

# A study to evaluate the relationship between the age of the fetus and intestinal length

K.G. Rao Mohandas<sup>1</sup>, S.N. Somayaji<sup>1</sup>, K.L. Bairy<sup>2</sup>, S. Nayak<sup>1</sup>  
and R. Vincent<sup>1</sup>

1- Department of Anatomy, Melaka Manipal Medical College (Manipal Campus)

2- Department of Pharmacology, Kasturba Medical College, Manipal, India

## SUMMARY

Usually, crown heel length (CHL), crown rump length (CRL), head circumference (HC), biparietal diameter (BPD) are commonly used to determine the age of fetuses. In the present study, we attempted to correlate the relationship between fetal age and intestinal length. The CHL, HC and intestinal length (IL) of 100 human abortuses were measured. The results show that there is a steady and progressive increase in IL with fetal age. The IL can be used to determine fetal age when other measurements are abnormal or unavailable.

**Key words:** Abortus – Intestinal length – Gestational age

## INTRODUCTION

The exact age of any embryo or fetus can only be determined when the date of conception is known. Owing to the uncertainty in obstetric history with regard to the mother's last menstrual period, in developing countries it is normally difficult to determine the exact age of the fetus (Sailaja et al., 1996). Different measurements and external characteristics are employed for approximate estimations of the

age of aborted specimens. The measurements commonly used are crown-rump length (CRL), crown-heel length (CHL) (Hamilton et al., 1957), biparietal diameter (BPD) (Sailaja et al., 1996), foot size (FS) (Molly et al., 1994) and femur length (FM) (Ruvulo et al., 1987). CRL is conventionally used as a method of age determination in developmental studies. Since the positioning of CRL of the conceptus is usually arbitrary, this measurement is the least reliable (Sailaja et al., 1996). In many of these methods, the head is the key point for measurements. In certain abnormalities, such as hydrocephalus or anencephaly, the head cannot be taken as a point for measurement. With above in mind, we attempted to correlate fetal age with intestinal length and to develop an additional method for fetal age estimation.

## MATERIALS AND METHODS

A total of 100 abortuses were collected from the Department of Obstetrics and Gynecology, Kasturba Hospital, Manipal. Soon after obtaining the specimens they were cleaned and measurements were taken, using standard procedures, and were repeated to ensure accuracy. The abdomen was opened and the length of the intestine was measured from

the pylorus to the anus. Fetal age determined by the Department of Obstetrics and Gynecology was compared with the ages determined by CHL and HC. These ages were then matched with intestinal length.

## RESULTS

Scrutiny of the data in Table 1 shows that there is a steady and progressive increase in intestinal length with increased fetal age. This steady and progressive increase in intestinal length was seen in all parts (duodenum, jejunum, ileum and large intestine) of the intestine. The CRL also revealed a progressive increase as gestational age advanced. Head circumference also increased steadily with fetal age.

Age in months	No. of fetuses	CHL (cm)	HC (cm)	LD (cm)	LJI (cm)	LLI (cm)	Total intestinal Length (cm)
4	24	19.5	11	2.75	53.5	10.5	66.25
5	16	32	22	4.5	108	26.5	139
6	30	44	27.5	5.1	170.5	35.2	210.3
7	30	50.5	33	6	224.5	50	280.5

**Table 1.-** Table showing the average of the crown-heel length (CHL), head circumference (HC), length of duodenum (LD), length of jejunum/ileum (LJI), length of large intestine (LLI) and total length of intestine. The ages of the fetuses obtained at the Department of OBG and the number of fetuses used for the study in each age group are also shown.

## DISCUSSION

The date of the last menstrual period is the best way of determining gestational age. However, women who are perhaps uneducated or illiterate may not be able provide such information, leading to uncertainty as regards to actual estimation of the duration of pregnancy. In such cases, age must be determined by the size of the uterus, recorded by abdominal and vaginal examination or by ultrasound. Mukerjee et al. (1986) reported that the body weight and CRL of Indian fetuses were lower than those given in Western textbooks (Hamilton et al., 1957). In abnormal formation of the head, such as hydrocephalus or anencephaly, and in conditions such as Amelia, determination of fetal age by CHL or

CRL or BPD or HC is not possible. Large numbers of such abortuses are available and can be used for developmental studies if the gestational age is known. Here, we are attempted to determine gestational age by measuring the length of the intestine, which can then be used as an index to determine the approximate age of the fetus.

Shanklin and Cooke (1993) have reported that intestinal length increases with birth weight, gestational age, and crown-heel length. According to Fitz Simmons et al. (1988), the overall growth of the gastrointestinal tract is linear with respect to gestational age. These studies clearly indicate the clear relationship between fetal age and intestinal length.

As shown in table 1, average intestinal length at the fourth month is about 66 cm. There onwards it increases steadily by about 70 cm every month. At about the seventh month, it reaches about 280 cm.

We conclude by suggesting that the length of the intestine may be used alone or together with other measurements to determine the fetal age of human abortuses.

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