Paediatrica Indonesiana 19 : 91 — 102. March — April 1979.

ORIGINAL ARTICLE

The Low Birth Weight Infants. Factors influencing their weight; a prospective and retrospective study.

by

ALIAMRAN RASJID, H.E. MONINTJA, RACHMAT SADELI and AMAT KUAT

(From the Department of Child Health, Medical School, University of Indonesia, Jakarta)

Abstract

A study on 1045 low-birth-weight infants born in the Dr. Cipto Mangunkusumo General Hospital, Jakarta, between January 1975 and December 1976 was conducted; exogenous factors that may influence birth weight were statistically analyzed. From a sample of 214 infants that had been studied it revealed that the health status of the mother and the type of pregnancy significantly influence their birth weight. On the other hand, the education of the mother, prenatal-care, vitamines and hematinic ingested in pregnancy, the method of

Received 14th. Jan. 1978.

delivery, and the age of the mother exert no influence on their birth weight. Further studies revealed that anemia of pregnancy, antepartum hemorrhage, pre-eclampsia, eclampsia, intrapartum infection and early rupture of the membrane seems to influence their birth weight ($P < 0,05$). Combined 4 years sample gave similar results in cases of hypertension and cardiac diseases.

The mothers (healthy vs. sick) were grouped according to parity and age. As far as the socio-economic conditions were concerned one can say that low- and middle-class families delivered in this hospital. Specification according to income or residential areas gave many difficulties, because of multiple income resources and fast moving tendencies of families in a growing big city like Jakarta. It seems that pre-natal care should be aimed at the optimal health through comprehensive care of the pregnant women in relation to the foetal growth and developmental stages rather than only distributing vitamines and hematinics. In certain diseases such as eclampsia, heart disease and diabetes mellitus multi- and inter-disciplinary close cooperation should be established in case of early termination of the pregnancy.

Introduction

Many factors influence fetal growth; these are exogenous factors (a.o. socio-economic, congenital anomalies, toxaemia, attitude, smoking, and salicylate ingestion in pregnancy) and endogenous factors. It seems that maternal factors play a most distinctive role (Turner and Collins, 1976; Gruenwald et al., 1968). Twinning may be associated with greater occurrence of premature delivery; abortion, still birth, premature labor are the final outcome of untreated syphilis (Eastman and Hellman, 1961).

A preterm baby may be delivered by mothers liable to recurrent premature labors (Black, 1972). There are conditions where pregnancy must be terminated at the cost of the baby (antepartum hemorrhage, toxaemia, multiple pregnancy associated with overdistention of the abdomen where vomiting occurs constantly, exerts respiratory distress and pain (Eastman and Hellman, 1961).

Lubchenco et al. (1972), in their long-term follow-up studies of prematurely born infants, observed that from the tiny babies almost not viable without special care, 43% of them become mentally retarded as defined by I.Q. < 90. Even more remarkable were the many learning problems observed in the group of children with normal intelligence. Of the 72 children with normal I.Q. 's, 7 had school problems secondary to vision and hearing, 21 had difficulty in learning mathematics or reading, 5 had speech problems, and 3 had behavior problems which interfered with learning. Central nervous system disorders included an incidence of spastic diplegia of 32 per cent, suggesting that this central nervous system condition is related to premature birth. Convulsive disorders, microcephaly, hemiplegia, and growth arrest occurred 17 times, singly or in combination with spastic diplegia.

The other central nervous system conditions appeared sporadically and, presumably, are unrelated to prematurity. Further evidence of brain damage in these children was formed in the electroencephalograms. Out of 116 electroencephalograms, 65 tracings were abnormal (56 per cent). The types of abnormalities found were predominantly seizure patterns and 6 and 14 per second spikes. We are now in the era of population explosion and population dilemma. If a large percentage of the people consist of mentally retarded or mentally slowlearners, we are not only dealing with everyday's life dilemma, but rather more with a world hazard.

The present study observed the exogenous factors influencing the premature deliveries in the Dr. Cipto Mangunkusumo, General Hospital, Jakarta.

Material and Method

Two hundred and fourteen low-birth-weight infants (infants with a birth-weight 2500 gm or less) were analyzed as far as exogenous factors go. These factors are: the education of the mothers, prenatal care, the age of the mo-

thers, methods of delivery; the health status of the mothers, the drugs ingested in pregnancy, the type of pregnancy (single or multiple).

The statistical-test has been used was the X^2 — test and the null-hypothesis.

To pursue one of the high-lights revealed in the afore-mentioned study, i.e., that unhealthy mothers had significant influence on the birth-weight of their infants, the complete data of the years 1973 - 1976 were collected and analyzed as far as the influence of the morbidity of the mother on the birth-weight of the infants go. In analyzing the data the requirement of proper statistics was taken into consideration.

The mothers (healthy vs. sick) were grouped according to parity and age. As far as the socio-economic conditions were concerned one can say that low and middle-class families delivered their babies in this hospital. Specifications according to income or residential areas gave many difficulties. Priority was given to the year 1976; in case of insufficient material, cases in the previous years were added. Using the null hypothesis (Spiegel, 1961) it was formulated that there was no difference of body weight at birth (i.e., any observed differences are merely due to fluctuations in sampling from the same population) among infants of healthy mothers and certain morbid mothers. In other words, there was no statistically significant influence of the disease sufferred by the mothers on the birth weight of their off-springs.

Results

The education of the mother, prenatal care, vitamines and hematinics ingested in pregnancy, the methods of delivery, and the age of the mothers have influence on the birth weight of the infants in this sample (table 1, 2, 3, 4a, 4b and 4c).

The health status of the mother, and the type of pregnancy significantly influence the birth weight (table 6 and 7). In pursueing further it seems (statistically significant) that anemia of pregnancy, antepartum hemorrhage, preclampsia-eclampsia, and early rupture of the membrane significantly ($p < 0.05$) influence the birth weight of their off-springs (see tables 5a, 5b, 5c, and 5d, 5e). Combined sample of 1974 - 1976 gave similar result in case of antepartum infection, hypertension and cardiac diseases (see tables 5f, 5g and 5h).

For hydramnion there were only 7 cases in a 4-year-period (see table 5i).

Discussion

Our findings confirmed the statements mentioned in the introduction as far as the exogenous factors are concerned. In our study the health status of the mother rather than the age of the mother determined the birth-weight of the babies. It seems that diseases which influence the weight of the infants were antepartum hemorrhages, anemia of pregnancy, preclampsia, eclampsia, hypertension, cardiac diseases, early rupture of the membrane and antepartum infection ($p < 0.05$). These are diseases or condition which may force the obstetrician to terminate

the pregnancy before the optimal intrauterine growth is accomplished. In case of hydramnion the material was insufficient (only 7 cases in a 4-year-period) and $p > 0,05$, see table 5i. Thus prenatal care should be aimed at the optimal health through comprehensive care of the pregnant women in relation to the foetal growth and developmental stages rather than only distributing vitamines and hematinics.

That pre-natal care has no influence upon the birth weight is still open to question. This is due to the fact that the intensity or what has been done without period is very inportant.

In anemia of pregnancy most of them were given hematinics, but care should be taken that they took them regularly and sufficiently. In refractory cases, other possible causes should be looked for.

Every survival in a neonatal period, to some extent will add certain amount to the population explosion and dilemma. As doctors under solemn oath we must do our best for their survival - knowing deeply in ourhearts that we add inferior human beings-, with all the consequences to the family, socially as well as economically. High-risk, very-low-birth-weight premature infants are now being fed by intravenous alimentation to increase caloric intakes when gastric feeding is insufficient or must be delayed (Bryan et al., 1973; Babson, 1971; Driscoll et al., 1972; Behrman, 1972; Heird et al., 1972; Helmuth et al., 1972; Johnson et al., 1972; Rhea et al. (1973) and Cheek and Staub (1975) advocated naso-jejunal alimentation for premature infants, who are unable to suck. However, these procedures are too sophisticated and expensive, even for big centres in our country.

TABLE 1 : *Birth weight by type of education of the mother*

Education of the mother	Birth Weight (gm)			Total
	< 1500	1500	2000	
Illiterate	6	9	14	29
Elementary School	16	22	53	91
Junior High School	5	13	20	38
Senior High School	9	16	20	45
University	3	—	8	11
T o t a l	39	60	115	214

$0,70 < P < 0,80$

TABLE 2 : *Birth weight by prenatal care*

Birth Weight (gm)	Pre-natal care		Total
	(—)	(+)	
< 1500	27	12	39
1500 —	32	28	60
2000	66	49	115
T o t a l	125	89	214

$0,20 < P < 0,30$

TABLE 3 : *Birth weight by drugs ingestion in pregnancy*

Drugs ingestion	Birth weight (gm)			Total
	< 1500	1500 —	2000	
(+)	3	12	28	43
(—)	36	48	87	171
T o t a l	39	60	115	214

$0,05 < P < 0,10$

* Vitamines and hematinics.

TABLE 4a : *Birth weight by age of the mother*

Age of the mother	Birth weight (gm)			Total
	< 1500	1500 —	2000	
15 —	9	10	12	31
20 —	12	29	41	82
25 —	8	12	26	46
30 —	6	3	16	25
35 —	4	5	14	23
40 — 49	—	1	6	7
T o t a l	39	60	115	214

$0{,}10 < P < 0{,}20$

TABLE 4b : *Birth weight by age of the mother*

Age of the mother	Birth weight (gm)			Total
	< 1500	1500 —	2000	
15 —	21	39	53	113
25 —	14	15	42	71
35 — 49	4	6	20	30
T o t a l	39	60	115	214

$0{,}10 < P < 0{,}20$

TABLE 4c : *Birth weight by age of the mother*

Age of the mother	Birth weight (gm)			Total
	< 1500	1500 —	2000	
< 20	21	39	53	113
20	18	21	62	101
Total	39	60	115	214

0,05 < P < 0,10

TABLE 5a : *Anemic and healthy mothers (parity and age-groups compatible) by number and birth-weight of the infants (X and SD), 1976*

Anemic			Healthy			Statistics		
N	$\overline{X}$ (kgms)	S.D.	N	$\overline{X}$ (kgms)	S.D.	T	P	Significance
49	1,99	0,44	49	2,27	0,25	< 3,86	< 0,05	Significant

TABLE 5b : *Mother with preclampsia and healthy mothers (parity and age-groups compatible) by number and birth-weight of the infants (X and SD), 1976*

Preclampsia			Healthy			Statistics		
N	$\overline{X}$ (kgms)	S.D.	N	$\overline{X}$ (kgms)	S.D.	T	P	Significance
56	2,03	0,32	56	2,18	0,39	2,23	< 0,05	Significant

TABLE 5c : *Mothers with antepartum hemorrhage and healthy mothers (parity and age groups compatible) by number and birth-weight of the infants (X and SD), 1976*

Antepartum hemorrhage			Healthy			Statistics		
N	$\overline{X}$ (kgms)	S.D.	N	$\overline{X}$ (kgms)	S.D.	T	P	Significance
32	1,96	0,43	52	2,19	0,36	2,31	$< 0,05$	Significant

TABLE 5d : *Mothers with early rupture of the membrane and healthy mothers (parity and age groups compatible) by number and birth-weight of the infants (X and SD), 1976*

Early rupture of the membrane			Healthy			Statistics		
N	$\overline{X}$ (kgms)	S.D.	N	$\overline{X}$ (kgms)	S.D.	T	P	Significance
26	1,99	0,37	26	2,27	0,27	*3.11*	$< 0,05$	Significant

TABLE 5e : *Mothers with eclampsia and healthy mothers (parity and age-groups compatible) by number and birth weight of the infants, 1975 — 1976)*

Eclampsia			Healthy			Statistics		
N	$\overline{X}$	S.D.	N	$\overline{X}$	S.D.	T	P	Significance
15	2,04	0,29	25	2,29	0,19	2,8	$P < 0,05$	Significant

TABLE 5f : *Mothers with intrapartum infection and healthy mothers (parity and age groups compatible) by number and birth weight of the infants, 1975 — 1976*

Intrapartum infection			Healthy			Statistics		
N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	T	P	Significance
22	2,07	0,35	22	2,29	0,18	2,5	$P < 0,05$	Significant

TABLE 5g : *Mothers with hypertension and healthy mothers (parity and age-groups compatible) by number and birth weight of the infants, 1975 — 1976*

Hypertension			Healthy			Statistics		
N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	T	P	Significance
15	1,89	0,41	15	2,34	0,16	3,8	$P < 0,05$	Significant

TABLE 5h : *Mothers with cardiac disease and heart failure, and healthy mothers (parity and age-groups compatible) by number and birth weight of the infants, 1975 — 1976*

Cardiac diseases			Healthy			Statistics		
N	X	S.D.	N	$\bar{X}$	S.D.	T	P	Significance
15	1,87	0,37	15	2,19	0,30	3,46	$P < 0,05$	Significant

TABLE 5i : *Mothers with hydramnion and healthy mothers (parity and age-groups compatible) by number and birth weight of the infants, 1975 — 1976*

Hydramnion			Healthy			Statistics		
N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	T	P	Significance
7	1,78	0,58	7	0,23	0,24	1,78	P 0,05	Not significant

TABLE 6 : *Birth Weight by Health Status of the Mother*

Health status of the mother	Birth Weight (gm)			Total
	< 1500	1500 —	2000	
Healthy	22	37	44	103
Not healthy	17	23	71	111
Total	39	60	115	214

N < 0,01

TABLE 7 : *Birth Weight by Type of Pregnancy*

Type of Pregnancy	Birth Weight (gm)			Total
	< 1500	1500 —	2000	
Single	25	55	95	175
Twin	11	5	20	36
Multiple	3	—	—	3
Total	39	60	115	214

N < 0,01

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