

A study on the relation of mid-arm circumference of newborn babies with gestational age

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Abstract

There is a strong correlation of MAC with birth weight, gestational age and early neonatal mortality. A recent study has held MAC to be superior to birth weight. HC or length in discriminating between AGA and SGA babies. MAC has also shown promise as a valuable tool in identification of neonate at risk for metabolic derangements. Thus MAC could be useful parameter for assessing fetal growth. MAC was measured at a point halfway down the left arm between tip of acromion and olecranon process to the nearest of 0.1 cm by a flexible non stretchable fiber glass tape. The mean mid arm circumference of the babies analyzed was 9.08 cm, with the standard deviation of 0.83 cm. It was found that mid arm circumference was correlated well with the gestational age. In the derived normogram based on mid arm circumference and gestational age it was observed that there is a linear relationship of the mid arm circumference with increasing gestational age.

Keywords: Mid Arm Circumference, New Born Babies, Gestational Age.

INTRODUCTION

In neonates MAC represents somatic muscle and fat stores. There is also a high co-relation between MAC and gestational age of newborns. MAC which relatively unaffected by body water shifts may be useful in assessing loss or gain of muscle plus fat mass during periods of frequent changes in water balance.¹

Used in conjunction with changes in weight the evaluation in increments in MAC measurements may more accurately determine the quality of weight given in hospitalized preterm infants. MAC is also more accurate than length, weight and HC in discriminating between AGA and SGA babies.²

Studies done showed that MAC is sensitive index of determining interactive growth retardation. Hence measuring MAC is a simple procedure that is easily performed in the nursery without any complicated mathematical calculations. This makes available discriminating method for the evaluation of IUG and a non invasive technology following somatic protein status in growth of preterm infants.^{3,4}

METHODOLOGY:

1283 single live babies born in institute of medical college and research center over a period of one year were included in the study.

INCLUSION CRITERIA:

All the singleton live born babies born in hospital were included in the study.

EXCLUSION CRITERIA:

- 1) All twin babies.
- 2) Intra uterine deaths and still born babies.
- 3) Babies with gross congenital anomalies.
- 4) Babies born to mothers with condition likely to influence fetal growth i.e. hypertensive disorders of pregnancy, gestational diabetes mellitus, chronic infections and illnesses are excluded.
- 5) Babies whose gestational age could not be accurately assessed i.e. >2 weeks difference between obstetrical and clinically assessed gestational age.

METHOD OF COLLECTION OF DATA:

All the singleton live born babies born in the hospital were examined within 48 hours of birth. Gestational age was calculated by enquiring into 1st day of mothers last menstrual period and will be subsequently confirmed by New Ballard Score. If any disparity of more than 2 weeks between gestational age by enquiring LMP and by NBS, were excluded from the study. Their gestational ages ranged from 29 to 42 weeks. As there were few babies in less than 30 weeks gestation they were grouped together.

Newborns were subjected to the following anthropometric measurements within 48 hours of birth by standard techniques.

Mid arm circumference: MAC was measured at a point halfway down the left arm between tip of acromion and olecranon process to the nearest of 0.1cm by a flexible non stretchable fiber glass tape.

RESULTS:

The mean mid arm circumference of the babies analyzed was 9.08 cm, with the standard deviation of 0.83 cm.

It was found that mid arm circumference was correlated well with the gestational age.

($r = 0.664$, $p < 0.0001$)

In the derived normogram based on mid arm circumference and gestational age it was observed that there is a linear relationship of the mid arm circumference with increasing gestational age.

There is increase in the mid arm circumference with the increasing gestational age, which started declining after 40 weeks gestations.

There is slight depression in the curve noticed at 36 wks of gestation. This is possible because of only 46 babies are there in 36 wk gestational group constituting only 3.56 % of

the total study group.

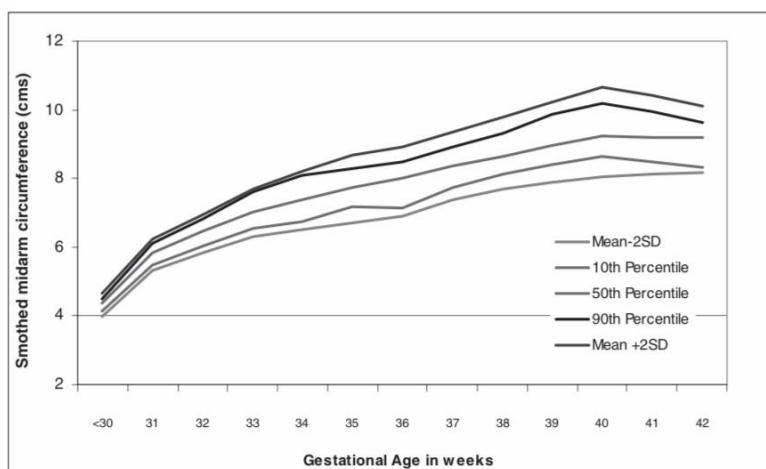


Fig 1: Mid arm circumference and Gestational age

Table 1: MID ARM CIRCUMFERENCE

Gestational age (wks)	No. of subjects	Mean	Std. Deviation	Mean-2SD	Percentiles			Mean + SD
					10th	50th	90th	
<"30	6	6.55	0.28	5.99	6.2	6.6	6.8	7.11
31	8	6.74	0.27	6.20	6.4	6.8	7.2	7.27
32	7	6.80	0.32	6.17	6.4	6.9	7.3	7.43
33	12	7.41	0.38	6.64	6.9	7.4	8.16	8.18
34	30	7.61	0.48	6.66	6.9	7.6	8.4	8.57

35	21	7.90	0.54	6.83	7.44	8	8.4	8.98
36	46	8.06	0.51	7.04	7.11	8.2	8.6	9.09
37	124	8.66	0.49	7.67	8.15	8.6	9.2	9.64
38	235	8.96	0.54	7.88	8.4	8.8	9.6	10.05
39	315	9.29	0.63	8.04	8.6	9.2	10.2	10.54
40	437	9.53	0.70	8.14	8.8	9.4	10.4	10.92
41	36	9.22	0.53	8.16	8.4	9.2	9.8	10.29
42	7	9.03	0.42	8.18	8.2	9.2	9.4	9.87
Overall	1284	9.08	0.83	7.41	8.2	9	10.2	10.75

DISCUSSION:

MAC is measured midway between the point of the shoulder acromion and the olecranon process of the left arm.⁴ For all practical purposes the maximum circumference of the upper arm is measured, when the left arm is hanging by the side of the body.

MAC is measured at a point halfway down the left arm between tip of acromion and olecranon process to the nearest of 0.1cm by a flexible non stretchable fiber glass tape.

There is a strong correlation of MAC with birth weight, gestational age and early neonatal mortality ^{4,5} A recent study has held MAC to be superior to birth weight. HC or length in discriminating between AGA and SGA babies. MAC has also shown promise as a valuable tool in identification of neonate at risk for metabolic derangements. Thus MAC could be useful parameter for assessing fetal growth.⁶

Between 1-5yrs, the MAC is relatively constant between 16.5cm and 17.5cms. Any child in this age group whose upper circumference is <12.5cm {<80% of the reference international standard} is to be considered suffering from malnutrition.²

Mid upper arm circumference is also a useful method of screening for nutritional status of an infant. MAC is a useful method of screening large number of children during nutritional emergencies, but it is less useful in long term growth monitoring program.

CONCLUSION:

Mid Arm Circumference Correlated well with the gestational age and there is slight depression in the curve noticed at 36 weeks of gestation.

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