Medical Journal of the
Islamic Republic of Iran

Volume 9
Number 4
Winter 1374
February 1996

MATERNAL HEIGHT AS A CONTRIBUTORY FACTOR TOWARDS BIRTH OF SMALL FOR DATE INFANTS

A. MAJD, M.D.,* H. EFTEKHAR, M.D.,* AND F. AZORDEGHAN Ph.D.*

From the School of Public Health, Tehran University of Medical Sciences, Tehran, Islamic Republic of Iran.

ABSTRACT

A case control study of "small for date" and premature infants was conducted at 17 hospitals in Tehran between December 1989 and June 1990. The study population consisted of mothers of 347 small for date, 261 premature and 1164 normal infants.

Mothers who were less than 18 years old and their height less than 155 cm had a statistically significant R.R.F.† (2.18) for the birth of small for date infants, while mothers of the same age group but with a height of 155-159 or 160-165 cm had an R.R.F. of 2.61 and 1.41, respectively. It was therefore concluded that an increase in height did not decrease the R.R.F. for birth of small for date infants in teen-age mothers.

Mothers older than 18 years, 18-29 and 30-39 years with a height of less than 155 cm had an R.R.F. of 1.63 and 1.47, respectively, both being statistically significant concerning the birth of small for date infants. Whilst in mothers taller than 155 cm and older than 18 years no significant risk factor was noted, it was concluded that a maternal height of less than 155 cm seems to be a contributory factor to birth of small for date infants. In this study no association was established between maternal height and prematurity.

Since 57% of LBW† infants were small for date, any measures aiming at decreasing this figure would be beneficial to the individual as well as to the community. Short-term measures such as marriage at an older age, availability of contraception to teen-age mothers, and more years of education for girls may help decrease the proportion of small for date infants.

MJIRI, Vol. 9, No. 4, 307-310, 1996.

* Faculty Members: School of Public Health, Tehran University of Medical Sciences.

LBW—All single born infants weighing less than 2500 g at birth; "Small for date" or IUGR—All single born infants weighing less than 2500 g who have had more than 37 full weeks of gestation; Premature—All single born infants weighing less than 2500 g who have had less than 37 weeks of gestation; R.R.F.—Relative risk factor.

INTRODUCTION

Birth weight is considered to be an important indicator of the health status of a community.[1] Low birth weight infants born in developed countries are usually premature, whilst a great majority of such infants born in developing countries are "small for date", which means they have had a normal intrauterine period but are growth retarded.[2] Factors influencing the birth of small for date infants have been extensively examined, and some independent factors have been singled out.[3,4] Genetic, demographic and socio-economic factors, as well as smoking, pre-pregnancy weight and availability of medical services have all been implicated in the birth of small for date infants.[5,6] Maternal height as a genetic or constitutional factor has also been examined by Dr. Krammer who has shown that an increase in the height of the mother is associated with an increase in birth weight.[7,8] In this paper maternal height and age have been evaluated in relation to the birth of premature and small for date infants. Since teen-age pregnancies constitute a special group, age as a contributing factor may further elucidate the effect of height on the birth of small for date and premature infants.

PATIENTS AND METHODS

The results of this study have been extracted from a survey on the birth of LBW infants conducted in Tehran between December 1989 and June 1990. Out of the 54 nonmilitary hospitals and maternity units, the number required was chosen by random sampling. The 17 hospitals selected included private, nonprivate and teaching hospitals, covering north, south, east, west and central parts of Tehran. The number to be interviewed was calculated according to the following criterion: the population of Tehran was estimated at about 10 million, birth rate 32/1000, and the number of newborns about 320000 in 1989. 10% of this number would be 32000. An attempt was made to interview about 16000 mothers who had delivered a live or dead baby within a period of six months at these hospitals. Between Dec. 1989 and June 1990, 13799 mothers were interviewed. 677 cases of stillborn or late aborted mothers were excluded from this study; therefore, mothers of 13122 newborn infants were interviewed.

Out of 13122 single births, 730 infants weighed less than 2500 grams and were thus termed LBW (low birth weight). For each LBW infant, 2 normal weight infants (i.e., term infants weighing more than 2500 grams) were selected by random sampling as controls (a total of 1458), and a questionnaire was completed for both

Table I. Number of LBW, premature and normal infants.

Infants less than 2500 g	More than 37 full weeks of gestation	347
Infants less than 2500 g	Less than 37 full weeks of gestation	261
Infants more than 2500 g	More than 37 full weeks of gestation	1164

LBW and control infants. All mothers of LBW and control infants were weighed and their height recorded. Out of 730 mothers of LBW infants and 1458 normal infants, 608 (81.9%) and 1164 (79.9%), respectively, could remember the exact date of their last menstrual period; therefore mothers of 122 LBW and 294 normal infants were excluded from the study. Hence the total number of mothers of LBW and normal infants in this study was 608 and 1164, respectively.

Babies born less than 37 complete weeks from the first day of their mother's last menstrual period were termed premature, and those born after 37 complete weeks were considered to have had a full normal gestational period. Therefore, infants weighing less than 2500 grams who had had a 37 week gestational period were growth retarded and thus termed small for date or intrauterine growth retarded (IUGR) infants. Infants who had had less than 37 full weeks of gestation and weighed less then 2500 grams were termed premature.

Out of 608 LBW infants, 261 (43%) had a gestational period of less than 37 full weeks and were termed premature, and 347 or 57% who had complete gestational periods but weighed less than 2500 grams were termed small for date infants.

Even though the proportion of LBW infants in this study was 5.5%–a figure comparable to that of most developed countries – when further subdivided into premature and small for date groups, the pattern significantly changes and the proportion of small for date infants approaches that of other developing countries. Maternal height as a possible contributory factor to the birth of small for date infants was also examined in this study and the results are outlined below.

RESULTS

As outlined in Table II, the R.R.F. for birth of small for date infants for mothers under 18 with a height of less than 155 cm was 2.8 (confidence limits 1.14 - 4.56). For mothers under 18 with a height between 155-159 cm, 160-164 cm or 165 cm, the R.R.F. for birth of small for date infants was 2.61, 3.4 and 1.46, respectively

Table II. Frequency distribution, percentage and relative risk factors of IUGR infants in relation to maternal height and age.

Height / Age	< 150				150-159				160-164				165 +				Total	
	No.	%	R.R.F.	Con.L.	No.	%	R.R.F.	Con.L.	No.	%	R.R.F.	Con.L.	No.	%	R.R.F.	Con.L.	No.	%
<18	6	2.3	2.05	0.91-6.7	13	5.0	3	1.5-6	6	2.3	1.99	0.74-5	1	0.4	1.48	0.16-14.2	26	10
18-29	41	15.8	1.29	0.58-1.87	66	25.4	0.85	0.6-1.12	42	16.2	0.60	0.43-0.87	21	8.1	1.11	0.7-1.85	170	65.4
30-39	7	2.7	0.79	0.33-1.66	25	9.6	1.21	0.76 1.9	20	7.7	1.01	0.62-1.68	10	3.8	1.40	0.7-2.9	62	23.8
40 +	-	-	-	-	-	-	-	-	2	0.8	1.39	0.35-9.23	-	-	-	-	2	0.8
Total	54	20.8	-	-	104	40	-	-	70	26.9	-	-	32	12.3	-	-	260	10

Con. L. = confidence limit

Table III. Frequency distribution, percentage and relative risk factors of premature infants in relation to maternal height and age.

Height / Age	< 150				150-159				160-164				165 +				Total	
	No.	%	R.R.F.	Con.L.	No.	%	R.R.F.	Con.L.	No.	%	R.R.F.	Con.L.	No.	%	R.R.F.	Con.L.	No.	%
<18	7	2.0	2.18	1.14-5.56	15	4.4	2.61	1.33-5.15	6	1.7	1.46	1.56-3.8	3	0.9	3.41	0.7-16.8	31	9.0
18-29	66	19.2	1.63	1.2-2.24	93	27.1	0.90	0.7-0.18	65	19.0	0.74	0.55-1.0	10	2.9	0.38	0.2-0.75	234	48.2
30-39	18	5.2	1.47	1.1-2.6	27	7.9	0.97	0.62 1.5	21	6.1	0.79	0.49-1.3	6	1.7	0.62	0.26-1.5	72	21.0
40 +	3	0.9	5.12	0.86-30.5	1	0.3	3.40	0.2-53.7	1	0.3	0.8	0.76-5.7	1	0.3	1.69	0.15-18.6	6	1.67
Total	94	27.4	-	-	136	39.7	-	-	93	27.1	-	-	20	5.8	-	-	343	0

Con. L. = confidence limit

(confidence limits 1.33-5.15, 1.56-3.8 and 0.7-16.8). Therefore, it seems that when maternal age is below 18 years, an increase of height does not decrease the risk of delivering a small for date infant; thus one can assume that age has a greater influence on the birth of a small for date infant than height. But, as is further noted, when maternal height declines to less than 155 cm and age to between 18-29 or 30-39 years, the R.R.F. for birth of small for date infants continues to be 1.63 and 1.47, respectively (confidence limit, 1.2-2.4 and 1.1-2.6). With a height above 155 cm (155-165 cm) and an age of above 18 years (18-29 or 30-39), the R.R.F. for birth of small for date infants does not increase. Therefore, one can conclude that a height of less than 155 cm plays a contributory role in producing small for date offspring, whilst this risk significantly decreases with an increase in height.

Premature infants

As shown in Table III, the R.R.F. for birth of premature infants in mothers below 18 with a height of less than 155 cm is 2.05 (confidence limit 0.91-6.7), a result which is not statistically significant. Furthermore, when mothers are less than 18 with heights of 155-159, 160-164 or 165 cm, the R.R.F. is 3, 1.99 and 1.48, respectively (with confidence limits of 1.5-6, 0.74-5 and 0.16-14.2), and no regular pattern of statistically significant figures is noted. The R.R.F. for the birth of premature infants in mothers older than 18 (18-29 and 30-39) with a height less than 155 cm is 1.29 and 0.79, respectively (confidence limit 0.88-1.81 and 0.33-1.66). With an increase in height in other age groups, a downward trend in prematurity is not noted, and one can thus conclude that maternal height is not an important contributory factor in the birth of premature infants.

DISCUSSION

As outlined in the results of the study, a maternal

Table IV. Frequency distribution and percentage of normal infants (controls) in relation to maternal height and age.

Height / Age	< 155		155-159		160-164		165+		Total	
	%	Number	%	Number	%	Number	%	Number	%	Number
< 18	0.9	11	1.7	20	1.2	14	0.3	3	4.1	48
18-29	12.7	148	29.1	339	24.0	279	7.2	84	73.0	850
30-39	3.6	42	8.1	94	7.6	88	2.7	32	22.0	256
40+	0.2	2	0.1	1	0.4	5	0.2	2	0.9	10
total	17.4	203	39.0	454	33.2	386	10.4	121	100	1164

age of less than 18 years seems to be a more important contributory factor to the birth of small for date infants than maternal height. However, for a mother over 18 years old, a height of less than 155 cm plays a statistically significant role in producing a small for date offspring. Amongst those women who are under 18 years, factors such as pre-pregnancy weight, adolescence, and possibly low educational status, which can lead to an irresponsible attitude towards themselves as well as perhaps an under-use of medical facilities, can all play an active role in the birth of small for date infants.[9,10] Nevertheless, apart from this group, short stature seems to have a positive effect on the birth of small for date or IUGR infants.

In the Iranian society where women tend to not be so tall, a height of less than 155 cm may be an important contributory factor in the birth of small for date infants in the community.

For premature infants, maternal height does not seem to play an active role, as demonstrated by other investigators as well.[3]

As pointed out earlier, even though the total proportion of LBW infants in this study is low, i.e. 5.6%, a high percentage of these infants (57%) are small for date, a figure approaching that of other developing countries.[2] Furthermore, as demonstrated by Kessel et al.,[11] improvement of preventive health care in the U.S. has contributed vastly towards a decrease in small for date infants.[11] Therefore, identification of contributory factors remains important, since preventive measures can be directed against these factors. Maternal height seems to contribute to the birth of small for date infants, but as changes in height can take many generations of improved social settings accompanied by better nutrition and better education and other important social changes, short-term measures such as a higher age of marriage and pregnancy, availability of contraception for teen-age mothers and improvements in the educational status of women before marriage can have beneficial effects and lead to a lower proportion of IUGR infants with its resultant neurological sequelae for the individual and the community.

REFERENCES

1. World Health Organization "Health Services": Development of indicators from monitoring progress toward health for all by the year 2000. No. 4: 32, 1981.
2. Villar J, Belizan JM: The relative contribution of prematurity and fetal growth retardation to low birth weight in the developing and developed world. Am J Obstet Gynecol 143: 783-798, 1982.
3. Kramer DR, et al: Determinant of low birth weight methodological assessment and metaanalysis. World Health Organization 65(5): 663-737, 1987.
4. Abrams B, Newman V: Small for gestational age birth: maternal predictors and comparison with risk factors of spontaneous preterm delivery in the same cohort. Am J Obstet Gynecol 164(3): 785-90, 1991.
5. (3): pp. 719-723.
6. Read AW, Stanley FJ: A comparison of recurrent and isolated small for gestational age term births. Paediatric Perinatal Epidemiol 5(2): 138-56, 1992.
7. (3): pp. 676-677.
8. Ghatia BD, Tyagi NK, Sur-Amsatya K: Comparative evaluation of two maternal weight-height indices during pregnancy. Indian Pediatrics 26(4): 353-7, 1989.
9. Nieto A, Matorras R, Serra M: Multivariate analysis of determinants of fetal growth retardation. Eur J Obstet Gynecol Reprod Biol 53(2): 107-13, 1994.
10. Vega J, Saez G, Smith M: Risk factors for low birth weight and intrauterine growth retardation in Santiago Chile. Rev Medical Chil 121(10): 1210-19, 1993.
11. Kessel S, Villar J: Changing pattern of low birth weight in the United States: 1970-1980. JAMA 251: 1978-1986, 1984.