

A Study of Mean Birth Weights of Babies Born in Alexandra Hospital, Singapore, 1980-1989

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Summary

The birth weights of 14,924 Chinese, 11,590 Malay and 2,227 Indian liveborn babies from 34th to 42nd weeks of gestation and delivered at Alexandra Hospital were studied. The mean birth weight was calculated for each gestational week and the 10th, 50th and 90th percentiles obtained. At term (37-42 weeks) the mean birth weights for Chinese, Malay and Indian babies were 3,316 gm, 3,290 gm and 3,273 gm respectively.

Key Words: Mean birth weights, Gestational age in weeks, Chinese, Malay, Indian

Introduction

We were interested to study whether birth weights of babies born in Singapore have increased over the years. It is a general impression that this has been the case. We were able to compare the mean birth weights of our study with those of Mills 1952¹ and Cheng *et al* 1972². Our study was completed in 1992 and thus these three studies are 20 years apart.

Birth weights are influenced by race, parity, nutritional status and pregnancy complications, especially preterm deliveries^{3,4,5}. Preterm and small for gestational age babies suffer higher perinatal mortality and morbidity^{6,7,8,9,10}. The normal distribution of birth weights in the different gestational age groups will enable us to identify appropriate for gestational age, small for gestational age or large for gestational age babies. Management and prognosis of these three groups of babies vary.

The gestational age is calculated by Naegele's rule where from a 28-day menstrual cycle and a known first day of the last normal menses, the expected date of delivery is on or around the day of 40 completed weeks. In cases where the last normal menstrual period (LMP) is uncertain, an ultrasound scan performed in

the first trimester would have estimated the expected date of delivery more accurately.

Materials and Methods

The case records of babies delivered in Alexandra Hospital between 1st January 1980 to 31st December 1989 were reviewed. The birth weights, gestational age and sex of the babies were noted. There were altogether 42,003 births and of these, 28,743 births formed the basis of this study.

The patients excluded from the study were because of uncertain LMPs or there were complications of pregnancy like multiple pregnancy, preeclampsia, severe foetal anomalies or hydramnios. The racial distribution of the babies studied comprised 51 per cent Chinese, 40.3 per cent Malay and 7.8 per cent Indian. This is different from the racial representation of the racial groups from the 1990 Singapore census when there were 78 per cent Chinese, 14 per cent Malay, and 7 per cent Indian. Thus there was a preponderance of Malay and Indian babies born in Alexandra Hospital which served the north western part of Singapore. Of the total of 28,743 babies studied, 14,924 were Chinese, 11,590 were Malay and 2,227 were Indian. The babies were immediately weighed by midwives

using the Avery weighing scale which was calibrated each morning before use. Birth weights were calculated in 400 gram lots and each birth weight was to the nearest 400 grams. Gestational age was calculated in completed weeks from the first day of the last known menstrual period.

Results

In Table I the mean birth weights and standard deviations in the study group of the three races were shown together with their corresponding gestational age from 34 to 42 weeks. The majority of babies were born from 36 to 40 weeks. It can be observed that there was a gradual, steady increased of mean birth weights as gestation progressed in babies of the three racial groups. The mean birth weights were remarkably similar at about 2,200 gm at 34 weeks, 2,800 gm at 36 weeks and 3,300 at 40 weeks. At 42 weeks, the Indian babies were heavier than the Chinese babies, who were in turn heavier than the Malay babies, at 3,794 gm, 3,656 gm and 3,598 gm, respectively.

In Table II the mean birth weights were compared with those of Cheng *et al.* It can be observed that the mean birth weights of the 1992 study (Teo) were heavier than those of the 1972 study (Cheng) from

34 weeks up to 42 weeks.

In Table III the mean birth weights at the 10th, 50th and 90th percentiles of the study group are shown against race and gestational age. Weights below the 10th percentile will indicate small for gestational age and weights above the 90th percentile will indicate large for gestational age. At 40th week, the 10th percentile weight was about 2,800 gm and the 90th percentile was about 3,900 gm in the three races.

In Table IV, the mean birth weights of the three races by gestational age and sex is shown. The male babies were usually heavier than the female babies at each gestational age in the three races with a few exceptions. The mean birth weights of female and male babies of the three races were generally similar except at 42 weeks when the Indian male and female babies were heavier.

In Table V, the mean birth weights of babies from 37-42 weeks were heavier when each sex was compared for Chinese and Indian babies in the 1992 study when compared to the 1952 study. From the 1952 to 1992, the Chinese male and female babies gained 244 gm and 213 gm respectively, and the Indian male and female babies gained 366 gm and 361 gm respectively.

Table I
Mean birth weights in grams, by race and gestational age

Gestation in weeks	No. of cases			Mean birth weights			Standard deviation		
	C	M	I	C	M	I	C	M	I
34	189	165	49	2,237	2,271	2,166	300	371	370
35	669	521	120	2,566	2,580	2,520	288	323	314
36	1,471	1,205	221	2,869	2,873	2,828	301	335	310
37	2,199	1,549	342	2,985	2,999	2,890	328	362	641
38	4,782	3,550	661	3,151	3,133	3,079	320	355	356
39	3,231	2,556	457	3,292	3,258	3,179	369	382	374
40	1,536	1,316	245	3,337	3,311	3,265	406	429	435
41	648	526	109	3,524	3,446	3,404	461	501	476
42	217	199	23	3,656	3,598	3,794	542	594	501

C = Chinese M = Malay I = Indian

Table II
Mean birth weights in grams and weeks of gestation
Comparison of 1992 and 1972 series

Gestation weeks	Mean birth weight Teo (1992)			Mean birth weights (Cheng (1972))		
	C	M	I	C	M	I
34	2,237	2,271	2,166	2,210	2,220	2,130
35	2,566	2,580	2,520	2,460	2,500	2,400
36	2,869	2,873	2,828	2,790	2,720	2,630
37	2,985	2,999	2,890	3,030	2,870	2,780
38	3,151	3,133	3,079	3,030	3,000	2,880
39	3,291	3,258	3,179	3,120	3,110	3,000
40	3,337	3,311	3,265	3,180	3,170	3,020
41	3,524	3,446	3,404	3,240	3,240	3,060
42	3,656	3,598	3,794	3,290	3,290	3,100

C = Chinese M = Malay I = Indian

Table III
Percentiles of birth weight by race and gestation age

Gestation	10th			50th			90th		
	C	M	I	C	M	I	C	M	I
34	1,930	1,945	1,625	2,200	2,200	2,100	2,600	2,700	2,625
35	2,250	2,100	2,100	2,550	2,550	2,500	2,900	2,973	2,850
36	2,450	2,400	2,400	2,900	2,990	2,850	3,200	3,250	3,200
37	2,600	2,550	2,475	3,000	3,000	2,850	3,400	3,450	3,350
38	2,750	2,700	2,650	3,150	3,100	3,050	3,550	3,600	3,550
39	2,800	2,800	2,700	3,300	3,250	3,150	3,750	3,750	3,700
40	2,900	2,800	2,800	3,300	3,300	3,200	3,900	3,900	3,850
41	2,950	2,800	2,850	3,500	3,400	3,350	4,100	4,100	4,050
42	3,000	2,913	3,160	3,700	3,500	3,800	4,400	4,375	4,400

C = Chinese M = Malay I = Indian

The 1952 study by Mills did not have enough Malay babies for study and was not included.

Also, in Table V, the mean birth weights of male and female babies at full term (37 - 42 weeks) of the three races were compared from the three studies. For the Chinese babies, there were weight gains of 26 gm and

203 gm from 1952 to 1972, and 1972 to 1992 respectively; similarly the Indian babies gained 64 and 300 gm. In the case of the Malay babies from 1972 to 1992 there were a weight gain of 177 gm. From 1972 to 1992 there seemed to be an appreciable increase of mean birth weights of male and female babies in the three racial groups of between 200 to 300 gm.

Discussion

Our analysis of the mean birth weights of babies born in Alexandra Hospital, Singapore, suggests that the Singaporean Chinese, Malay and Indian babies have increased in weights when compared to the studies carried out in 1952 and 1972. This is, we think, mainly attributable to the socio-economic development of

Singapore from post World War II in 1952 to 1992 when Singapore became better economically developed. This seems to have affected the mean birth weights of the three racial groups, viz. the Chinese, Malay and Indian.

We can therefore add one more factor to account for changes in mean birth weights, i.e. socio-economic

Table IV
Mean birth weights by gestational age, sex and race

Gestation in weeks	Mean Birthweight (gm)					
	Chinese		Malay		Indian	
	Male	Female	Male	Female	Male	Female
34	2,240	2,234	2,238	2,304	2,206	2,112
35	2,593	2,545	2,618	2,544	2,481	2,554
36	2,896	2,842	2,900	2,846	2,809	2,847
37	3,025	2,945	3,016	2,981	2,904	2,874
38	3,182	3,114	3,157	3,108	3,135	3,015
39	3,339	3,235	3,287	3,225	3,222	3,136
40	3,374	3,297	3,349	3,271	3,312	3,218
41	3,581	3,441	3,465	3,421	3,358	3,461
42	3,724	3,532	3,614	3,582	3,900	3,737

C = Chinese M = Malay I = Indian

Table V
Mean birth weights in grams, 37-42 weeks by race and sex
Comparison between 1952, 1972 and 1992

Authors	Chinese		Malay		Indian				
	Both sexes combined	Male	Female	Both sexes combined	Male	Female			
Mills (1952)	3,087	3,125	3,048	-	-	-	2,909	2,939	2,879
Cheng <i>et al</i> (1972)	3,148	-	-	3,113	-	-	2,973	-	-
Teo <i>et al</i> (1992)	3,316	3,371	3,261	3,290	3,315	3,265	3,273	3,305	3,240

development. The increased mean birth weights might be an important factor to account for the increased Caesarean section births in our population, from about 5 per cent in the 1950's to about 15 per cent in the 1990's. Our methodology of determining birth weights is similar to that of Mills (1952) and Cheng *et al* (1972). As with Cheng's study, we did exclude a proportion of patients. This would detract from the accuracy of our results. However, we believe that our finding of increased birth weights is real.

Another study of mean birth weights among the three racial groups in Singapore will be useful. This is because with the increasing use of dating ultrasound,

the gestation of pregnancy is more accurate. Also, birth weights are more accurately determined by electronic digital weighing machines.

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