*Int.J.Adv.Microbiol.Health.Res.*2017; 1(1):15-19

International Journal of Advanced Microbiology and Health Research
www.ijamhr.com
Volume 1; Issue 1; September 2017; Page No. 15-19

Original Research Article

Relation Between Gestational Age and Fetal Weight on Human Foetuses

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Article Info

Received 20th August, 2017
Revised 27th August, 2017
Accepted 16th September, 2017
Published online 18th September, 2017

Keywords

- Human Foetuses
- Gestational Age
- Foetal Weight

ABSTRACT

Gestational age is a measure of the age of a pregnancy. Estimation of gestational age and foetal weight of human foetuses is of great medico-legal importance. The present study aims to determine the foetal weight of human foetuses at different gestational age. After permission from the Institutional Ethical Committee the foetuses were collected from Manipal College of Medical Sciences Teaching Hospital, Pokhara. The age of foetuses was calculated from the obstetrical history, crown rump length (CRL) and crown heel length (CHL).The weight of the foetuses was calibrated by digital weighing machine. The foetal weight has shown a significant correlation with gestational age. The knowledge of measurement of foetal weight on human foetuses is helpful in anatomy and paediatrics. Accurate prediction of foetal weight is also very important in the management of high risk pregnancies in order to prevent premature deliveries.

INTRODUCTION

Gestational age is a measure of the age of a pregnancy. It is not the same as fertilization age. It takes about 14 days from the first day of the last menstrual period for conception to take place and thus for the conceptus to form. The age from this point in time (conception) is called the fertilization age and is thus 2 weeks shorter than the gestational age. Thus a 6 week gestational age would be a 4 week fertilization age. An average gestational period (duration of pregnancy from the first day of the last menstrual period up to delivery) is 280 days. On average, this is 9 months and 6 days. [1]

Anthropometry is defined as the scientific study of the human body measurements and proportions. These studies are generally used by clinicians and pathologists for adequate assessments of the growth and development of the foetus at any specific point of gestational maturity. Foetal height, foetal weight, foetal head circumference, crown rump length etc. are measured individually to assess the growth and development of the organs and the foetus as a whole and can be a parameter for normal or abnormal development also including adaptation of the foetus to its newer environment. [2] Another important factor that contributes towards the measurement of the human foetal growth is the maternal nutrition and maternal well-being. Malnutrition, as already established by WHO, is a global serious health problem not only in adults but in pregnant and lactating mothers too and is a serious problem in third world countries. In Africa and South Asia, 27 to 50% of women in the reproductive age are underweight resulting in 30 million low birth weight babies. [3]

Accurate estimation of gestational age and foetal weight is important in obstetric care. Knowledge of accurate prediction of gestational age and foetal weight may assist obstetricians in appropriately counselling women who are at risk of a preterm delivery about likely neonatal outcomes and is also essential in the evaluation of fetal growth and the

detection of intrauterine growth restriction.4 Estimation of gestational age and foetal weight of foetus is of great medico-legal importance. [5]

It is of extreme importance in supporting the charge of infanticide by knowing that whether the baby born was alive and had a separate existence from the mother and that a willful act of commission or omission caused its death. [6] The fetal growth is not an individual growth and is dependent on the composite growth of the organs. [7] Growth of the individual organs is controlled by the genetic potential, the environment provided by the mother and by the foetus itself. Scientists have or are trying to determine such relationship through series of investigations. [8] Main objective of the present study was to estimate the ratio between foetal/body weight and gestational age.

MATERIALS AND METHODS

The present study was carried out on 40 normal human foetuses, aged between 10^{th} to 38^{th} gestational weeks. The normal foetuses were obtained from the Department of Obstetrics and Gynaecology, Manipal College of Medical Sciences Teaching Hospital, Fulbari, Pokhara.

After ethical review and permission from the concerned authorities of the Institute, the foetuses were collected in 10% formalin for carrying the present study. The foetuses included the spontaneous abortion and still born foetuses.

Cases with any anomaly or pathology were not included in the study.

The age of foetuses was calculated from the obstetrical history, crown rump length (CRL) and crown heel length (CHL). The weight of foetuses was calibrated in grams by electronic digital weighing machine. All the measurements were taken thrice and the average value was taken.

RESULTS

The present study was carried out in the Department of Anatomy, Manipal College of Medical Sciences, Pokhara, from March 2017 to August 2017. Total 40 human foetuses ranging from 10^{th} to 38^{th} weeks were studied. The parameters, gestational age and foetal weight were studied.

Fig. 1: Foetuses of different gestational age kept on dissection table.

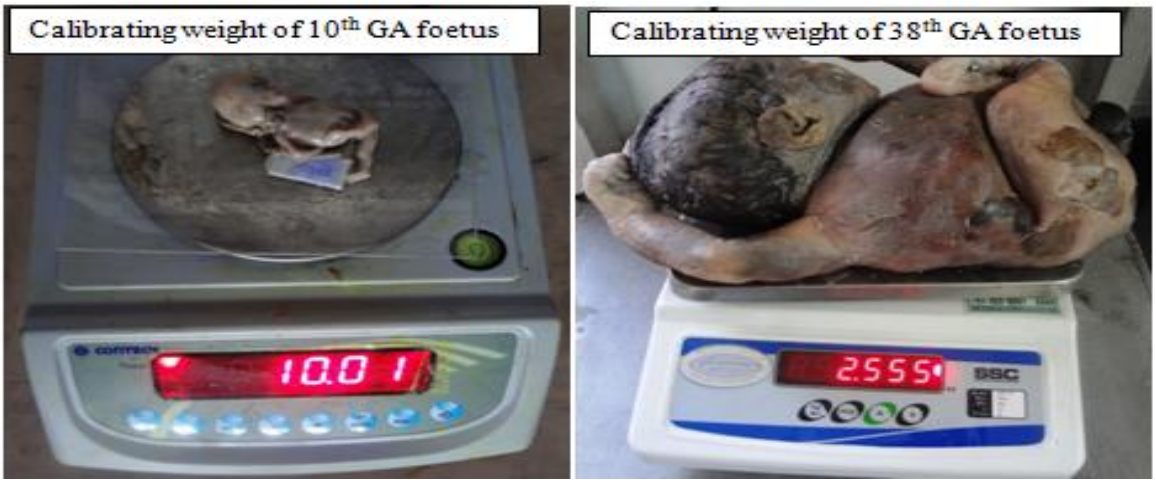

Fig. 2: Calibrating foetal weight of 12th and 38th gestational week foetuses.

Table 1: Showing Average Foetal/Body weight of foetuses at different gestational age (GA).

GA (in weeks)	No. of foetuses	Body weight in gm
10	2	10.01
12	3	12.20
14	2	69.25
16	3	100.00
18	2	197.60
20	3	319.25
22	4	435.40
24	3	630.00
26	3	766.80
28	2	1019.50
30	3	1360.00
32	2	1558.00
34	2	1925.00
36	3	2324.00
38	3	3101.60

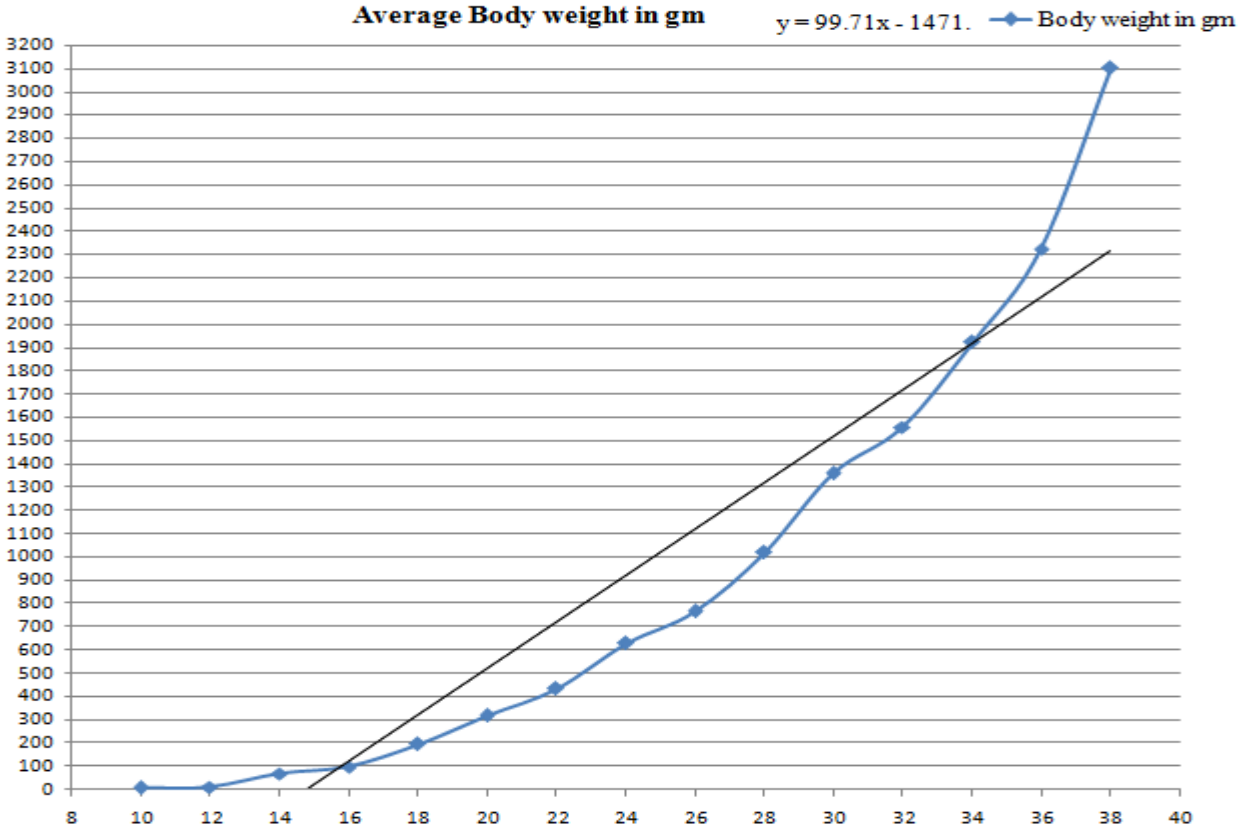

Fig. 3: Scatter diagram showing linear relationship between gestational age (X-Axis) and Foetal weight (Y-Axis).

DISCUSSION

For decades, the topic of question pertaining to the body weight of human foetus with respect to different time periods of gestation has baffled many developmental researchers and biostatisticians. These biological variations are all based on linear curves based on human foetuses between 9 and 28 weeks of gestation. [9] Body weight, for example, is an important function and parameter for growth with respect to gestational age of the foetus. There will be great variations in the body weight of a 16 weeks old foetus. The weight will not be constant for every foetus and will vary from individual to individual. Therefore, rather than an appropriate or standard value, a range can be specified like 90 to 100 grams. This amount of variations applies to all other anthropometric measurements. Often, the scientific world cover up their ignorance by stating that the rate of growth of particular human foetus depends on its intrinsic growth potential and environment provided by the normal mother. It is a visible function of the genetic potential. [10]

Increase in foetal weight is a good indicator of foetal growth in general. Rate of weight gain during 1st, 2nd, and 3rd trimester differs considerably. In the present study the body weight of foetuses showed gradual increase from 10th to 38th weeks of gestation. These findings were compared with the findings of others researchers and was in agreement well with that of Keith Moore (2008), [11] while it is less compared to the findings obtained from the study of Hamilton (1972) [12] and Bocian (1993). [13] On comparing the results of the present study with that of previous researchers, we concluded that the present study is in agreement with that of some previous studies, while some findings were deviating owing to the difference in amount of data and population, sample size of study, genetic and environmental factors which affects the foetal development and interfere with the accurate foetal weight studied to the particular area.

CONCLUSION

Ours study for assessing the relation between gestational age and foetal weight corroborates with others researchers. In the normally developing foetuses the foetal weight increases with advancing gestational age. The average body weight from 10th to 38th G.W. increased from 10 gm to 3101 gm. The

foetal weight has shown a significant correlation with gestational age. The knowledge of measurement of foetal weight on human foetuses is helpful in anatomy and pediatrics. Accurate prediction of foetal weight is very important in the management of high risk pregnancies in order to prevent premature deliveries.

ACKNOWLEDGEMENTS

We are highly grateful to Dr. CP Sharma, Dr. Kanaklata Iyer, Dr. Sharbada, Dr. Bhima, and Dr. Diwakar, Department of Anatomy, Manipal College of Medical Sciences, Pokhara, Nepal for providing the necessary supports for carrying out the present study.

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How to cite this article:

Mukhia R, Poudel PP, Bhattrai C, Powar BP. Relation Between Gestational Age And Fetal Weight On Human Foetuses. Int. J. Adv.Microbiol.Health.Res., 2017; 1(1):15-19.

Source of Financial Support: Nil, **Conflict of interest:** Nil