

Effect of Ante-Natal Care on Birth Weight

Pages with reference to book, From 93 To 99

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Abstract

The mean birth weight of 373 full-term singleton infants born to those women, who had been attending ante-natal clinics, was recorded. The results were compared with the findings from another groups of 373 infants, born to women who did not receive any ante-natal care but were properly matched with those of the first group in respect of age, parity, height, previous obstetric history, socio-economic status, sex and gestational age of the neo-nate and the month of delivery.

The mean birth weight (Mean \pm SD) in the ante-natal group was 3.04 \pm 0.47 kg as compared to 2.85 \pm 0.48 kg for non antenatal group. The difference was highly significant (P <0.001). The incidence of low birth weight was significantly higher (P <0.001) in the non ante-natal group (19%) as compared to ante-natal group (13%).

Possible aetiological factors and their modii operandi have been discussed (JPMA 32:93, 1982).

Introduction

Ante-natal care is regarded as a preventive branch of obstetrics and its ideal result should be a healthy mother in possession of a healthy child (Percival, 1980). The effects of ante-natal care are more apparent, when simultaneous attention is paid to maternal diet during pregnancy. In this way its beneficial effects become manifest both on maternal health as well as the foetal growth (Ebbs et al., 1941; Buke et al., 1949; Jacobson, 1977). However it still remains to be seen, if ante-natal care has any effect on the foetus in those communities, where due to traditional beliefs, taboos and socio-economic reasons any advice regarding the ante-natal diet is usually ignored.

Since our obstetric patients provided an ideal population for this type of study, it was decided to evaluate the effects of the ante-natal care on birth weight, which is not only a well recognised index of intra-uterine growth (Lub-chenco, 1970) but also a useful measure of reproductive efficiency (W.H.O., 1961).

Material and Methods

The records of all the deliveries conducted at Maternity Hospital, Katsina, between 1st January, 1977 and 31st December, 1977 were studied. The cases where the mothers had attended at least five visits at our ante-natal clinic and fulfilled the following criteria were selected.

1. Age of the mother was known.
2. Date of last menstrual period was precisely stated.
3. Duration of gestation, as told by the mother was consistent with the findings of clinical examination.
4. At the time of delivery, the duration of gestation was 37 weeks or more,
5. There was no history or any finding suggestive of pre-eclamptic toxemia, eclampsia or hypertension.
6. There was no complication or surgical interference during labour.
7. There was no twin, multiple or still birth.
8. Birth weight was accurately recorded.

There were 373 such cases, which formed study group and will henceforth be referred to as ante-natal group.

Each case in the study group was matched with a case from the records of those mothers, who fulfilled the afore-said criteria, but had not attended any ante-natal clinic. The parameters taken into consideration for matching were the age, height, parity and socio-economic status of the mother, sex and gestational age of the neonate, the month of delivery, the place of mother's residence on urban/rural basis and the history of previous abortions: These 373 matched cases were to act as a control and will be referred to as non ante-natal group. The age and parity of the mother, sex and gestational age of the neonate, the month of delivery and history of previous abortions were exactly matched, whereas the height was matched within 2 centimeter's difference. Fifty nine percent of these women were "urbanites", while the rest (41 percent) were resident in rural areas.

The women included in both these groups were all Hausas, married to Hausa men of low to middle socio-economic background. Hausa is the name of the largest ethnic group of Nigeria. The detailed description of Hausas has previously been reported (Rehan and Tafida, 1979, 1980; Rehan and Abashiya, 1981) and is being reproduced below.

Hausa is a linguistic, not an ethnic term, and refers to those whose mother tongue is the Hausa language (Hill, 1972). So far the Hausas were regarded as being people of mixed stock, which resulted from the inter-marriage between Negroes and Hamitic people—a branch of Mediterranean race, named after I-Lam, the second son of Noah. However the recent research shows that this theory of racial Origin is not correct. It has now been proved that Hausas were autochthons in the area, which is now called Hausaland (Adarnu, 1978).

The Hausa people are settled mainly between 10.5 and 13.5 degrees North and 4 to 10 degrees East, in a huge area in the north of Nigeria and the south of Niger Republic. The Hausaland consists essentially of the basin of Sokoto river and its tributaries to the west and of a greater plateau to the east (Hill, 1972). Good farmers and skilled craftsmen, the Hausas are known throughout Africa as remarkably clever traders.

In most parts of Hausaland, child marriage is the rule; both boys and girls are married at the age of 12 to 13 years in the large towns but at even younger ages in the villages (Madauci et al., 1968). Girls may be married before they reach puberty, so that some have their first menstrual period when they are already in their marital homes (Harrison, 1978). Consequently, most of the girls have their first child before they are fully grown. Hausas are predominantly Muslim. Polygamy is widely practised and only a minority of the women smoke, though the trends are changing with younger generations.

The ante-natal clinic of our hospital usually registers the mothers after 12th week. The primigravidae are expected to have completed 9 visits before delivery, whereas for multiparas even six visits are considered adequate. Apart from complete physical and pelvic examinations, (during each visit the weight and blood pressure is recorded and the urine is tested for the pre-sence of sugar, albumen, or pus cells. The haemoglobin level of the blood is checked at the first visit and then during any subsequent visit if anaemia is suspected. The mothers are given informative talk about health education and are provided with multi-vitamins, iron, folic acid and daraprim tablets. These supplies are replenished on each subsequent visit. If during any visit, the nurse or midwife conducting the clinic notices an abnormal finding she immediately refers the case to the doctor.

The maternal age of the population studied ranged from 14 to 40 years, the mean being 22.80 years with a standard deviation (S.D.) of 5.93. The parity ranged from 0 to 13 and there were more primigravidae as compared to other groups.

Table I

Distribution of Mothers According to Age and Parity

AGE

Age Group (Years)	≤ 18	19—24	25—30	31—36	$37 \geq$
Number	129	95	119	22	8
Percentage	34.58	25.47	31.90	5.90	2.14
Range: 14-40 Years		Mean: 22.80 Years		S.D: ± 5.93	

PARITY

Parity	0	1	2	3	4	5	$6 \geq$
Number	142	50	42	34	30	13	62
Percentage	38.06	13.41	11.26	9.12	8.05	3.48	16.62

Table II

Distribution of Mothers According to Height and Previous Obstetric History

HEIGHT

Height (C.M.)	Under 140	140-149	150-159	160-169	170 & over
Number	31	84	172	73	13
Percentage	8.31	22.52	46.12	19.57	3.48

PREVIOUS OBSTETRIC HISTORY

Previous Abortions	0	1	2	3	4	5 & above
Number	191	76	42	28	16	20
Percentage	51.20	20.38	11.26	7.51	4.29	5.36

Tables I and II give the distribution of the mothers in each age group according to height and history of previous abortion.

The birth weight in all these cases was recorded before first feed by using a metric scale, which was frequently checked for zero error. There were 198 male and 175 female neo-nates in each group and the birth weight was calculated separately for males and females.

Results

The mean birth weight (MBW) of the infants born to the mothers in ante-natal group was 3.04 ± 0.47 kg (Mean \pm S.I.), whereas the MBW of infants in non ante-natal group was 2.85 ± 0.48 kg. The difference

was highly significant ($P < 0.001$). The MBW of males in the ante-natal group was 3.09 ± 0.46 and that of the females was 2.91 ± 0.52 kg. The corresponding figures for non ante-natal group were 2.98 ± 0.48 kg and 2.78 ± 0.43 kg respectively. The differences were highly significant ($P < 0.001$).

Table III

Mean Birth Weight of Male Children According to Maternal Age.

Age (Years)	Ante-natal Group			Non ante-natal Group			Statistical Significance
	No.	Means	S.D.	No.	Mean	S.D.	
≤ 18	61	2.90	0.52	61	2.73	0.32	$P < 0.01$
19-25	57	3.18	0.47	57	2.92	0.45	$P < 0.005$
25-30	64	3.18	0.51	64	3.04	0.31	$P < 0.05$
31-36	12	3.20	0.49	12	3.05	0.52	NS*
≥ 37	4	3.28	0.78	4	3.12	0.82	NS*
Total	198	3.09	0.46	198	2.91	0.52	$P < 0.001$

*Non Significant

Table IV

Mean Birth Weight of Female Children According to Maternal Age.

Age (Years)	Ante-natal Group			Non ante-natal Group			Statistical Significance
	No.	Mean	S.D.	No.	Mean	S.D.	
≤ 18	68	2.86	0.41	68	2.72	0.29	$P < 0.02$
19-24	38	2.96	0.48	38	2.81	0.52	NS*
25-30	55	3.12	0.52	55	2.80	0.54	$P < 0.002$
31-36	10	3.19	0.36	10	2.99	0.15	NS*
≥ 37	4	3.26	0.86	4	2.97	0.39	NS*
Total	175	2.98	0.48	175	2.78	0.43	$P < 0.001$

*Non Significant.

Tables III and IV give the distribution of MBW of male and female infants respectively according to the age of the mothers. Apart from exhibiting the influence of maternal age, these tables clearly indicate

that for each age group the MBW of the infants in the ante-natal group is significantly higher than their counterparts in the non ante-natal group.

Table V Birth Weight of Male Children According to the Parity

Parity	Ante-natal Group			Non ante-natal Group			Statistical Significance
	No	Mean	S.D.	No	Mean	S.D.	
0	68	2.90	0.43	68	2.67	0.46	P < 0.002
1	26	3.18	0.42	26	2.96	0.36	P < 0.05
2	23	3.22	0.39	23	2.97	0.45	P < 0.05
3	21	3.20	0.35	21	2.97	0.36	P < 0.05
4	18	3.21	0.31	18	2.99	0.34	P < 0.05
5	8	3.16	0.64	8	3.50	0.54	N.S.*
6 ≥	34	3.18	0.56	34	3.18	0.35	N.S.*
Total	98	3.09	0.46	198	2.91	0.52	P < 0.001

*Non Significant.

Table VI Mean Birth Weigh of Female Children According to Parity

Parity	Ante-natal Group			Non ante-natal Group			Statistical Significance
	No	Mean	S.D.	No	Mean	S.D.	
0	74	2.88	0.44	74	2.67	0.40	P < 0.002
1	24	2.89	0.36	24	2.63	0.32	P < 0.05
2	19	2.84	0.50	19	2.90	0.55	N.S.*
3	13	3.32	0.46	13	2.96	0.43	P < 0.05
4	12	3.27	0.58	12	2.89	0.21	P < 0.05
5	5	2.87	0.46	5	2.78	0.17	N.S.*
6 ≥	28	3.18	0.47	28	3.00	0.47	N.S.*
Total	175	2.98	0.48	175	2.78	0.43	P < 0.001

*Non Significant.

Tables V and VI give the distribution of MBW of male and female infants respectively according to the parity of the mother. Although in both groups the increasing birth order was associated with heavier birth weight, yet on the whole MBW of infants of each birth order in the ante-natal group was significantly higher than their counterparts in the non ante-natal group.

The non-significant differences in few groups in tables III to VI are possibly due to the small number of

observations.

Discussion

Two useful measures of reproductive efficiency are birth weight and per-natal mortality (W.H.O., 1961). In most developing countries, the former is easy to record and evaluate, while the tabulation of the latter is fraught with many handicaps. It was therefore, decided to use the birth weight as an indicator to evaluate the impact of ante-natal care being delivered by our hospital. One of the commonest objections levelled against this type of study is validity of the claim that ante-natal care alone is responsible for such good results as rightly pointed out by Harrison (1978), it may be argued that the women who accept ante-natal care are the enlightened minority and socio-economic advantages unrelated to their acceptance of ante-natal care are responsible for the successful outcome of their pregnancies. Being aware of such objection, due precautions were taken to carefully match the cases in all respects with particular reference to husbands' Occupations, so that this element of "Socio-Economic bias" may be eliminated.

Apart from pre-maturity i.e., birth before 37th week of pregnancy (W.H.O., 1961) and chronic debilitating diseases of the mothers, the other important factors likely to affect the birth weight in the tropics are maternal age, parity, small maternal stature, multiple pregnancies, previous history of abortions, maternal malnutrition, anemia of pregnancy, malarial placenta, (Jelliffe, 1974), seasonal changes (Morely and Knox, 1960), and smoking (Underwood et al., 1967; Tsafir and Halbrecht, 1971). Since the present data pertain only to the fullterm singleton deliveries, the effects of prematurity and multiple pregnancies get excluded. The matching of data for maternal age, parity, maternal height, previous obstetric history and month of delivery has added further uniformity to both groups. Unfortunately there were no reliable data regarding the smoking habits of these women. Therefore, while matching, this factor could not be taken into account. Since one of the criterion for matching was husbands' occupations, it can be inferred that the eating habits of both these groups were uniform. This leaves three major factors, which can influence the birth weight. These are maternal nutrition, anaemia of pregnancy and the placental diseases. If an ante-natal care affects all or any of them, its effects are going to be reflected on birth weight as well.

During ante-natal sessions, there is always great emphasis on health education including advice about various foods desirable to be taken during pregnancy. Unfortunately there are no previous studies to show the dietary pattern of women during pregnancy in this area. The impression gathered through "over-the-years" experience is that although the diet consumed by women during pregnancy, particularly in the first trimester, is somewhat different from their normal diet, yet its selection is governed more by the traditional customs, beliefs, old wives' tales and economic factors rather than caloric or nutritional value and any advice given on this subject is rarely adhered to. So this cannot be argued that the women in ante-natal group have been consuming a more nourishing diet.

Anaemia during pregnancy, common in Nigeria, is less severe in the north as compared to the south (Fleming, 1972). The malarial haemolysis and folate deficiency are the commonest causes (Harrison, 1978; Fleming, 1972), though in about 20 percent cases the deficiency of iron is also a contributory factor (Fleming, 1972). The women attending the ante-natal clinic regularly received iron, folic acid and antimalarials. Apart from protecting the women from malaria and thus further haemolysis, this regimen also corrects the deficiency of folic acid, which is known to be related to low birth weights (Baker et al., 1977). The iron deficiency may not be manifest at the beginning of pregnancy, yet due to increased maternal and foetal demands the iron reserves of the pregnant women are likely to be depleted, if these are not adequately and promptly replenished. The routine use of iron supplement in ante-natal clinic is an effective way of combating this problem (W.I.O., 1965; Lawson and Stewart, 1967; Clayton et al., 1972). The vitamins, being co-enzymes and necessary for intermediate

metabolism (Baker et al., 1977), may also affect the birth weight favourably.

The recent studies by Baker et al. (1977) have established that the deficiency of pantothenic acid is a causative factor in the pathogenesis of low birth weight (Baker et al, 1977). The best sources of this vitamin-liver, kidney, yeast, egg and fresh vegetables (Davidson et al., 1975), are not commonly used in the area.

Apart from causing anaemia and thus a state of "relative malnutrition", malaria can also affect the birth weight through placental infection. Since malarial parasitaemia of placenta is associated with reduced birth weights (Bruce-Chwatt, 1952; Archibald, 1956; Cannon, 1958), the prevention of malaria among pregnancy women in ante-natal group by the use of antimalarial might have affected the, birth weight. The incidence of low birth weight i.e. 2.50 kg and below (W.H.O., 1961) was 19% in the non ante-natal group and 13% in the ante-natal group. The difference was statistically significant ($P < 0.05$). Similar results have been reported by Harrison (1978) from Zaria, who found the incidence of low birth weight to be 23% in the non ante-natal group as compared to 8% in the ante-natal group.

Some shortcomings of this retrospective analysis of the records are acknowledged. It may be criticised for lack of laboratory data particularly serial haemoglobin levels, estimation of serum proteins the inclusion of which would have added to the validity of results, but no such data were available. Notwithstanding these shortcomings, this study clearly proves that an ante-natal care, as simple as outlined above, can favourably influence the intra-uterine growth and fulfill the basic aim of ante-natal care i.e., a healthy mother in possession of a healthy child.

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