

ORIGINAL ARTICLE

The Relationship Between Birth Weight and a Number of Body Measurements of Neonates at Dr. Pirngadi Hospital Medan

by

NURHAYATI HAMID, HELMI LUBIS, MARTINUS SARAGIH,
RAFITA RAMAYATI, CHAIRUDDIN P. LUBIS,
DACHRUL ALDY and NOERSIDA RAID

(From the Department of Child Health, School of Medicine
University of North Sumatera, Medan)

Abstract

From January 1980 to November 1980 a survey on the relationship between birth weight (BW) with body length (BL), head circumference (HC) and chest circumference (CC) was carried out on 1689 newborn infants born in the Dr. Pirngadi General Hospital Medan. They were divided into six groups, based on their BW i.e.:

Group I : 1501 — 2000 g	Group IV : 3001 — 3500 g
Group II : 2001 — 2500 g	Group V : 3501 — 4000 g
Group III : 2501 — 3000 g	Group VI : 4001 — 4500 g

The average of BL, HC and CC in cm is shown below :

Group	B L	H C	C C
I	40.70	30.93	26.88
II	45.69	32.30	30.67
III	47.83	34.07	33.68
IV	50.52	34.81	34.07
V	51.57	35.37	35.08
VI	51.81	36.24	35.61

The mean values of total BL, total HC and total CC can represent the anthropometric values for the certain BW group.

No significant differences were found between male and female newborn infants in each group.

Received 1st October, 1982.

Introduction

From the beginning of conception till birth, the foetus undergoes the process of growth and development. The duration of gestation, the physical condition of the mother, the socio-economic condition of the family and the existence of congenital diseases can influence these processes.

BW curve and graph are one of the methods used to evaluate the intra uterine growth of the foetus. Other methods commonly used to determine the growth and development of the foetus, infant and child, are by anthropometric measurements.

This study tries to figure out the relationship between a certain BW and the related anthropometric values of newborn infants.

Material and methods

From January through November 1980 the measurements of BW, BL, HC and CC of newborn infants were obtained and analyzed at the Neonatology Ward, Pediatric Department Dr. Pirngadi Hospital Medan.

These measurements were performed by the on-duty doctors, assisted by the nursing staff. The BW were obtained by using Refa Balance tape No. 120.

Neonates who do not fulfill the parameters mentioned above, were excluded from the survey. The included babies were then divided into six groups (Cockburn, BPM survey data):

Group I : BW = 1501 — 2000 g
Group II : BW = 2001 — 2500 g
Group III : BW = 2501 — 3000 g
Group IV : BW = 3001 — 3500 g
Group V : BW = 3501 — 4000 g
Group VI : BW = 4001 — 4500 g

Group I : BW = 1501 — 2000 g

Group II : BW = 2001 — 2500 g

Group III : BW = 2501 — 3000 g

Group IV : BW = 3001 — 3500 g

Group V : BW = 3501 — 4000 g

Group VI : BW = 4001 — 4500 g

Statistical analysis was used to determine the relationship of BW to BL, BW to HC and BW to CC.

Results

This survey covered 3011 newborn infants with BW between 1501 gram to

TABLE 1 : Distribution of the samples based on BW

Group	BW (gram)	M	F	Total
I	1501 — 2000	43	45	88
II	2001 — 2500	90	119	209
III	2501 — 3000	117	228	345
IV	3001 — 3500	372	265	637
V	3501 — 4000	156	111	267
VI	4001 — 4500	43	40	83
Total		881	808	1689

4500 gram. Among them 331 were still infants were studied (881 males and 808 births. Nine hundred and ninety one females). The following tables show were excluded from the survey due to the result of the statistical analysis of lack of data, so that only 1689 newborn these measurements.

TABLE 2 : Relationship between BW and BL by sex

Group	M e a n (cm)			S D		
	M	F	T	M	F	T
I	39.72	40.75	40.70	4.11	3.07	4.25
II	45.60	45.19	45.69	2.93	2.79	2.92
III	47.92	47.75	47.83	1.98	2.24	2.13
IV	50.83	50.51	50.52	1.82	1.87	1.84
V	51.71	51.56	51.57	1.75	1.68	1.73
VI	51.76	51.85	51.81	1.81	1.46	1.64

M = male

F = female

T = total

TABLE 3 : Relationship between BW and HC by sex

Group	M e a n (cm)			S D		
	M	F	T	M	F	T
I	30.93	30.93	30.93	2.77	2.54	2.70
II	32.26	32.08	32.30	1.78	2.10	1.97
III	34.22	33.95	34.07	1.18	1.19	1.20
IV	34.75	34.88	34.81	1.45	1.81	1.61
V	35.46	35.24	35.37	1.37	1.59	1.47
VI	36.32	36.15	36.24	1.44	0.95	1.22

BIRTH WEIGHT AND BODY MEASUREMENTS OF NEONATES

There is no significant difference between the mean values of BL of male and female newborn infants for each group of BW with a level of confidence of 95% ($p > 0.05$). Both values obtained for male and female newborns have no difference in the mean total BL, so the average total value of BL will represent the measurement of infant BL for the group of BW.

ined for male and female newborns have no difference in the mean total BL, so the average total value of BL will represent the measurement of infant BL for the group of BW.

TABLE 4 : Relationship between BW and CC by sex

Group	Mean (cm)			SD		
	M	F	T	M	F	T
I	27.35	26.44	26.88	2.64	2.33	2.55
II	30.84	30.54	30.67	1.76	2.06	1.91
III	33.71	33.65	33.68	1.24	1.75	1.77
IV	34.14	33.96	34.07	2.03	2.02	2.03
V	35.14	34.09	35.08	0.76	1.45	1.32
VI	35.49	35.49	35.61	1.58	1.79	1.65

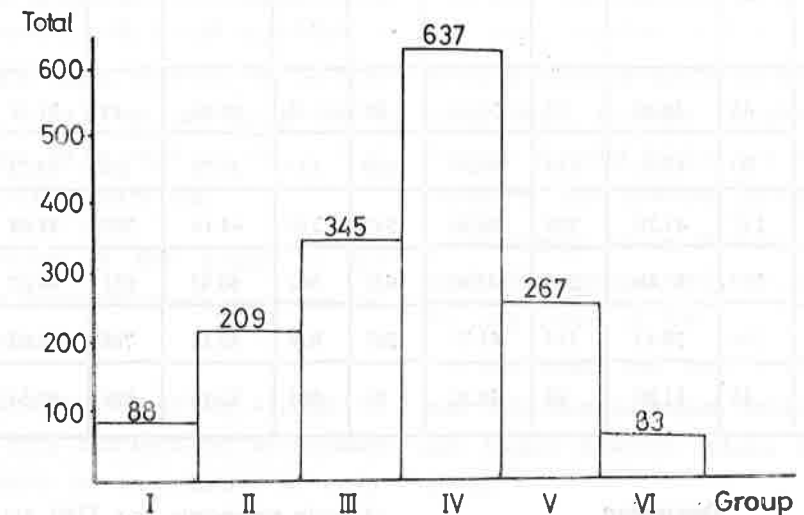
TABLE 5 : Relationship between BW groups and anthropometric values

Anthropometric values of		BW Group I	BW Group II	BW Group III	BW Group IV	BW Group V	BW Group VI
BL	Mean	40.70	45.69	47.83	50.52	51.57	51.81
	SD	4.25	2.92	2.13	1.84	1.73	1.64
HC	Mean	30.93	32.30	34.07	34.81	35.37	36.24
	SD	2.70	1.97	1.20	1.61	1.47	1.22
CC	Mean	26.88	30.67	33.68	34.07	35.08	35.61
	SD	2.55	1.91	1.77	2.03	1.32	1.65

Table 3 shows also that there is no significant difference between mean HC of male and female newborn infants for the groups of BW, except for BW group III. Both values obtained have no difference in mean total HC of the infants, so the average total value of HC represents the measurement of infant HC for the group of BW.

In table 4 we can see that there is no significant difference between the mean CC of male and female newborn infants for a certain group of BW. Both values obtained also have no difference in the mean total CC, so the average total value of CC also represents the measurement of infant CC for a certain group of BW.

FIG. 1: Distribution of the number of sample



The above results show that there are relationships between BW and the anthropometric values for each group of BW and can further be seen in table 5.

Table 5 shows that for each group of BW there is a certain anthropometric value of BL, HC and CC.

In this study, a sample distribution of (n) = 1689 infants was obtained.

Results obtained from the sample in this study is sufficient and represents the population of newborn infants. With a level of confidence of 95% and with the use of Coding technique the average BW was $3023.52 < BW_n < 3089.28$. This value was within BW group IV (3001 - 3500 g).

Obtaining the values mentioned above, cumulative percentage of sam-

ple's distribution can be determined with the unexpected results before in which the percentage of the number of births are :

a. Below Normal BW, the percentage of male birth is less than female;

b. Normal BW, the percentage of male birth is the same as female;

c. Above Normal BW, the percentage of male birth is greater than female.

This is further clearly shown in table 6.

TABLE 6 : Cumulative percentage of distribution of newborn infants

Group	M	%	F	%	T	C u m u l a t i v e				
						M	%	F	%	T
I	43	48.86	45	51.14	88	43	48.86	45	51.14	88
II	90	43.06	119	56.94	209	133	44.78	164	55.22	297
III	117	43.70	228	56.30	345	310	44.16	392	44.84	702
IV	372	58.40	265	41.60	637	682	50.93	657	49.07	1339
V	156	58.43	111	41.57	267	838	52.18	768	47.82	1606
VI	43	51.80	40	48.20	83	881	52.16	808	47.84	1689

Discussion

Some authors reported that there is a relationship between BW and birth anthropometrics. M. Sugiono (1963 - 1964) found in his study at Mampang and Utan Kayu, Jakarta, that male BW is 3093 gram and BL is 48 cm and female BW is 3014 gram and BL is 48 cm.

Manoeroeng et al. (1974) reported in their studies in Medan that average BW

of male newborns was 3280 gram while of female newborns was 3120 gram and BL was 48 cm.

In this study these values were in the fourth group of BW meaning that the mean normal value of BW and average values of BL in male newborn infants is 50.83 cm and in female 50.51 cm.

This study also shows clearly the average values of BL, HC, CC for a cer-

tain BW, which have not been reported exclusively.

Schäffer and Avery (1977) obtained a certain value for male birth weight (3400 g) and female birth weight (3200 g) and their birth length is from 46 to 57 cm (average 51 cm), their birth HC is 33 - 37 cm, although CC is almost the same as HC or a few centimeters less.

Bistok Saing et al. (1977) on their study in Medan, found that male BW is 3335 gram, BL is 50.40 cm, HC is 33.87 cm, CC is 30.70 cm and female BW is 3201 gram, BL is 49.86 cm, HC is 33.67 cm and CC is 30.51 cm.

The values of BW greater or less than the mentioned above were not further studied.

The determination of the average values of body measurements of neonates can possibly be an indicator of matu-

ration of intra uterine growth like curve or graph of BW.

One thing that has never been expected before is obtained in this study, that is a difference in percentage of births between male and female with BW below or above the mean average normal BW.

Conclusions

A survey on the relationship between BW and a number of body measurements of newborn infants at the Neonatology Ward, Pediatric Department Dr. Pirngadi Hospital Medan has been conducted on 1689 newborn infants.

The average values of these measurements can represent body measurements for each group of BW.

It was found that there is no significant difference in values between male and female newborn infants for each group.

REFERENCES

1. BISTOK SAING; LEMAN SEMBIRING; LEONARD NAPITUPULU; NURSIDA RAID; HELENA SIREGAR : Anthropometry in the newborn. Paediatr. Indones. 17 : 299 - 304 (1977).
2. MANOEROENG, S.M.; LEMAN SEMBIRING : Growth and Development of infant in the first years of life. Naskah Lengkap KONIKA III, Surabaya 1974.
3. M. SUGIONO; TE BEK SIANG : Angka rata-rata Berat Badan & Tinggi Badan Bayi 0-1 tahun, hasil pemeriksaan selama 1963 - 1964 di BKIA Mampang dan Utan Kayu. Buku Kumpulan Kuliah Ilmu

Kesehatan Anak, Bagian I. Pediatri Sosial, 178 (1974).

4. SCHÄFFER, A.J.; AVERY, M.E.: Fetal growth and Neonatal adaptations. in: Di-

seases of the newborn. 4th ed. pp. 16-28 (Saunders, Philadelphia/London/Toronto 1977).