EFFECT OF GENDER ON THE ANTHROPOMETRIC PARAMETERS OF NEWBORNS OF UDAIPUR DISTRICT

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ABSTRACT

Introduction: The health and growth of fetus is entirely depending upon the mental and physical health of a mother. Apart from maternal factor one more important infantile factor affects the anthropometric parameters of newborn i.e. the gender of babies.

Aim: the aim of study was to know the effect of gender on anthropometric parameters of newborns of Udaipur district of Rajasthan.

Method: A Cross sectional study was conducted in the Department of Anatomy, RNT Medical College and Hospitals, Udaipur, Rajasthan, India. All the anthropometric parameters of 1422 newborns were taken from; newborns delivered at Government health institutes of Udaipur district, at Pannadhay Ward of Maharana Bhopal Government Hospital of RNT Medical College and Hospitals.

Results: Mean values of Birth weight, Crown Heel Length, Head Circumference, Chest Circumference, Foot Length and Skin Fold Thickness were significantly higher in male. Mean values for Abdominal Circumference, Thigh Circumference, Mid arm Circumference and Calf Circumference was also higher in male; however it was not statistically significant.

Conclusion: The anthropometric parameters of newborns revealed a significant difference between male and female newborns.

Key Words: Newborn, Anthropometric Parameter, Gender

INTRODUCTION

The health and growth of fetus is entirely depending upon the mental and physical health of a mother as she is both "Seed as well as the Soil - in which Fetus grows." Healthy and well nourished mother deliver to a disease free and normal weighed baby. As such infant's anthropometry is certainly subjected to Psychology and Physical fitness of a mother. Apart from maternal factor one more important infantile factor affects the anthropometric parameters of newborn i.e. the gender of babies. These factors were investigated by many scholars in their studies in different countries.

Various studies like Taksande A M et al (2015)[1], Ahmed M et al (2014)[2], Anupama MP et al (2012)[3], Muhammad N et al (2001)[4] etc have reached to conclusion that the identification of nutritional status of newborn by the birth weight alone is insufficient for the detection of neonatal risk because weight only gives an assessment of all the tissue together and greater weight does not necessary signifies good growth. It may achieve at the cost of liquid retention or fat deposition. Apart from this demerit of birth weight, it is necessary to determine the additional or alternative anthropometric parameter to assess the nutritional status of both in males and females newborns. That's why other Anthropometric measurements e.g. Crown Heel Length, Head Circumference, Chest Circumference, Calf Circumference, Thigh Circumference, Abdominal Circumference, Foot Length, Mid Arm Circumference and Skin Fold Thickness measurements of newborns are an important part of Infant Health Surveillance. It can help to detect over weight and underweight, short stature and faltering growth potentially due to underlying medical problems. Therefore, this study introduces the role of anthropometry in Infant's health conditions and its assessment.

Anthropometry is an easy and cost effective technique having following advantages:-

- Methods are precise and accurate while providing standardized techniques.
- Procedures are simple, safe, and non-invasive.

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- Equipments required are inexpensive, portable, and durable and can be purchased or arranged locally.
- Relatively unskilled persons, trained accordingly, can also follow measurement procedures.
- The method is also suitable representative samples.

MATERIAL AND METHODS

Cross sectional study was conducted in the Department of Anatomy, RNT Medical College and Hospitals, Udaipur, Rajasthan, India. 1422 newborns were included in this study delivered at Government health institutes of Udaipur district, at Pannadhay Ward of Maharana Bhopal Government Hospital of RNT Medical College and Hospitals.

Inclusion/ Exclusion Criteria:

(A) Inclusion Criteria**:**

- All the singleton pregnancy without any maternal co morbidity affecting newborns anthropometry.
- Mother should be native resident of Udaipur district willing to participate in this study.
- Patient who was able to cooperate for the study

(B) Exclusion Criteria:

- All twin babies
- Intrauterine death & still born babies.
- Newborns with gross congenital anomalies.
- Newborns born to mother with conditions affect fetal growth i.e. hypertensive disorder of pregnancy, gestational diabetes mellitus, chronic infections and illness.
- Newborns whose gestational age would not be accurately assessed greater than 2 weeks difference between obstetrical and clinical assessed Gestational Age.
- Mother taking treatment which is likely to affect fetal growth
- Anthropometric measurements of new born, except birth weight were measured by using standard instruments and techniques by investigator personally. Birth weight was taken from hospital record / admission ticket.

Instruments & Methods

Anthropometric measurements of new born, except birth weight were measured by using standard instruments and techniques by investigator personally. Birth weight was taken from hospital record/ admission ticket.

Following instruments & methods were used for measurement of various anthropometric parameters of newborns:-

(A) Crown Heel Length (CHL): The baby was placed supine on an infantometer. The head is held firmly in position against a fixed upright headboard, while keeping legs of the baby straight and footboard brought into firm contact with the baby's heels with toes pointing upwards. Length of the baby is measured from a scale, which is set on the board.

(B) Head Circumference (HC): To get the head circumference measured, a flexible non-stretchable fiber glass measuring tape was used. Being the head circumference, the largest dimension around the head (the occipito-frontal circumference) was obtained with tape placed snugly above the ears. The measurement was taken to the nearest 1 mm.

(C) Chest Circumference(CC): To measure Chest Circumference, a flexible non-stretchable fiber glass measuring tape was used, which is most suitable to fit the chest more snugly to ensure accuracy, while placing the same at the level of the nipples during quite respiration The CC was measured to the nearest of 1 mm.

(D) Thigh Circumference (TC): At first, Newborn was placed in supine position to take accurate measurement. Flexible non-stretchable fiber glass measuring tape was placed at the level of the lowest gluteal furrow of the left thigh by extending the tape circumferentially. Measurement was recorded to the nearest of 1 mm.

(E) Calf Circumference (CFC): Flexible non-stretchable fiber glass measuring tape was placed at the level of most prominent point in semi flexed position of the left leg by extending the tape circumferentially. Measurement was recorded to the nearest of 1 mm.

(F) Abdominal Circumference (AC): Flexible non-stretchable fiber glass measuring tape was placed at the level of umbilicus by extending the tape circumferentially. Measurement was recorded to the nearest of 1 mm.

(G) Foot Length (FL): A Wooden Scale or Flexible Non-stretchable Fiber glass measuring tape, having division of 1mm, was used for the measurement. Wooden Scale or the Tape was fixed against the foot and the length from the heel to the tip of great toe of the left foot was measured to the nearest of 1 mm, after straightening the foot.

(H) Mid arm circumference (MAC): Flexible non-stretchable fiber glass measuring tape was placed at the level of a point halfway down to the left arm between tip of acromion and olecranon process by extending the tape circumferentially. Measurement is recorded to the nearest of 1 mm.

(I) Skin Fold Thickness (SFT): Double skin thickness was measured by Thickness Measuring Caliper in the midline of the posterior aspect of the arm over the triceps muscle, at a point halfway down the left arm between tip of acromion and olecranon process. Calipers used were two pronged type with screw adjustment. Slight pressure was applied on a double fold of skin and distance between prongs measured on a millimetre rule with screw adjustment.

RESULTS

In present study out of 1422 newborn babies of Udaipur district 785 were males and 637 were females.

Mean values of Birth weight, Crown Heel Length, Head Circumference, Chest Circumference, Foot Length and Skin Fold Thickness were significantly higher in male. Mean values of Abdominal Circumference, Thigh Circumference, Mid Arm Circumference and Calf Circumference was also higher in male; however it was not statistically significant.

Table 1: Comparison of anthropometric parameters between male and female newborns

Anthropometric parameters	Male (N=785)		Female (N=637)		T-value	P-Value
	Mean	SD	Mean	SD		
Birth Weight (gm)	2750	430	2630	400	5.34	<0.001
Crown Heal Length (cm)	45.14	2.06	44.62	1.92	4.84	<0.001
Head Circumference (cm)	33.42	1.38	33.02	1.41	5.37	<0.001
Chest Circumference (cm)	31.10	1.66	30.74	1.88	3.81	<0.001
Abdominal Circumference (cm))	28.38	1.56	28.20	1.93	1.87	0.062
Mid Arm Circumference (cm)	10.04	1.00	9.97	0.97	1.42	0.157
Calf Circumference (cm)	9.99	1.13	9.93	1.11	1.09	0.275
Foot Length (cm)	7.45	0.67	7.36	0.64	2.48	0.013
Thigh Circumference (cm)	13.49	1.20	13.40	1.22	1.42	0.155
Skin Fold Thickness (mm)	4.42	0.65	4.26	0.64	4.69	<0.001

Table 1 shows the mean values of all the anthropometric parameters taken into consideration showed a high values in male newborns when compared to female newborns. Also show t-test and their p-values.

Table 2: Shows the percentiles (3rd, 50th and 95th) of all the study measurements

Anthropometric parameters	3rd Percentile	50th Percentile	95th Percentile
Birth Weight (gm)	1900	2700	3476
Crown Heal Length (cm)	41	45	48
Head Circumference (cm)	30.5	33.5	35.5
Chest Circumference (cm)	28	31	33.985
Abdominal Circumference (cm))	25	28	31
Mid Arm Circumference (cm)	8.5	10	12
Calf Circumference (cm)	8	10	12
Foot Length (cm)	6.5	7	8.5
Thigh Circumference (cm)	11	13.5	15.495
Skin Fold Thickness (mm)	3.1	4.3	5.2

Table: 2: Shows the percentiles (3rd, 50th and 95th) of all the study measurements

DISCUSSION

In present study out of 1422 newborn babies of Udaipur district 785 were males and 637 were females.

Gender is one of the important factors which affect the anthropometric parameters of newborns. Various studies led down to conclusion that male newborns are larger than the female newborns so anthropometric parameters of male are greater than the female newborns. Similar findings were observed in present study.

Birth weight of male & female newborns in present study was 2750±430 grams & 2630±400 gram respectively.

Birth weight of male newborns was found significantly higher in present study similar to study of Ahmed M et al (2014)[2].

Taksande AM et al (2015)[1] and Anupama MP et al (2012)[3] also found higher birth weight of male newborns however, it was not found statistically significant.

The crown heel length of male and female was 45.14 ±2.06 and 44.62 ±1.92 cm respectively. Crown heel length of male newborns was found significantly higher in present study.

Taksande AM et al (2015)[1], Ahmed M et al (2014)[2], Anupama MP et al (2012)[3], Muhammad N et al (2001)[4] also found higher crown heel length of male newborns however, it was not found statistically significant.

The head circumference of male and female newborns was 33.42 ±1.38 and 33.02 ±1.41 cm respectively. The head circumference of male newborns found significantly higher in present study.

Ahmed M et al (2014)[2], Anupama MP et al (2012)[3] and Muhammad N et al (2001)[4] also obtained higher head circumference of male newborns, however, it was not found statistically significant.

The chest circumference of male and female newborns was 31.10 ±1.66 and 30.74 ±1.88 cm respectively. The chest circumference of male newborns found significantly higher in present study.

Taksande AM et al (2015)[1], Ahmed M (2014)[2], Anupama MP et al (2012)[3] and Muhammad N et al (2001)[4] also obtained higher chest circumference of male newborns, however, it was not found statistically significant.

The abdominal circumference of male and female newborns was 28.38.14 ±1.56 and 28.20 ±1.93 cm. respectively. The abdominal circumference of male newborns found higher in present study, however it was not statistically significant, similar to studies of Anupama MP et al (2012)[3] and Muhammad N et al (2001)[4].

The mid arm circumference of male and female newborns was 10.04 ±1.00 and 09.97± 0.97 cm. respectively. Mid arm circumference of male newborns was not found significantly higher in present study similar to study of Ahmed M et al (2014)[2], Anupama MP et al (2012)[3] and Muhammad N et al (2001)[4].

Taksande AM (2015)[1] found mean ±SD 10.1±1.21 and 10.28± 1.38 for male and female newborns respectively which was not matched to our study because of mean values of male newborns were lower.

The calf circumference of male and female was 9.99 ±1.13 and 9.93± 1.11 cm respectively. Mid calf circumference of male newborns was not found significantly higher in present study similar to study of Anupama MP et al (2012)[3] and Muhammad N et al (2001)[4].

Taksande AM et al (2015)[1] obtained the mid calf circumference 10.55 ±1.27 and 10.61± 1.11 in male and female newborns respectively. It was not similar to our study. Because of higher mean values in females.

The foot length of male and female newborns was 7.45 ±.67 and 7.36± .64 cm respectively. The foot length of male newborns found significantly higher in present study.

Ahmed M et al (2014)[2] and Muhammad N et al (2001)[4] also obtained higher foot length of male newborns; however, it was not found statistically significant.

The thigh circumference of male and female newborns was 13.49 ±1.20 and 13.40± 1.22 cm respectively. Mid thigh circumference of male newborns was not found significantly higher in present study similar to study of Ahmed M et al (2014)[2] and Anupama MP et al (2012)[3].

Taksande AM et al (2015)[1] found mean ±SD 14.23±1.90 and 14.44± 1.54 for male and female newborns respectively which was not matched to our study because of mean values of male newborns were lower.

Skin fold thickness of male and female newborns was found 4.42±0.65 and 4.26±0.64 respectively. These values were lower than the values of Kaur H et al (2012)[5]. Alvear J et al (1978)[6] found mean values of skin fold thickness 6.1±1.1, 4.3±.9, 4.9±1.1 in Negroes, Europeans and Indian Asians respectively. Values were matched with the values of J. Alvear (1978) in Europeans and Indian Asians population. They did not specify mean values in male and female newborns.

CONCLUSION

The present study was undertaken with the aim to determine the effect of gender on anthropometric parameters among male and female newborns of Udaipur district, showed statistically significant higher mean values of birth weight; crown heel length, head circumference, chest circumference and skin fold thickness in male newborns which is in conformity with the previous studies.

Except for the mean values of abdominal circumference, mid arm circumference, thigh circumference and calf circumference were not statistically significant however, it was higher in males.
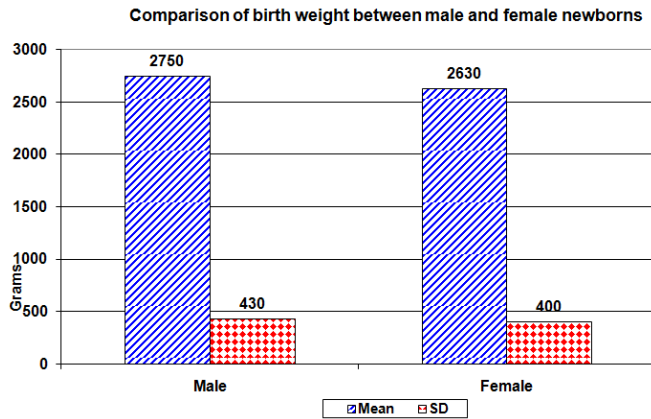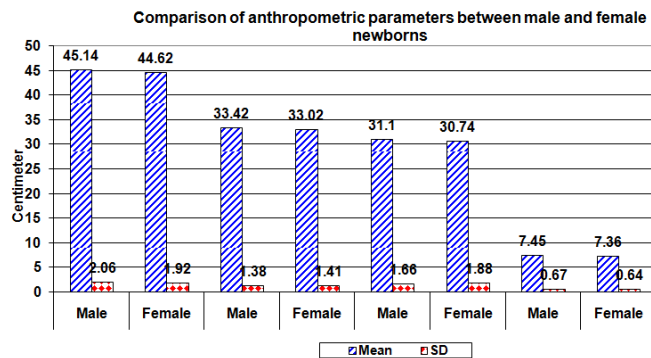
ACKNOWLEDGEMENT

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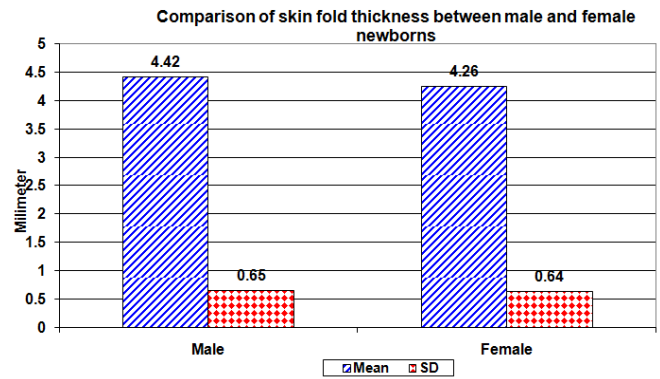
The bar diagram shows the comparison of mean values of statistically significant anthropometric parameters among male and female newborns.

Graph 1

Graph 2

Graph 3