
Age and Weight Gain in Kg.

Age	Wt. upto 10 weeks	11-20	21-30	31-40	Total	Baby Wt.
upto 20	38.2	2.48	3.05	1.15	6.68	2650
21-25	40.4	2.66	2.76	1.30	6.72	2588
26-30	40.5	3.42	2.83	1.12	7.37	2846
31-35	43.6	1.76	2.80	2.67	7.23	2674

TABLE VI
Maternal Weight Gain and Baby Weight

Baby Weight in grams	Maternal weight gain in Kg.
upto 2000	6.71
2001-2500	7.04
2501-3000	8.01
3001 +	8.92

TABLE VII
Maternal Weight Gain and Prematurity

Maternal Wt. gain in Kg.	Percentage of premature births Wt. less than 2500 G.
upto 4	100
4.1-5	70
5.1-6	60
6.1-7	35
7.1-8	14
8.1-9	12
9.1-10	8
10.1+	8

babies were premature when the maternal weight gain was more than 8 kg.

It should be realised that just as excessive weight gain could produce toxæmia and smaller babies, less weight gain would also produce smaller babies and so one should take serious note if the weight gain is below average. Heavier babies may produce greater risk to the mother at the time of birth and so one

should strike a balance between optimal baby weight and maternal weight gain.

Summary and Conclusions

1. Weight gain pattern is studied in 100 normal pregnant women.
2. The average weight gain from 10 weeks to term is 7 kilograms. The maximum weight gain takes place from 21-30 weeks.
3. Weight gain is not much affected by parity but there is a correlation between weight gain and height of the women.
4. The baby weight increases with increase in maternal weight gain upto a limit.
5. The prematurity rate is high if the mother gains less than 6 kilograms during pregnancy.

References

1. Chesley, L. C.: Am. J. Obst. & Gynec. 48: 565, 1944.
2. Clements, F. W.: Fed. Proc. 20 supp. page 165. cited by Mosley.
3. Davis, C. H.: Am. J. Obst. & Gynec. 6: 575, 1923.
4. Devi, P. K. and Bakhru, S. J.: J. Obst. & Gynec. Ind. 13: 19, 1963.
5. Dickman, W. J.: The Toxaemias of pregnancy. 2nd ed. Henry Kimpton, London.

6. Gopalan, C. and Venkatachalam, P. S.: Ind. J. Med. Res. 48: 511, 1960.

7. Humphreys, R. C.: J. Obst. & Gynec. Brit. Emp. 61: 764, 1954.

8. Kerr, A. (Jr.): Am. J. Obst. & Gynec. 45: 950, 1943.

9. Kuo, C. C.: Chinese Med. J. 59: 278, 1941.

10. Mosley, D. L.: West. A. Med. J. 7: 35, 1952.

11. Plass, E. D., Yoakam, W. A.: Trans. Am. Gynec. society 54: 165, 1929.

12. Scott, J. A. and Benjamin, B.: Lancet. 1: 550, 1948.

13. Thomson, A. M. and Billewicz.: Brit. Med. J. 1: 243, 1957.

14. Tompkins, W. T. and Wiehl, D. F.: Am. J. Obst. & Gynec. 62: 898, 1951.

15. Venkatachalam, P. S., Shanker, K. and Gopalan, C.: Ind. J. Medical Research 54: 402, 1966.