

The pattern of physiological changes in pregnancy in Malaysian women

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Introduction

STUDIES OF TOTAL WEIGHT gain in pregnant women in other parts of the world have revealed wide variations from about 6 kgm. (12 pounds) in Indian and Nigerian women (Hauck, 1960) to about 14 kgm. (30 pounds) in European and American women (Hyttén and Leitch, 1966). Thus far, there has been no planned study undertaken to map out the physiological pattern of weight changes in Malaysian women throughout their pregnancy and puerperium.

As from the middle of 1968, a prospective study was embarked to evaluate the pattern of weight changes in normal pregnant women at the Obstetric Unit, University Hospital, University of Malaya in Kuala Lumpur, Malaysia. The subjects that were incorporated into this study had to fulfill certain definite criteria. These were:-

- (1) the subjects were healthy and normal
- (2) the exclusion of all abnormal pregnancies

- (3) the absence of manipulation of diet
- (4) the subjects were weighed at least throughout the last half of pregnancy
- (5) no medical treatment that might interfere with weight changes, such as diuretics and steroids, should have been given.

Method of Study

All pregnant women, who booked at the ante-natal clinic of the University Hospital before the 20th week of pregnancy, were incorporated into this study. Most of the women were weighed monthly until the 32nd week, thence every two weeks until the 36th week, and thereafter weekly till delivery. Accurate lever balance type of weighing was used, and patients were weighed with a fixed set of clothing, (weighing 0.2 kgm.).

The weighing machine is a SECA lever balance type, weighing correctly to one-tenth of a kilogram.

WEIGHT CHANGES IN PREGNANCY

The machine is periodically checked by one of the authors, usually at 2-weekly intervals.

Results of Study

The present report constitutes a preliminary communication of an extensive study project, still in progress. This study presents the pattern of weight changes in the first 300 subjects, who have been comprehensively documented.

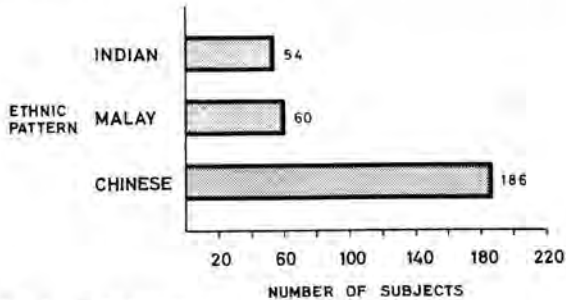


Fig. 1 – Ethnic pattern

Ethnic Pattern

In all, there were 300 subjects studied, and of these, 186 were Chinese, 60 Malays and 54 Indians. Subjects of other ethnic groups were deliberately left out of this study.

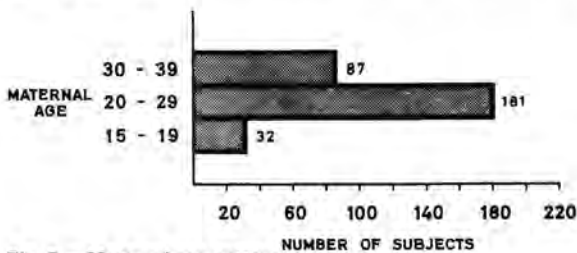


Fig. 2 – Maternal age pattern

Maternal Age Pattern

There were 32 subjects in the age group 15–19 (Chinese 12, Malays 10, Indians 10), 181 in the 20–29 age group (Chinese 103, Malays 42, Indians 36), and 87 in the 30–39 age group (Chinese 71, Malays 8, Indians 8).

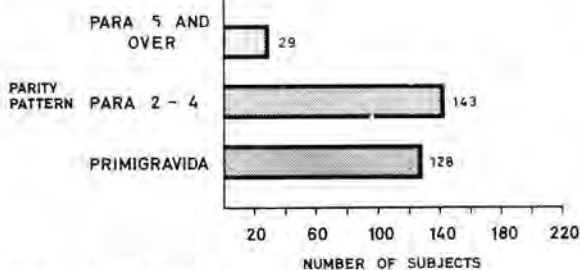


Fig. 3 – Parity pattern

Parity Pattern

There were 128 primigravida (Chinese 75, Malays 30, Indians 23) and 172 multiparae (Chinese 111, Malays 30, Indians 31).

TABLE I – AVERAGE WEIGHTS DURING ANTENATAL PERIOD

| DURATION OF PREGNANCY MID-WEEK | NUMBER OF READINGS | AVERAGE WEIGHT (Kilos.) |
|--------------------------------|--------------------|-------------------------|
| 8 | 22 | 47.3 |
| 12 | 64 | 48.2 |
| 16 | 161 | 49.1 |
| 20 | 300 | 50.5 |
| 24 | 263 | 52.4 |
| 28 | 224 | 53.7 |
| 32 | 215 | 55.1 |
| 36 | 232 | 56.3 |
| 40 | 185 | 57.1 |
| 42 | 24 | 57.6 |

Average Antenatal Weight Pattern

Table I shows the results of the average weights of the 300 women incorporated into this study, during the various periods of gestation. Not all these subjects came up for ante-natal visits at all periods of gestation, and the average weights shown are the average weights for different numbers of subjects. For example, there were 300 readings at the 20th week of gestation, 263 readings at the 24th week of gestation, and 185 readings at the 40th week of gestation.

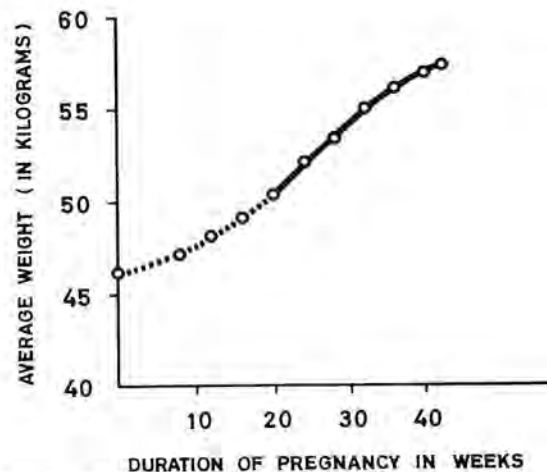


Fig. 4 – Pregnancy weight gain pattern

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TABLE II – COMPARATIVE STUDY OF THE PATTERN OF WEIGHT GAIN IN PREGNANCY

| AUTHOR | YEAR | PLACE | SUBJECT | PARITY | NO. |
|---------------------|------|----------|---|------------------|------------|
| KUO | 1941 | CHINA | 200 normal out of 4175 for complete records | PRIM. MULTIP. | 101 99 |
| ROBINSON et al | 1943 | U.S.A. | NORMAL PRIVATE 'WELL SITUATED ECONOMICALLY' | PRIM. MULTIP. | 300 184 |
| SCOTT & BENJAMIN | 1948 | U.K. | UNSELECTED (IN LONDON) | PRIM. | 360 |
| THOMSON & BILLEWICZ | 1957 | U.K. | HOSPITAL PATIENTS WITH NORMAL B.P. | PRIM. | 2868 |
| VENKATACHALAM et al | 1960 | INDIA | POOR CLASS WOMEN OF TEA PLANTATION | PRIM. MULTIP. | 13 35 |
| H.M. HAUCK | 1960 | NIGERIA | NORMAL | | 31 |
| SINNATHURAY & WONG | 1970 | MALAYSIA | NORMAL | PRIM. MULTIP. | 128 172 |

| MANIPULATION OF DIET | WEIGHT GAIN (Calculated from date:—) | FIRST WEIGHED | TOTAL GAIN | RANGE | NET GAIN POST-PARTUM |
|---|--------------------------------------|----------------|----------------|------------------------|----------------------|
| NONE | "NON-PREGNANT WEIGHT" | FIRST 3 MONTHS | 23.39 21.29 | | |
| OVER WEIGHT — restricted diet UNDER WEIGHT — encouraged to eat | "USUAL WEIGHT" | 3–4 mths. | 24.3 | | 6 weeks + 2.0 lb. |
| WAR TIME RATIONING | 16–20 wks. | 16–20 wks. | 21.53 | | |
| NONE | 13 wks. | 13 wks. | 25.1 | | 2 weeks + 6.05 lb. |
| NONE but POOR DIET | 12 wks. | 12 wks. | 11.8 13.6 | S.E. 1.67 S.E. 0.96 | |
| NONE | AVERAGE 20.7 wks. | From 3 months | 6.6 | | |
| NONE | 20 wks. | 8.20 wks. | 17–14 15.74 | 4.4–30.8 | 6 weeks + 10.8 lb. |

WEIGHT CHANGES IN PREGNANCY

Pregnancy Weight Gain Pattern

From the above results, it has been possible to plot a graph of the pattern of weight gain in pregnancy. The graph from the 20th to the 40th weeks of gestation are in bold lines, as they present the mean weights for a significant number of subjects. The rest of the graph is dotted, and present results from a lesser number of subjects. We have extrapolated the graph to evaluate the average pre-pregnant weight of the Malaysian women. The average pre-pregnant weight so assessed is 46.4 kgm. (102 lbs.). This is close to the average pre-pregnant weight of 202 young, nulliparous women, evaluated in a study by WONG and KUAH, which was 44.9 kgm. (98.7 lbs.)

From the above graph and the other results, the following conclusions can be drawn for the Malaysian pregnant women:

- (1) the weight gain from the 20th week to the 40th week of gestation was 7.33 kgm. (16.12 lbs.).
- (2) the weight gain from pre-pregnant weight to the 40th week of gestation was 11.32 kgm. (24.9 lbs.).
- (3) the weight gain from pre-pregnant weight to the 40th week of gestation for primigravida was 11.8 kgm. (25.9 lbs.).

This is closely comparable to the average weight gain of 12.5 kgm. (27.5 lbs.) by 2,868 Scottish primigravida as shown in the study by Thomson and Billewicz (1957).

- (4) Primigravida gained about 0.65 kgm. (about 1½ lbs.) more than multiparae.
- (5) At end of puerperium, the Malaysian women had gained 4.91 kgm. (10.8 lbs.)

Comparative Studies

Table II shows the pattern of weight gain in pregnancy in various studies in other parts of the world. As one can expect, the greatest weight gain were seen in studies in the United Kingdom and United States, and the least in the studies from Nigeria. Our study has shown that the weight gain in pregnant Malaysian women is of the intermediate variety but closer to the patterns seen in the socio-economically advanced Western countries.

This is most probably a reflection of the general standard of living in this part of Malaysia. But firm conclusions on this point will have to await a more extensive survey, still in progress.

The weight gain at the end of puerperium is 4.91 kgm. (10.8 lbs.), and this figure is considerably more than those obtained in other studies, (Thomson and

TABLE III - A COMPARATIVE STUDY OF THE DISTRIBUTION OF WEIGHT GAIN IN PREGNANCY

| SOURCE | COUNTRY | NO. OF SUBJECTS | WEIGHT GAIN IN 4-WK. PERIODS OF PREGNANCY IN LBS. | | | | | | | |
|----------------------------|----------|-----------------|---|-------|-------|-------|---------------|---------------|---------------|------|
| | | | 12-16 | 17-20 | 21-24 | 25-28 | 29-32 | 33-36 | 37-40 | |
| KUO (1941) | CHINA | 200 | 2.4 | 4.0 | 4.3 | 3.5 | 3.0 | 3.0 | 3.0 | 2.8 |
| ROBINSON (1942) | U.S.A. | 484 | 1.4 | 3 | 3.9 | 4.0 | 3.2 | 3.4 | 3.4 | 3.2 |
| SCOTT & BENJAMIN (1948) | BRITAIN | 360 | | 4.24 | 4.70 | 3.99 | 3.39 | 3.38 | 3.38 | 2.55 |
| THOMSON & BILLEWICZ (1957) | BRITAIN | 2868 | 3.1 | 4.1 | 4.7 | 4.1 | 3.4 | 3.5 | 3.5 | 3.2 |
| VENKATACHALAM et al (1959) | INDIA | 130 | 1.94 | 2.37 | 3.24 | 2.06 | 1.94 | 1.72 | 1.72 | 0.73 |
| H.M. HAUCK (1960) | NIGERIA | 98 | | | | | *28-32 1.2 | *32-36 1.3 | *36-40 1.0 | |
| SINNATHURAY & WONG (1970) | MALAYSIA | 300 | *13-16 2.09 | 3.00 | 4.14 | 2.99 | 2.86 | 2.77 | 2.77 | 1.81 |

Billiewicz 6.05 lbs. at the end of 2 weeks, and ROBINSON et al 2 lb. at the end of 6 weeks). Perhaps, this is because the Malaysian women are not as yet too concerned about their figures after delivery. This is also most probably tied up with the cultural patterns of the Malaysian women with reference to diet, pregnancy and puerperium.

Table III compares the distributional pattern of weight gain in the varied periods of gestation. It can be seen that the greatest gain in weight is in the 21-24 weeks of gestation, 0.45 kgm. per week (approx. 1 lb. per week). Thereafter, the weight gain decreases to about 0.35 kgm. (0.75 lbs.) per week at the 30th week, and 0.18 kgm. (0.4 lb.) per week at term.

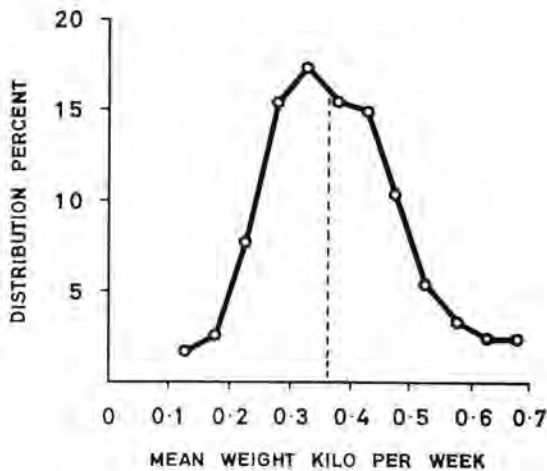


Fig. 5 — Mean weight gain in pregnancy pattern

Mean Weight Gain Pregnancy Pattern

Figure 5 shows the distribution of the mean weight gain per week of the pregnant women in this study. Total weight gain by these women is not strictly comparable because duration of the pregnancies ranged from 38 — 42 weeks. In this graph (Figure 5) is shown the average weekly weight gains from the 20th week until delivery. The modal value is about 0.367 kgm. per week (0.81 lb. per week). This figure also shows that the range of total weight gain from

the 20th to the 40th week of gestation is very wide, from 2 kgm. (4.4 lbs.) (i.e. 0.1 kgm. x 20 weeks) to 14 kgm. (30 lbs.) (i.e. 0.7 kgm. x 20 weeks). This indicates that it may be necessary to re-consider our present concept of only regarding a weight gain of 1 lb. per week in the later part of pregnancy as the criterion for recognising excessive weight gain of the pregnant mother in the ante-natal period.

SUMMARY and CONCLUSIONS:

- (1) The average maternal weight gain throughout pregnancy in Malaysian women is around 11.5 kgm. (25 lbs.).
- (2) The pattern of maternal weight gain in the Malaysian women shows a range of variation when the results of the study are comparatively reviewed with reference to the maternal age, gravida, and ethnic group patterns.
- (3) The average total weight gain in the Malaysian women in this study is about 1 kgm. to 2 kgm. (2 to 4 lbs.) less than the total weight gain, that has been reported in the European and American pregnant women. Whereas, when compared to the studies done in India and Nigeria, the average total weight gain in the Malaysian women is about 5 kgm. to 6 kgm. (11 to 13 lbs.) more than their counterparts in India and Nigeria.

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