INTRAUTERINE GROWTH OF FOETUS AND FACTORS INFLUENCING IT

By

SMITA ABASAHEB DAKH
B.Sc (Home Science)

DISSERTATION

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CONTENTS

CANDIDATE'S DECLARATION

I here by declare that the dissertation or part thereof has not been previously submitted by me for a degree of any University

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Dakh

(Ms Smita Dakh)

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This is to certify that the dissertation entitled **INTRAUTERINE GROWTH OF FOETUS AND FACTORS INFLUENCING IT** submitted in the partial fulfillment of the requirement for the award of the degree of **Master of Science (Home Science) in Child Development and Family Relationships** is a piece of the result of bonafied research carried out by **Ms SMITA ABASAHEB DAKH** under my guidance and supervision. I also certify that the dissertation or part thereof has not been previously submitted by her for a degree of any University.

Parbhani

Date 29/12/2001

(Prof Visala Patnam)
Guide
Professor & Head
Department of Child Development
and Family Relationships
College of Home Science
MAU Parbhani

Certificate - II

This is to certify that dissertation entitled **INTRAUTERINE GROWTH OF FOETUS AND FACTORS INFLUENCING IT** submitted by **Ms SMITA ABASAHEB DAKH** to the Marathwada Agricultural University, Parbhani in the partial fulfillment of the requirements for the of the Degree of **Master Of Science (Home Science)** in the subject of **Child Development and Family Relationships** has been approved by the Student's Advisory Committee after oral examination in collaboration with the External Examiner.

Members

(Prof Visala Patnam)
Guide
Professor & Head
Department of CD & FR
College of Home Science
MAU Parbhani

(External Examiner)

(Prof D Murli)
Professor & Head
Department of Home Management
College of Home Science
MAU Parbhani

Head
Department of Child Development
and Family Relationships
College of Home Science
MAU Parbhani

(Prof Dr H S Acharya)
Associate Professor
Department of BSCT
College of Agril. Engineering
MAU Parbhani

Associate Dean & Principal
College of Home Science
Parbhani- 431 402

(Prof R V Desetty)
Associate Professor
Department of CD & FR
College of Home Science
MAU Parbhani

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Parbhani

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Dakh

(Smita Abasaheb Dakh)

INTRODUCTION

Chapter 1

INTRODUCTION

Human beings evolve from birth to death through two distinct processes: growth and remodeling. Birth can only be regarded as a milestone in life, which really begins from the fertilization. The understanding of human growth from implantation to birth remains a great challenge even, as recent years have seen the elucidation of the process of placentation, development of technology to assess growth and observations linking foetal growth to a lifelong programming of human health. Foetal growth has great significance as it has implications on the well being of the foetus, infant and the long term health of humans.

Mother is the origin of human life, whether she gives birth to a male or a female baby. But only healthy women can produce healthy children who are not only parents' property but also natural resources of nation and families. They also build up healthy, happy, civilized society and nation. Therefore there is a great need to protect and care children not only from early childhood but right from the time of conception i.e. from prenatal period.

In the past, mother was the patient to be cared for and the foetus was merely a maternal appendage. The human foetus has for centuries remained a medical recluse in an opaque womb. The concept of the foetus as a patient is modern as currently availability of diagnostic or therapeutic measures to assess foetal growth before delivery have become common. Therefore, it is important to study the intrauterine growth of foetus and factors influencing it.

Prenatal development of the human foetus involves three physiological phenomena: its maintenance or survival, its differentiation or the formation of elements with new characteristics and its growth.

Hyteen and Lietchi in 1964 stated that pregnancy is a physiological condition in which the foetal growth is accompanied by extensive changes in maternal body composition and metabolism. There are three sub stages in which foetus growth and development are distinguished. They are the stages of ovum embryo and foetus.

Foetus is the developing young one in the human uterus after the end of eighth menstrual week. Before this it is called as embryo, it becomes an infant when it is completely outside the body of the woman, even before the umbilical cord is cut (Peter, 1983).

The process of foetal growth involves a gradual differentiation of tissues and body organs. The nervous system that begins to form in the second month continues to mature through 38 weeks of an average pregnancy. In the first trimester internal organs, limbs and facial features are established. During this period of rapid growth foetus is most vulnerable to the effects of drugs and viruses that may enter the placenta. By the end of the second trimester, the foetus is capable of responding to a variety of sensory experiences including taste, touch, light and movement. The third trimester involves changes in body weight, size and the integration of life sustaining systems including breathing, swallowing and digesting.

Mothers under 20 yrs and over 35 yrs tend to have a higher proportion of retarded babies than the mothers between 20 yrs and 35 yrs of age. These difficulties may be due to the inadequate development of the reproductive system in some younger women and to progressive decline reproductive functioning in some older ones.

The developing foetus receives its nutrients through the woman's body and thus is dependent on her for an adequate diet. Lack of a well balanced diet during pregnancy has serious implication not only on the health of the mother but also on the intrauterine growth of the foetus especially at the critical period of development. Malnutrition during pregnancy increases the likelihood of a whole host of complications during pregnancy and birth and also appear simultaneously to affect the growth of the nervous system in the developing foetus.

Gopalan and Rao (1972) indicated that nutrition plays an important, special and definite role in the course of pregnancy for the maintenance of sound maternal health. Hence the requirements of nutrients for women during pregnancy increase significantly in order to meet the extra demands for rapid growth and development of foetus.

Drugs given during pregnancy adversely affect the development of the embryo and foetus in many ways. Differentiation of the embryo begins during the second week and continues for the next eight weeks. During this period of organogenesis drugs produce congenital malformations (teratogenicity) and severe damage may result in abortion. During the second and third trimester drugs affect the growth and functional development of the foetus. The central nervous system continues to develop through out pregnancy and damage to it after the first trimester can produce microcephaly and mental retardation.

Anthropometric measurements help to assess nutritional and health status of pregnant women. A pregnant woman should not weigh less than 38 kg and her stature should not be less than 145 cm. Long term undernutrition in pregnant women results in lower weight and height (Swaminathan, M. 1985). These indices are considered to be the indicators

of past nutritional status of pregnant women. Prema (1978) found that height and weight of pregnant women have an effect on birth weight of infants and of the two, the effect of maternal weight was more pronounced.

Socio-economic status and education affect the health and nutritional status of pregnant women because in low socioeconomic status women can not afford to take proper care of their health and nutrition due to lack of money. Dass Gupta *et al.* (1950) found that there was a high incidence of premature births among the women of lower socioeconomic group. Kaur (1991) stated that balanced diet, regular medical checkup including tetanus immunization, consumption of iron and folic acid tablets and maintenance of good mental health during pregnancy are equally important to determine the progress of pregnancy and foetal well being. Pregnant women's emotional state has indirect effect on well being of the foetuses though there is no direct neural connection between the pregnant women and the foetus that would directly communicate the pregnant women's emotional state to the foetus. However, the hormonal changes take place in women under state of high emotional arousal. These hormones can pass through the placenta. Thus indirectly the women's emotional state affects the intrauterine environment. Foetal growth is mostly influenced by the intrauterine environment. Various risk factors of pregnancy identified in pregnant women for foetal growth are maternal age, anthropometric measurements like height, weight, weight gain during pregnancy, parity, previous obstetric history and prevalence of anaemia. The pregnant women themselves contribute to the quality of intrauterine environment through the foods they eat, the drugs they consume and the emotional state they maintain during pregnancy. In light of above the present study is taken up to study

the intrauterine growth of foetus and factors influencing it with following objectives as given below

Objectives

- To study antenatal care practices adopted for the pregnant women
- To study intrauterine growth of foetuses in women during pregnancy
- To find out the association between foetal growth and the selected background variables of pregnant women

REVIEW OF LITERATURE

Chapter 2

REVIEW OF LITERATURE

A comprehensive review of literature is a must in any research endeavor as it provides insight into the methods and procedures to be adopted for attaining the objectives of the research study and also finally to work out a base for interpretation of the findings of the research study. The literature reviewed relating to the study on intrauterine growth of foetus and factors influencing it was put together, classified, organized and written below under the following heads.

2.1 Antenatal care practices adopted for pregnant women

2.2 Intrauterine growth of foetuses in women during pregnancy

2.3 Association between foetal growth and background variables of pregnant women

2.1 Prenatal Care Practices Adopted For Pregnant Women

Shankar (1962) studied dietary pattern of pregnant women and found that they consumed monotonous diet. Rice and jowar were their staple food and was in proportion of 2 : 1. A very small number of Muslim pregnant women consumed wheat in addition to rice and jowar. However relatively a higher percent of Hindu women as compared to that of the Muslims included pulses in their daily diet. It was also found that nearly two thirds of all pregnant women did not consume milk and milk products and 50 percent of them had not taken eggs or meat. The diets of the pregnant women generally were found to contain very small amount of fat. The consumption of green leafy vegetables was indicated to be inadequate

and nearly 25 per cent of them were found to use leafy vegetables very rarely.

. Madhunath (1974) studied on the diet and nutritional status of pregnant and lactating women of the urban slum area of Hyderabad and reported that 80 percent of the women surveyed were not aware of the increased food requirements during pregnancy. Daily food intake of all these pregnant women also indicated very low intake of all the food items.

. A longitudinal study on 357 pregnant women of Kenya in relation to outcome of pregnancy by Kusin (1979) revealed that the mean weight of the selected pregnant women was 55.4, 55.5 and 57.6 kg at 3 to 4, 5 to 6 and 7 to 9 months of pregnancy respectively. Weight gain was about 1.5 kg from 3 to 6 months and about 3.1 kg from 7 to 9 months of pregnancy.

According to the report of Naeye and Peters (1982), working during pregnancy can be deleterious to pregnancy outcome. They identified birth weights of infants whose mothers worked during the third trimester to be 150 to 400 g lesser than those of new born whose mothers did not work, even though the length of gestation was the same for both groups, reduction in birth weight was greatest with mothers who were under weight before pregnancy and whose weight gain during pregnancy was low.

Pendse and Giri's (1983) study results revealed that the respondents had attained menarche at age between 13 and 15 yrs and more than half (54.5%) of them had experienced the first child birth within one to three years of their menarche i.e. approximately between 15 to 17 yrs while 38 percent and 7.5 percent had achieved motherhood 4-6 and 7-9 yrs after attaining menarche respectively. The reasons given by the women for their marriage and childbirth were security and proving their fertility.

Pendse and Giri's (1983-84) study on pregnancy care practices in rural Rajasthan indicated that diagnosis of pregnancy was usually done by the respondents themselves or sometimes by the elderly women of the household and their diagnosis was based on certain commonly known signs and symptoms such as amenorrhoea (in the case of 65 percent of the respondents); nausea and vomiting (26.5 percent); change in taste of food i.e. likes / dislikes (2 percent), quicking (15 percent) and foetal movement (15 percent).

. Pendse and Giri (1983) studied on special care during advanced pregnancy and reported that out of 200 sample only 67 respondents (35.5 %) had taken special care during advanced pregnancy almost two third (66.5 %) did not get any such care. The main reasons for not taking extra care during advanced pregnancy were that of household and field duties.

Scholl *et al.* (1987) carried out a prospective study of 757 adolescents who gave birth to singleton live-born infants was undertaken to assess effects of prenatal care on pregnancy outcome. The analysis indicated that the odds of low pregnancy weight gain for gestation was reduced by a factor of two (odds ratio = 0.50, $P < 0.05$) for adoloscents with adequate prenatal care; the risk of preterm delivery was reduced with both adequate (odds ratio = 0.34 $P < 0.01$) and intermediate prenatal care (odds ratio = 0.46, $P < 0.05$). Birth weight was increased by an average of 157 gm with adequate care ($P < 0.05$) and 107 gm with adequate care ($P < 0.05$) and 107 gm with intermediate care ($P < 0.05$). After adjusting for pregnancy weight gain and preterm delivery differences in birth weight were much smaller and no longer statistically significant, suggesting indirect effects of care on birth weight (i.e. Improvements in weight gain and in lessening preterm delivery).

Kaur (1991) studied on care of the mothers is the role of the fathers and found that the general health care of pregnant women is very much necessary because their physical and mental health affect the unborn baby of the pregnant women being nourished inside. Besides balanced diet regular medical check ups and their mental health were equally important for well being of unborn babies.

Patnam *et al.* (1993) studied on several health care practices of pregnant women and their influencing factors in rural and urban areas of Marathwada region by interviewing randomly selected 360 rural and 150 urban nursing women. Nausea, oedema, anemia, indigestion and body pains were their commonly reported health problems of pregnant women. Urban pregnant women were better cared than their counter parts in rural area.

According to Cunningham *et al.* (1997) the clothing worn during pregnancy should be practical and non-restricting.

2.2 Intrauterine Growth Of Foetus In Women Of Different Stages Of Pregnancy

During the past two decades use of ultrasonography for scanning uterus contents and studying foetal growth has been gaining a lot of importance. It has become a necessary item in the antenatal checkup.

In 1970, Kloosterman described findings from a group of 80,000 well-supervised pregnancies of accurately known duration. Although fully cognizant that the weight of new born, born prematurely was probably not the same as those destined to remain longer in uterus. It was noted that deceleration of growth after the 38th week of gestation, which was not due to foetal factors because acceleration took place again after birth. Prematurely born neonates did not show a decrease in growth around the time they were

delivered. It has been postulated that this may be as a result of human posture, with a resultant decrease in uterine blood flow and relative foetal malnutrition near term. (Briend, 1979). Kloosterman also noted that boys weighed more than girls, subsequent neonates weighed more than firstborns and the weight of twins equaled that of singletons until the 32nd week but fell behind progressively after that.

Human growth results from an interplay of maternal, placental and foetal factors. The nutritional supply to the foetus provided by the uteroplancental circulation and the transfer of substrates across the placenta are probably the major contributors to the complicated process that regulates foetal growth. (Sparks *et al.*, 1980; Salvesen *et al.*, 1992).

Bissenden *et al.* (1981) studied on anthropometric and biochemical changes during pregnancy in Asian and European mothers having well grown babies. At the hospital where this study was carried out, about a third of all mothers were Asian. Although generally they have smaller and lighter babies, many Asian mothers achieve standards of intrauterine growth similar to those European mothers. This paper describes the nutritional status of Asian and European mothers having well grown babies. Twenty eight European and eleven Asian mothers who had a normal past obstetric history and a normal present pregnancy, resulting in a well grown baby were studied throughout pregnancy. At each visit weight, skin fold thickness and mid-upper arm circumference were measured and biochemical measurements of nutritional status were performed (serum albumin, transferring and alkaline ribonuclease, plasma amino skids and nitrogen partition of urine). The Asian mothers were fatter than the European mothers at booking and put on more fat during the second trimester. At the same time, the biochemical tests suggested that the Asian

mothers had a higher plane of nutrition. It was found that if the Asian mothers are well nourished in the second trimester they can achieve a standard of intrauterine growth as comparable to that of the Europeans.

Bhatia *et al.* (1981) worked on intrauterine growth percentiles for singleton live born babies. Five thousand three hundred and twenty one singleton live born babies were studied for their intrauterine growth (IUG) pattern from 26-44 weeks of gestation and the measurements for birth weight (BW), crown heel length (CHL) and head circumference (HC) and at each gestation was expressed as smoothed percentiles. All the three parameters showed a uniform increase until 35-37 week after which the increments gradually reduced and the IUG curves started flattening out. The birth weights after 41 weeks showed an appreciable decrease for the lower percentiles but not so much for the higher percentiles. This declining trend beyond 41 weeks was less marked for the crown heel length and head circumference. In comparison with two other Indian studies the weights and the head circumferences in this study were smaller whereas the crown heel length were slightly greater.

Moore (1986) compared the use of "ratios" to serial ultrasonographic measurements in 50 growth deficient foetuses. Intrauterine growth restriction was diagnosed if the femur to abdomen ratio exceeded 23.5 per cent. Ratio methods or if the estimated foetal weight was below the 10^{th} percentile on two of three successive examination (serial method) the femur length to abdominal circumference ratio demonstrated surprisingly poor sensitivity when compared with longitudinal growth profiling, with a normal femur length to abdominal circumference giving a predictive value of only 71 per cent compared with 91 per cent with serial foetal weight estimations.

Storlazzi *et al.* (1987) carried out a study on forty-three consecutive twin pregnancies evaluated by ultrasound to establish criteria for antenatal detection of discordant foetal growth. For each foetus an attempt was made to measure the biparietal diameter, abdominal circumference and femur length, the estimated foetal weight was also calculated based on published formulas. The differences in biparietal diameter, abdominal circumference, femur length and estimated foetal weight were evaluated as predictors of discordant foetal growth. Although the intrapair difference in biparietal diameter measurement was not statistically significant predictor, an intrapair difference in abdominal circumference of 20 mm or more was found to have sensitivity 80 percent, specificity 85 percent, positive predictive value 62 percent and negative predictive valve 93 percent. Intrapair difference in the estimated foetal weight was found to be the best predictor of discordant foetal growth (sensitivity 80 % specificity 93 % positive predictive value 80 % and negative predictive value 93 %). The data suggested that the intrapair difference in abdominal circumference measurement could be effectively used as a screening test for the diagnosis of discordant foetal growth.

Reece *et al.* (1990) studied growth of the foetal head ultrasonographically in 45 insulin-dependent diabetics. They found that the foetus of the diabetic mothers exhibits head growth velocities similar to those of normal foetuses, even when advanced degrees of maternal vascular disease and hyperglycemia were present. London *et al.* (1989) also used serial ultrasound measurements to characterize foetal growth dynamics. Although head and femur growth did not differ statistically from normal foetuses. Abdominal circumference growth exceeded that of normal

foetuses beginning at 32 weeks (AC growth = 1.36 cm / wk in foetuses of diabetic mothers vs. 0.901 cm / wk in normal foetuses, $P < 0.001$).

Chang *et al.* (1993) assessed the efficiency of serial measurements of a combination of abdominal circumference, estimated foetal weight (EFW), and umbilical doppler studies to a single measurement in detecting IUGR. In small foetuses, growth failure, identified by serial assessment of abdominal circumference and estimated foetal weight was superior to a single set of measurement.

Sherer *et al.* (1993) conducted a study on the foetal sacral length in the ultrasonographic assessment of gestational age. A prospective cross-sectional study of 506 singleton foetuses with normal growth between 15 and 41 weeks gestation was performed. Regression analyses were performed on sacral length, gestational age, biparietal diameter, head circumference and femur length. The sacral length in 80 singleton gestations with abnormal growth (40 > 90^{th} percentile and 40 < 10^{th} percentile for gestational age) were compared with the nomogram. The sacral length of all 80 foetuses with abnormal growth demonstrated the same relationship to gestational age, as did the 506 normal controls. This study defined the normal limits of sacral length, demonstrates a high correlation between sacral length, gestational age and other standard measurements of foetal growth and indicated that the sacral length can predict gestational age, irrespective of foetal nutritional status.

Roy *et al.* (1994) studied on ultrasonographic nomogram of foetal kidney circumference and foetal abdominal circumference ratio for early prenatal diagnosis. Serial ultrasound scans were done in 300 foetuses between 16 to 24 weeks of gestation to establish nomogram of foetal kidney circumference (FKC) and foetal abdominal circumference (FAC) ratio (FKC

/ FAC). of 300 foetuses. One hundred and fifty foetuses were in high risk group for foetal malformation and 150 foetuses were in the control group. The value of FKC / FAC varied from 0.27 to 0.30 from 16 to 24 weeks of gestation. No statistical difference was observed in the value of FKC / FAC in high risk and low risk (control) cases ($P > 0.05$). The value of FKC / FAC greater than or equal to 0.5 at 20 weeks or more was pathological for enlarged kidney. In four cases of multicystic kidney the value of FKC / FAC ranged from 0.50 to 0.52 which was approximately 6 SD above the normal mean ratio for that period of gestation.

Pratapkumar and Vellanki (1995) studied yolk sac and its significance in first trimester of pregnancy by analysing cases of early pregnancy with ultrasonographic examination. Yolk sac was the first structure to be seen normally within the gestational sac and had significant role in early pregnancy. Among 118 reports 89 scans showed normal outcome and 29 had abnormal outcome. Accuracy of yolk sac was 63.6 percent sensitivity, 96.4 percent specificity, 72. 7 percent positive predictive value and 93.2 percent negative predictive value. Hence prior to starting treatment a careful yolk sac observation will decide further management and also useful to differentiate between potentially viable and non-viable pregnancies as well as to confirm the presence of an intrauterine pregnancy.

Tank *et al.* (1995) carried out a study on amniotic fluid index in the diagnosis of intrauterine growth retardation in pregnancy by studying 50 pregnant women for a period of 6 month with various grades of pregnancy induced hypertension (PIH) for expectant management at the Nowrojee Wadia maternity hospital. Distribution of cases according to severity of PIH, revealed that 51 percent had mild disease, 17 percent had moderate and 32 percent had severe disease. The incidence of oligohydramnios in this study

was 15 percent. The maximum number of cases of oligohydramnios were found in the patients suffering from severe diseases. The incidence of obstetric complications like acute foetal distress with intrauterine growth retardation (IUGR) necessitating delivery by lower segment caesarian section was highest in the patients who were categorized as having severe diseases in 15 percent of the patients who had oligohydramnios. It was found that oligohydramnios was significantly associated with IUGR. It was concluded that amniotic fluid index is one of the variables important for good foetal outcome.

In 1995 Mathai *et al.* conducted a study to determine the pattern of intrauterine growth and the gestation at birth of Indian foetus. One hundred and twenty consecutive women who had reliable menstrual histories, low risk pregnancies and who were booked for delivery at Christian medical college hospital, Vellore, before 20 weeks' gestation were recruited in the study. Ultrasound foetal biometry was carried out at 4 weekly intervals from 20 weeks and at weekly intervals after 36 weeks until delivery. Results showed that there was a lag in growth of abdominal circumference (AC) after 28 weeks.

In another longitudinal ultrasound study of 274 low risk pregnancies involving organised scanning schedules to establish the nature and limits of foetal growth in a low risk population from 22 weeks of gestation until term. Growth velocity charts have been created for a number of ultrasound parameters including estimated foetal weight, by applying appropriate statistical methods to the serial data. The rates of growth of the biparietal diameter, femur length, abdominal area and estimated weight each have characteristic patterns demonstrating maximal growth rates at different gestations (Owen *et al.* 1996)

Pregnancy is a unique metabolic state in which the women must provide substrates and fuels not only for their own energy needs but also for the growth and metabolic requirements of the conceptus (Moshe *et al.* 1996).

Owen *et al.* (1997) worked out on foetal size and growth velocity in the prediction of intrapartam cesarean section for foetal distress. Three hundred and ninety-eight women previously enrolled in a longitudinal study of intrauterine volume undergoing labour at a gestational age of > 37 weeks. From this study it was concluded that growth velocity of the foetal abdominal area in the third trimester is superior to a single measurement of the foetal abdominal area at either a mean of 32 or 36 weeks of gestation in the prediction of edesarean section for foetal distress and admission to the special care baby unit in low risk women labouring at term. These results support the hypothesis that in the third trimester at least, growth rate in uterus is more relevant to intrapartam performance and immediate perinatal outcome that estimates of foetal size alone.

Pandey *et al.* (2000) studied on maternal and foetal outcome in cases of premature rupture of membrane (PROM). 100 patients with premature rupture of membranes at 28-42 weeks gestation without any associated medical or obstetrical complications were studied. Equal number of normal deliveries were taken as controls. The incidence of PROM was found to be 7.71 per cent (69 % term 31 % preterm PROM). Incidence of LSCS (31 %) and other abnormal deliveries were high compared to controls.

Agrawal *et al.* (2000) studied placental grading by ultrasonogrophy in 125 normal and 125 high risk pregnancy cases after 28 weeks. After delivery APGAR score, birth weight, development of RDS and neonatal outcome were correlated with placental grading. It was found that the placental grading advanced with the gestational age in both low risk

and high risk cases, but in IUGR and hypertensive cases placental maturity was accelerated being higher than in normal pregnancy of similar gestational age. Cases of diabetes and Rh incompatibility however showed delayed maturity of placenta and lower grades were found even in cases approaching term. Premature aging of placenta was an indication of decline in its function and was found to be associated with an increased incidence of maternal and foetal complication in the form of hypertension, IUGR, foetal demise, abraptio placental and prenatal mortality.

According to Raman (2001) birth weight of infants is a simple indicator to foetal wellbeing and growth. Mean birth weight of infants born to low socioeconomic group mothers were lower and has not changed over the last 3 decades in India. Almost 90 percent of low birth weight (LBW) infants born all over the world are in developing countries. The flattering in intrauterine growth is mainly in the last trimester of pregnancy, since the disparity between maternal supply of nutrients and foetal requirements become more marked around this time due to greater needs of a fast growing foetus. Average birth weight of a healthy term infant of undernourished mothers was found to be 500 g lesser than that of well nourished mothers sand this one may be related to poor fat deposition in the foetus.

2.3 Association Between Foetal Growth And The Background Variables Of Pregnant Women

Sontag (1966) studied about implications of foetal behaviour and environment for adult personalities and it was found that children whose mothers were under great stress during pregnancy also showed more free floating anxiety although they performed their daily routines, such anxiety had an adverse effect on their ability to learn, to remember and to reason to

their full capacities. As a result they seem to be less brighter than what they actually are.

Menon (1967) found that maternal anaemia was a burning national public health problem and has lead to poor foetal outcome in developing countries. Iron deficiency anaemia was one of the most prevalent nutritional deficiency diseases among women during pregnancy. The WHO report (1992) has revealed that prevalence of anaemia at global level was 35.9 percent among the expectant mothers. In South Asia 65 percent pregnant women were found to be affected by nutritional anaemia. In India the incidence of anemia among expectant mothers was alarmingly high. The reported values were found to vary from 34.6 to 98.3 percent (ICMR, 1989 ; 1990 ; 1992).

During pregnancy anaemia had a significant impact on the health of the foetuses as well as that of the women. The major risks of anaemia associated with pregnancy were perinatal mortality and morbidity (Menon, 1967 ; Mukherjee, 1976 ; Ghosh *et al.*, 1978, Agrawal and Agrawal, 1991) emphasized that the damage to the foetal brain occurs from maternal anaemia and it is reported to be noticed even in earlier period of pregnancy.

According to Carter (1968) most common malformations of new born in England were significantly associated with poor maternal nutritional and severe viral infections during pregnancy.

Sontag *et al.* (1969) studied on the foetal and maternal cardiac response to environmental stress and reported that when prolonged emotional strain affects endocrine balance, anxieties are carried over into the period of the newborn and seriously affect their adjustment to postnatal life. The infants also showed hyperactivity.

Grimwade *et al.* (1971) described the foetal response to external sound and vibration in both antepartum and intrapartum patients. Antepartum, sound stimulation via a loud speaker on the maternal abdomen delivered a stimulus of 80 db pure tones with a frequency range of 500 to 1000 Hz. This resulted in a significant increase in the number of foetal heart rate accelerations (greater than 15 beats per minute) as well as an increase in amplitude and accelerations. Eighty three percent of the foetal heart rate accelerations were associated with foetal movements.

Sullivan (1972) researched four sites of action. The first site was direct on the foetus. Tetracycline administered late in pregnancy caused teeth discolouration. It is also indicated that most of the drugs acted directly on the foetus. The second site studied was the placenta. It interfered with blood supply or placental function thus indirectly affected growing foetus. Warrell and Taylor (1968) found that the still births and the other foetuses at risk were due to use of prednisolone during pregnancy which affected adversely placental functions.

Mc Bride (1972) published a report of three neonates with limb reduction deformities born to women who took imipramine or related drugs during pregnancy. Several subsequent studies have failed to find any association between the use of imipramine and congenital malformations in humans (Morrow, 1972).

According to Gopalan and Rao (1972) and Lectig *et al.* (1982) the deficiencies in the intake of nutrients have clearly reflected in poor weight gain during pregnancy and subsequently in low birth weight of the infants. Moreover, a poorly nourished pregnant women could not withstand the stress and strain of pregnancy and the nutritional demands of growing foetus and ultimately lead to poor growth and development of foetus.

Jones *et al.* (1973) described eight children born to women who were chronic alcoholics. These babies seemed to have common features of growth retardation, microcephaly, limb and heart deformities and mental deficiency.

Nutritional factors immediately related to pregnancy and the antecedent reproductive years have the greatest influence on foetal growth (Naeye *et al.* 1973). Women who were growth retarded themselves as newborns tended to give birth to infants who were growth retarded. In studies of women who emigrated from Pakistan to England and who were in good nutritional status during pregnancy still had a higher rate of neonatal deaths (Aykroyd, 1967).

In another study also Jones *et al.* (1974) has estimated that the risk of perinatal mortality or postnatal abnormal features in the offspring of alcoholic mothers was as high as 40 per cent which inferred that chronic alcoholism is a suitable justification for the termination of pregnancy.

ICMR (1975) Nath and Greevani, 1978 and Prema *et al.*, 1981 reported that initial incidence of anaemia at the onset of pregnancy was 15 to 20 percent while in the later stages of pregnancy this incidence raised to 60 to 70 percent.

Moghissi *et al.* in 1975 reported that there is a significant relationship between maternal amino acids, proteins and certain other factors and their foetal development. After studying the 129 gravidas maternal prepregnancy weight was significantly related to birth weight and cranial volume in the newborn. Among amino acids, glycine, lysine and total amino acids were positively correlated with birth weight. Cranial volume at birth was significantly related to the level of glycine and alpha globulin. Other protein and amino acids contributed to cranial volume included

threonine, histadine, glutamic acid and beta globulin was negatively correlated, whereas glutamine was positively correlated. Alpha globulin (negatively) and glycine (positively) made significant contributions to motor development. For mental development alpha globulin and histidine showed a negative correlation, whereas isoleucine was positively correlated. Findings indicated that the concentrations of certain maternal amino acids and proteins in the third trimester of pregnancy correlated significantly with foetal growth and development. This study suggested that 1. Specific proteins or amino acids may be responsible for different developmental measures 2. Injudicious dietary restrictions in pregnancy should be avoided 3. The determination of alpha globulin and a few amino acids such as glycine, lysine and histidine in late pregnancy may be used as predictors of foetal growth and development.

Milkovich and Van den Berg (1976) reported in their study that the incidence rate of severe congenital abnormalities in the offspring of mothers who took meprobamate (12.1 per 100) or chloride zepoxide (11.4 per 100) in the first 42 days after the last menstrual period was significantly higher than those taking other drugs (4.6 per 100) or no drugs (2.6 per 100).

A study conducted by Devdas *et al.* in 1976 to investigate the influence of environmental and socio-economic factors on birth weight of 500 new born belonging to different socio- economic background revealed that mean weight of new borns was 2.97 kg and was not influenced by family income levels.

Evans and Leonard (1976) studied on prematurity, post maturity and intrauterine growth retardation and found that women during pregnancy were generally nutritionally at risk. Severe maternal malnutrition

in early pregnancy impaired the linear growth and weight gain of the foetuses.

Smithells (1976) has summarized ten studies which showed that there was 1.9 percent incidence of congenital heart defects and the same incidence of cleft lip or cleft palate in 1499 epileptic women who took anticonvulsant during pregnancy.

Friis and Sardemann, (1977) stated that anticonvulsant therapy interfered with vitamin D metabolism caused osteomalacia and rickets. Severe, prolonged hypocalcaemia reported in infants, were born to the mothers treated with phenytoin and phenobarbitone and attributed to defective bone mineralization in the foetuses.

Naeye (1978) reviewed the research studies and found out that a decrease in birth weight of newborn was positively associated with consumption of coffee or alcohol, poor nutritional status, smoking, low socio-economic status and less duration between pregnancies.

While Quigley (1979) concluded that while foetal hypoxia was the main causes of reduction in birth weight and cigarette smoking probably induced foetal hypoxia. Nicotine was responsible for the increase in foetal heart rate and reduction in baseline heart rate variability which occured with maternal smoking (Kelly *et al.*, 1984). Carbon monoxide decreased foetal oxygenation by forming carbonhaemoglobin, thus reduced the oxygen carrying capacity of the blood. Both maternal and cord blood carboxy-haemoglobin levels were increased by smoking. Smoking also increased foetal blood viscosity which contributed to foetal hypoxia by reducing blood flow through the foetal placental villi (Buchan, 1983).

One thousand pregnant women admitted for delivery to the Zenana hospital in Jaipur were studied by Idnani *et al.* 1979. Results

indicated that the incidence of low birth weight babies increased in the pregnant women of ≥ 5 para and it was also found to be common in the primipara pregnant women. The incidence of prematurity was noticed to be more in primi and multipara pregnant women. It was also reported that the incidence of low birth weight babies (less than 2.5 kg) was more common among pregnant women in the age group of above 36 years (33.33 %) and below 20 years (28.0 % of age). On the whole, perinatal mortality was noticed in 17.4 percent of the pregnant women.

Harlop and Shiono (1980) found out that heavy drinking during pregnancy (more than 40 gm daily) was associated with a characteristic pattern of foetal abnormalities known as' foetal alcohol syndrome. In its complete form this consists of foetal and postnatal growth retardation, craniofacial abnormalities, microcephaly, behavioural abnormalities and mental retardation. The facial abnormalities include short pulpebral fissures, a short nose with sunken nasal bridge, epicanthic folds and micrognathia, producing a distinctive picture when all the abnormalities were present.

Chatterjee and Banerjee (1981) studied the 50 cases of malaria complicating in pregnancies. Clinical investigation method was used for detecting malaria. Twenty four percent of them were suffering from anaemia. Out of them 4 percent cases had signs of heart failure. In 16 percent cases anaemia was dimorphic variety while in 12 percent cases it was of macrocytic variety. The incidence of toxaemia in them was 40 percent. In 8 percent cases IUGR was detected and in 2 cases IUD occurred. Maternal (20%) and perinatal (80%) mortality were significantly high in 15 percent of these cases had low birth weight babies, having weight less than 2.5 kg.

Prema (1981) studied on effect of maternal nutrition on intrauterine growth retardation and weight gain of 476 women attending antenatal clinics at Baroda during pregnancy and the results indicated that the mean weight gain during pregnancy was 11 kg for women of upper income group. On the other hand it was only 6 kg for two women of low income groups during pregnancy.

Effects of maternal smoking on foetal growth and retardation were studied by Bosley *et al.* (1981). Anthropometric measurements of 320 term neonates was taken to investigate the influence of smoking on foetal growth and nutrition. Maternal height and triceps skin fold thickness were also measured. Of the 320 infants 39 percent were born to mothers who smoked. Maternal triceps skin fold thickness was significantly smaller in smoking mothers. A positive correlation was found between maternal and infant triceps skin fold thickness. Measurements of infant growth, birth weight, occipito-frontal circumference, and crown-to heel length were significantly smaller.

Bhargava *et al.* (1983) studied the influence of maternal size and nutrition on identification of foetal growth retardation and stressed that maternal weight and height found to have the positive correlation with respect to the babies weight at birth.

The weight gain of 6.7-18 kg by pregnant women was suggested as a useful measure of adequate foetal growth (Devi and Agrawal, 1984 ; Abrams *et al.*, 1989 ; Abrams and Parker, 1990 ; Naeye, 1990 ; Sethi *et al.*, 1991). In India, a mean gestational age of 39.2 weeks and a mean birth weight of 3211 gms were reported with a weight gain of 9 kg by pregnant women during pregnancy.

Rottmann (1984) observed that emotional disturbances among pregnant women have been associated with pregnancy and birth complications. Catastrophic category mothers who did not want their unborn child consciously and unconsciously had the most serious medical problems during pregnancy, more premature and low birth weight babies and emotionally disturbed children.

Newton *et al.* (1984) studied psychological stress in pregnancy and its relation to low birth weight on a sample of 250 pregnant women and found 20 women gave birth to premature babies, among them 60.30 per cent women had a history of abortion, still births and 5 percent had previously preterm deliveries. Further, it was also noticed that the psychological stress in the third trimester was significantly associated with preterm deliveries.

Mills *et al.* (1984) indicated incomplete forms of the syndrome are probably more common when there was evidence taking of less than 20 g alcohol daily during pregnancy produced the foetal alcohol syndrome while growth retardation alone was reported with regular consumption of alcohol as little as 10 gm daily during pregnancy.

Winick (1985) suggested that a key link in the chain of events from maternal undernutrition to foetal growth failure. According to Luke (1994) maternal malnutrition decreased placental cell number, reflecting on impaired rate of cell division. Maternal malnutrition also interfered with the normal increase in blood volume, resulting in decreased placental perfusion.

According to Campbell (1986) any mismatch between foetal nutritional and oxygenation demands and placental perfusion resulted in impaired foetal growth.

Maternal height, socio-economic environment and nutritional status were recorded to have a definite influence on the weight and mortality

of foetus and neonates (Bhargava *et al.*, 1990 ; Naeye, 1990 ; Sethi *et al.* 1991). The critical levels of measurement of indices are found to vary in different parts of the world. According to ICMR multicentric (1990) and other reports (Naeye 1990) in India the critical level of height of pregnant women is considered to be 140 cm. Bhatia *et al.* (1953) have demonstrated a significant correlation between maternal size and the outcome of pregnancy.

Ardhapurkar (1990) studied on nutritional and health status of selected pregnant women of Parbhani and found that the mean values of pregnant women of above poverty line groups was more than that of pregnant women of below poverty line group.

The results of Abrams (1991) study revealed that pregnant women addicted to smoking, more than 10 cigarettes per day had a low maternal weight gain during pregnancy and height was significantly associated with the small for gestational age (SGA) and preterm babies. Further, it was also noted that maternal age less than 16 yrs, primipara, incompetent cervix, trauma and hypertensive disorders also significantly associated with preterm and small for gestational age.

Mc Donald *et al.* (1992) reported that among the pregnant women who smoked more than 20 cigarettes per day had the risk of delivering a baby with a birth weight less than the fifth percentile was increased to more than three folds as compared to the nonsmokers. This risk was further increased by a factor of 1.5 for every additional 10 cigarettes smoked each day.

The results of a study carried out by ICMR in (1992) disclosed that at least 17 percent of women had haemoglobin levels lesser than 99 / dl

even during 20 to 24 weeks of gestation. It was also found that in Rajasthan this percentage was found to be much higher.

Raymond *et al.* (1993) found that exposure of pregnant women to a combination of carbon mono oxide adversely affected the foetal growth.

A longitudinal cohort study was conducted by Devoe *et al.* (1993) to observe the level of long term maternal caffeine ingestion influence on foetal behaviour. By dietary history 10 normal pregnant women were categorized as "high" caffeine consumers (> 500 mg / day, group H) and 10 as "low" caffeine consumers (> 200 mg / day, group L). Between 30 and 40 weeks biweekly 2-hour continuous ultrasonographic observations of fetal heart rate; breathing activity; and eye, trunk and extremity movements were conducted. Maternal caffeine levels were determined at each session and foetal states were identified and their duration quantified. When compared with group L foetuses, group H foetuses spent similar mean time in state 1 F (quiet sleep), less mean time in state 2 F (active sleep), and much greater mean time in state 4 F (arousal). The mean time spent in no state decreased significantly in group L, was unchanged in group H and was similar for both groups at term. Both groups had similar mean numbers of state changes at all gestational age studied. Mean maternal serum caffeine levels in group H were always significantly higher than those in group L. From this study it was concluded that evolving of foetal behaviour may be influenced by the level of maternal caffeine consumption during the last trimester.

Cnattingius *et al.* indicated in the study carried out in 1993 that older smokers are at an especially high risk for small for gestational age births and parous smokers are at an especially high risk for low birth weight and preterm delivery.

Dekker *et al.* in 1993 reported that use of low-dose aspirin during pregnancy is safe with regard to congenital anomalies and foetal, neonatal and maternal cardiovascular physiologic state and homeostasis. Aspirin was effective in reducing the incidence of preeclampsia and foetal growth retardation in selected high risk women.

Agrawal (1994) carried out study on effects of subclinical malaria on foetal development. Sixty one mothers and their neonates were studied for malarial antibody titres in mothers and its effect on the newborn. There was significant inverse relationship between maternal antibody titres against malaria and various anthropometric measurements of the newborn. Height, weight, head circumference, chest circumference and midarm circumference of the neonates born to the mothers having high malarial antibody titres were significantly lower in foetuses. Thus subclinical malaria in pregnant women lead to the intrauterine growth retardation.

Swain *et al.* (1994) studied on maternal hemoglobin and serum albumin and foetal growth. Four hundred and eighty four pregnant women and their offsprings were studied. The correlation coefficient of maternal hemoglobin as well as serum albumin level ($r = 0.1097$ and 0.0936, respectively) with birth weight of newborn were not statistically significant. The prevalence of low birth weight babies was significantly higher among anaemic mothers ($p < 0.01$). However no such trend was observed in relation to maternal serum hemoglobin.

According to Luke (1994) extremes of maternal age(> 40 yrs and ≤ 15 yrs) were associated with an increased incidence of adverse perinatal outcome, including stillbirth, perinatal mortality, low birth weight and intrauterine growth retardation, preterm delivery and congenital anomalies.

Arunakumari and Satyavani (1994) reported that along with the consumption of poor quality diet, the prevailing food beliefs had a strong hold on the nutritional status of the pregnant women.

Dhall and Bagga (1995) studied on maternal determinants on birth weight of North India babies at the Nehru hospital, Chandigarh over a period of two years and it was noted that there was increase in birth weight with increase in maternal height. They also reported that there was definite relation between maternal weight and baby's weight, the mean birth weight increased significantly with increasing maternal weight. While studying maternal weight was categorised into 4 groups < 50 kg, 51 - 60 kg, 61 - 70 kg and > 70 kg. Out of which 51-60 kg was taken as the reference category. The babies of mothers weighing < 50 kg were 187 gm lighter than those between 51-60 kg, those mothers between 61-70 kg and > 70 kg were 83 gm and 293 gm heavier respectively.

In 1996 Persson *et al.* carried out a longitudinal study from 6 to 14 weeks gestation to determine the relation between maternal levels of blood glucose and glyeated haemoglobin (Hb A/C) and infant size at birth in pregestational diabetes. The sample comprised of one hundred and thirteen consecutive pregnant women with pregestational diabetes and their newborn. The results disclosed that perinatal mortality was nil. The rates of spontaneous preterm deliveries and severe maternal hypoglycaemia were 8.9 per cent and 4.4 per cent respectively.

Moshe *et al.* (1996) research studies indicated that the group with pregnancy induced hypertension delivered foetuses with significantly lower birth weights. This suggested that foetal growth in hypertensive pregnancy without any accompanying metabolic derangement appeared to be influenced predominantly by uteroplacental blood flow or

intraplacental metabolism rather than by the availability of glycine in the maternal extra cellular compartment.

Qureshi *et al.* (1996) carried out a study to determine the prevalence and complications as well as to correlate maternal and foetal outcome with glycaemic control, in a community of Pakistani women. This was a retrospective study of 6830 deliveries over a 5 yrs period in a tertiary care hospital in Karachi. Either a 75 gm glucose tolerance test or a screening 50 gm glucose challenge was administered depending on risk factors for Gestational Diabetes Mellitus (GDM). Case records of deliveries during the period were analysed for presence of GDM or pre existing diabetes. Glycaemic control and complications were ascertained for these with diabetes. During this period 267 (3.9 %) of the 6380 deliveries were identified as diabetic pregnancies of these 223 (3.3 %) had GDM and 44 (0.6 %) women had pre-existing diabetes mellitus. Overall maternal complications found to be higher. They were pre-eclampsia (19 %). polyhydramnios (4.6 %) and threatened abortion (3.4 %). Foetal complications of mecrosomia (13.1 %), intrauterine growth retardation (7.1 %) and intrauterine deaths (5.3 %).

Iqbal *et al.* (1996) studied the foetal outcome of aspirin treated 90 patients in pregnancy induced hypertension at Aligarh university. 100 mg of aspirin was started from 14-16 weeks of gestation in patients who had history of pregnancy induced hypertension (PIH) in previous pregnancy and in patients who developed pregnancy induced hypertension in late second trimester, it was given when PIH was diagnosed. The results indicated that there was a higher caesarean rate in PIH group as compared to 3 (15.7 %) cases in low dose aspirin group. It is also concluded that aspirin improved birth weight in cases of uteroplacental insufficiency due to hypertension.

Aspirin given to patients of PIH group on anti hypertensive therapy decreased the caesarean section rate for impending eclampsia. The aspirin given in high risk patients significantly improved maternal and foetal outcome.

A prospective study was undertaken to evaluate the maternal zinc indices in those bearing small for gestational age babies and in those with appropriate-for-gestational age babies. Zinc levels in plasma, red blood cells and white blood cells in both groups were assayed in 65 patients with small for gestational age babies (regardless of cause) and 51 women with appropriate-for-gestational age babies. Results showed that there was no significant difference in the mean (SD) plasma [67.5 (9) / 70.67 > (13.9)], red blood cell [47.26 (5.8) / 45.69 (8.2)] and white blood cell [55.61 (10.5) / 54.77 (12.4)] in zinc levels of the mothers who gave birth to small-for-gestational age babies and those who delivered appropriate-for-gestational age babies. The presence of predisposing factors for intrauterine growth retardation also did not influence the maternal zinc levels. So it was concluded that maternal zinc levels were not associated with intrauterine growth retardation (George *et al.*, 1998).

A study on teenage pregnancy and risk related on late foetal death and infant mortality was carried out by Connolly and Byrne in 1999. The trend of preterm deliveries was found to be higher in the teenagers whose age was lesser than 17 yrs.

Sardesai (2000) carried out a study on beedi workers in Solapur city and concluded that in these women foetuses weight got decreased due to their habit of smoking while the weight of placenta got increased. Reverse thing was recorded in the cases of non smoking pregnant women. Foetus weight loss was proportional to the number of beedies or cigarettes pregnant

women smoked. It was also found that not only tobacco chewing habit but the daily beedi making using tobacco in it could also harm the foetus. The women who spent 9 to 10 hours in beedi making gave birth to babies weighing 1 to 1.4 kg only. Due to low birth weight babies growth got stunted and the babies became susceptible to many diseases. The pregnant women not having any bad habits also delivered abnormal babies for having continuous contact with harmful nicotine inhalation.

From the above research studies it could be concluded that intrauterine development of foetuses is influenced by maternal age, nutrition, physical and mental health, education and employment , as well as family financial condition.

MATERIALS AND METHODS

Chapter 3

MATERIALS AND METHODS

The details of the research tools and the methods used in the present study on **Intrauterine Growth Of Foetus And Factors Influencing It** are given below

3.1 Locale of the study

3.2 Selection of the sample

3.3 Research tools

3.4 Methods of data collection

3.5 Research design

3.6 Plan of analysis

3.1 Locale of the study

The study was carried out in the randomly selected seven out of fifteen radiology clinics of Parbhani town, Parbhani district of Marathwada region, Maharashtra state.

3.2 Selection of the sample

A sample of 170 pregnant women who have undergone ultrasonography during January to May were selected at random from Parbhani town. The sample was stratified on the basis of women's educational level, family monthly income and order of pregnancy. Out of 170 pregnant women 89 were high school educated and the remaining 81 pregnant women were college educated. Out of the high school educated pregnant women 48 pregnant women were in primigravida and 41 were in multigravida. On the other

hand out of the 81 college educated pregnant women 47 were in primigravida and 34 were in multigravida. Based on their family monthly income, 85 of the sample pregnant women belonged to the monthly income group of below Rs 10 000. Out of which 46 were in primigravida and 39 were in multigravida. The remaining 85 pregnant women belonged to the family monthly income group of above Rs 10 000. Among them 49 were in primigravida and 36 were in multigravida.

Distribution of Sample Pregnant Women

Total number of pregnant women	**High school educated (89)**		**College Educated (81)**		**Income below Rs 10 000 (85)**		**Income above Rs 10 000 (85)**	
	Primi gravida	Multi gravida	Primi gravida	Multi gravida	Primi gravida	Multi gravida	Primi gravida	Multi gravida
170	48	41	47	34	46	39	49	36

3.3 Research Tools

3.3.1 Interview schedule

Structured cum open ended interview schedule was formulated to elicit information about the background of the sample as well as the information pertaining to the objectives of the study from the sample pregnant women and from the respective gynaecologists and radiologists. The interview schedule mainly focussed on the various factors influencing intrauterine growth of foetus like maternal age, education, gravida, height, weight, diet, workload, mental health, haemoglobin level, family monthly income and size of the family etc.

3.3.2 Ultrasonography reports

Foetal growth in the selected pregnant women was assessed based on the foetal weight, femur length, biparietal diameter, head circumference and abdominal circumference indicated in the ultrasonography scanning reports of the respective pregnant women. Femur length of foetus was used for the detection of foetal skeletal displasias. Biparietal diameter of foetus was used to establish the estimated date of confinement and to detect abnormalities such as ancecephaly, hydrocephalus, encephalocele and cystic hygroma. Head circumference of foetus was used to establish growth of foetus. Abdominal circumference of foetus was used to know the foetal growth and to detect asymmetric growth retardation and abnormalities in morphology like gall bladder, spleen, oesophageal atresia absent stomach, small bowel atresias (dilated bowel) and gastrochis.

3.3.3 Standards for foetal growth

For comparing the mean weights of the sample foetuses the standards proposed by Secher, Hansen and Lenstrup (1986) were used. For comparing the mean femur lengths of the sample foetuses standards quoted by Jeanty, Rodesch, Delbeke, Durmont (1984) were used. For comparing the biparietal diameters of the sample foetuses, standards proposed by Kurtz, Wapner and Kurtz (1980) were used. For comparing the head circumferences of the sample foetuses, standards proposed by Hadlock, Deter, Harrist and Park (1982) were used and the standards proposed by Hadlock, Deter, Harrist and Park (1982) were used for comparing the abdominal circumferences of the sample foetuses.

3.4 Methods of data collection

The information pertaining to this study was elicited as per the survey schedule by personally interviewing the sample pregnant women (undergone ultrasonography scanning), their respective radiologists and gynaecologists as well as by personally perusing the reports of ultrasonography scanning and the records of maternity clinic. The anthropometric measurements of the sample pregnant women were taken by the investigator as per the standard procedures.

3.5 Research design

The variables tested in this investigation include independent variables such as

Family size

Family income

Family environment

Pregnant women's age

education

employment

order of gravida

gestational age

weight

height

spacing between past two pregnancies

health history (present and past)

haemoglobin level

mental health

work load

Attitudes towards pregnancy

Obstetric health history

Weight of foetuses

Dependent variables such as foetuses' weight

femur length

biparital diameter

head circumference and

abdominal circumference

3.6 Plan of Analysis

Coefficient of correlation was worked out between the selected background variables of the sample pregnant women and intrauterine anthropometric measurements of their foetuses. Cobb – Douglas correlation was computed between foetal weight and its other body measurements. The Cobb – Douglas relation was worked out as

$$\text{Log } Y = \text{Log } a + b_1 \text{ Log } x_1 + b_2 \log x_2 + b_3 \log x_3 + \log x_4 \ldots\ldots$$

Z test was applied to compare the percentages of the pregnant women for various items between the two groups of various kinds like Primigravida women of high school educated Vs Multigravida women of high school educated; Primigravida women of college educated Vs Multigravida women of college educated. Irrespective of order of pregnancies of high school educated women Vs college educated women; Primigravida women in income below Rs 10 000 Vs Primigravida women in income above Rs 10 000; Multigravida women in income below Rs 10 000 Vs Multigravida women in income above Rs 10 000 and irrespective of the

order of pregnancies of women having family income below Rs 10 000 and women having family income above Rs 10 000.

$$Z = \frac{P_1 - P_2}{\sqrt{\frac{P_1(1-P_1)}{n_1} + \frac{P_2(1-P_2)}{n_2}}}$$

't' test was used to compare the mean anthropometric measurements of foetuses of different age groups between the two groups of various kinds like Primigravida women of high school educated Vs Primigravida women of college educated; Multigravida women of high school educated Vs Multigravida women of college educated; Primigravida women in income below Rs 10 000 Vs Primigravida women in income above Rs 10 000; Multigravida women in income below Rs 10 000 Vs Multigravida women in income above Rs 10 000 by using the following formula

$$t = \frac{P_1 - P_2}{\sqrt{\frac{P_1(1-P_1)}{n_1} + \frac{P_2(1-P_2)}{n_2}}}$$

RESULTS AND DISCUSSION

Chapter 4

RESULTS AND DISCUSSION

The study entitled **Intrauterine Growth of Foetus And Factors Influencing It** was carried out in the randomly selected radiology clinics of Parbhani town, Parbhani district of Marathwada region, Maharashtra State. After the collection of data pertaining to the study, it were pooled, analysed, tabulated and discussed under the following heads

4.1 Family Background Information Of The Pregnant Women (Undergone Ultrasonography)

4.2 Intrauterine Foetal Anthropometric Measurements Of Sample Pregnant Women Based On Their Education And Income

4.3 Mean Gains In Intrauterine Foetal Weight And Head Circumference During Pregnancy Period Of 5-9 Months

4.4 Correlation Between Family & Maternal Background Variables And Intrauterine Foetal Anthropometric Measurements

4.5 Correlation Between Intrauterine Foetal Weight And Foetal Other Body Measurements

4.6 Antenatal Care Practices Adopted For Sample Women And Details Of Their Newborn

Table 1 Family background information of the pregnant women undergone ultrasonography

Background variables	Percentage of pregnant women				Z values				Percentage of pregnant women				Z values			
	High school educated (89)		College educated (81)		HPG Vs HMG	CPG Vs CMG	HPG Vs CPG	HMG Vs CMG	Income below Rs 10 000 (85)		Income above Rs 10 000 (85)		BPG Vs BMG	APG Vs BMG	BPG Vs APG	BMG Vs AMG
	PG (48)	MG (41)	PG (47)	MG (34)					PG (46)	MG (39)	PG (49)	MG (36)				
Area																
Urban	72.91 (35)	63.41 (26)	78.72 (37)	85.29 (29)	1.00^{NS}	0.87^{NS}	0.75^{NS}	2.75**	76.08 (35)	69.23 (27)	75.51 (37)	77.77 (28)	0.77^{NS}	0.25^{NS}	0.12^{NS}	0.88^{NS}
Rural	27.08 (13)	36.58 (15)	21.27 (10)	14.70 (5)	1.00^{NS}	0.87^{NS}	0.75^{NS}	2.75**	23.91 (11)	30.76 (12)	24.48 (12)	22.22 (8)	0.77^{NS}	0.25^{NS}	0.12^{NS}	0.88^{NS}
Types of family																
Joint	58.33 (28)	41.46 (17)	46.80 (22)	58.82 (20)	1.70^{NS}	1.20^{NS}	1.20^{NS}	1.70^{NS}	39.13 (18)	41.02 (16)	65.30 (32)	55.55 (20)	0.20^{NS}	1.00^{NS}	2.36*	1.27^{NS}
Nuclear	41.66 (20)	58.53 (24)	53.19 (25)	41.17 (14)	1.80^{NS}	1.09^{NS}	1.20^{NS}	1.70^{NS}	60.86 (28)	58.97 (23)	34.69 (17)	44.44 (16)	0.20^{NS}	1.00^{NS}	2.36*	1.27^{NS}
Sizes of family																
Small	41.66 (20)	31.70 (13)	61.70 (29)	41.17 (14)	1.00^{NS}	2.00^{NS}	2.00^{NS}	1.00^{NS}	65.21 (30)	43.58 (17)	38.77 (19)	25.00 (9)	2.20*	1.44^{NS}	3.00**	1.80^{NS}
Middle	35.41 (17)	53.65 (22)	25.53 (12)	41.17 (14)	1.80^{NS}	1.60^{NS}	1.25^{NS}	1.20^{NS}	23.91 (11)	43.58 (17)	36.73 (18)	52.77 (19)	2.22*	1.60^{NS}	1.62^{NS}	0.81^{NS}
Large	22.91 (11)	14.63 (6)	12.76 (6)	17.63 (6)	1.14^{NS}	0.71^{NS}	0.76^{NS}	0.42^{NS}	10.86 (5)	12.82 (5)	24.48 (12)	22.22 (8)	0.33^{NS}	0.25^{NS}	2.33*	1.42^{NS}

Continued on next page

Employment																
Employed	6.25 (3)	14.63 (6)	2.12 (1)	17.64 (6)	1.60 NS	---	0.57 NS	0.42 NS	6.52 (3)	12.82 (5)	---	22.22 (8)	---	---	---	1.42 NS
Non employed	93.75 (45)	85.36 (35)	97.87 (46)	82.35 (28)	1.33 NS	2.50*	1.00 NS	0.37 NS	93.47 (43)	87.17 (34)	100.0 (49)	77.77 (28)	1.00 NS	3.28**	2.33*	1.42 NS
Age (yrs)																
18-25	93.75 (45)	58.53 (24)	80.85 (38)	47.05 (16)	4.37**	3.30**	2.16*	1.10 NS	86.95 (40)	66.66 (26)	87.75 (43)	38.88 (14)	2.50*	5.44**	0.16 NS	2.80**
26-33	6.25 (3)	31.70 (13)	19.14 (9)	52.94 (18)	3.12**	---	---	2.10*	13.04 (6)	28.20 (11)	12.24 (6)	55.55 (20)	1.87 NS	4.77**	0.16 NS	2.70**
34-41	---	9.75 (4)	---	---	---	---	---	---	---	5.12 (2)	---	5.55 (2)	---	---	---	---

Figures in parentheses indicate frequencies

NS – Non significant * - $P < 0.05$ level ** - $P > 0.01$ level

PG – Primigravida MG – Multigravida

HPG – High school educated primigravida HMG – High school educated multigravida

CPG – College educated primigravida CMG – College educated multigravida

BPG – Income below Rs 10 000 primigravida BMG – Income below Rs 10 000 multigravida

APG – Income above Rs 10 000 primigravida AMG – Income above Rs 10 000 multigravida

4.1 Family Background Information Of The Pregnant Women (Undergone Ultrasonography)

4.1.1 Family Background Information Of The Pregnant Women Undergone Ultrasonography

Table 1 denotes that 63-73 percent primigravida and multigravida high school educated sample women belonged to urban area while the remaining of them belonged to rural area. With respect to college educated sample women, the corresponding percentages were 79-85 and 15-21. No significant differences were found in the areas of residence of high school educated primigravida and multigravida sample women; between college educated primigravida and multigravida sample women; and between high school educated primigravida and college educated primigravida. However significantly a higher percentage of college educated multigravida sample women belonged to urban area as compared to their counterparts in high school educated group and it was vice versa with regard to rural area.

Forty one to fifty eight percent each primigravida and multigravida high school educated sample women belonged to joint and nuclear families and the corresponding percentages of college educated women were 47-58 and 41-53. No significant differences were recorded in the types of families of sample women based on their educational levels and order of gravida.

Forty two percent primigravida high school educated sample women hailed from small size families followed by middle size (35.41 %) and large size (22.91 %) families. On the other hand 54 percent high school educated multigravida sample women hailed from middle size families followed by small size (31.70 %) and large size (14.63 %) families. The

corresponding percentages of primigravida college educated sample women were 61.70, 25.53, 12.76 and multigravida college educated sample women were 41.17, 41.17 and 17.63. No significant difference were noticed in the sizes of families of the sample women based on their educational levels and order of gravida.

A majority of the primigravida and multigravida sample women reported to be nonemployed irrespective of their educational level, while a lower percentage of them reported to be employed in various institutions. There were no significant differences in the employment status of the sample women based on their educational levels and order of gravida except significantly a higher percentage of college educated primigravida sample women were non employed as compared to their counterparts.

A majority of primigravida high school educated and college educated sample women were in age range of 18-25 yrs and the remaining of them (6-19 %) were in the age range of 26-33 yrs. Forty seven to fifty nine percent and 32-53 percent high school and college educated multigravida sample women were in the age ranges of 18-25 yrs and 26-33 yrs respectively. A meagre percentage of high school educated multigravida sample women were in the age range of 34-41 yrs. Few significant differences were noted in the sample women based on their age ranges.

Majority of the sample women in both the income groups belonged to urban area irrespective of their order of gravida and the remaining of them belonged to rural area. No significant differences were found in the area of residence of the sample women based on their family monthly income and order of gravida.

About 60 percent primigravida and multigravida sample women in the family monthly income level of below Rs 10 000 hailed from nuclear

type families and the remaining of them hailed from joint families while it was nearly viceversa with respect to the women in the family monthly income level of above Rs. 10 000. Significantly a higher percentage of primigravida sample women having monthly income above Rs. 10 000 belonged to joint families as compared to their counterparts in the monthly income below Rs. 10 000 and it was viceversa with respect to nuclear families. While such significant differences were not found within the family monthly income groups based on their order of gravida and also between the multigravida groups based on family monthly income.

Majority of the primigravida women in the family monthly income group of below Rs. 10 000 belonged to small size families followed by middle size (29.91 %) and large size (10.86 %) families. The corresponding percentages of multigravida sample women were 43.58, 43.58, 12.82. On the other hand 39 percent primigravida sample women in the family monthly income group of above Rs. 10,000 belonged to small size families followed by middle size (36.73 %) and large size (24.48 %) families. The corresponding percentages of multigravida sample women were 25.00, 52.77 and 22.22. A few significant differences were noted in the sample women's family sizes based on their order of gravida and family monthly income.

Ninety three to hundred percent primigravida sample women and 78-87 percent multigravida sample women in both the income groups recorded to be nonemployed and the remaining of them found to be employed in various institutions. Significantly more number of primigravida sample women having monthly income above Rs. 10 000 were non employed as compared to the multigravida sample women having same income level. While significantly more number of primigravida sample

women having monthly income below Rs. 10 000 were non-employed as compared their counterparts in the monthly income group of above Rs. 10 000.

About 87 percent each primigravida and 39-67 percent multigravida sample women in both the income groups found to be in the age group of 18-25 yrs followed by 26-33 yrs age group (13 % and 28-55 % respectively). A meagre percentage of the sample women in both the income groups found to be in the age group of 34-41 yrs. A few significant differences were noted in the sample women's age groups based on their family income levels.

4.1.2 Explanations Given By The Sample Pregnant Women For Having Undergone Ultrasonography

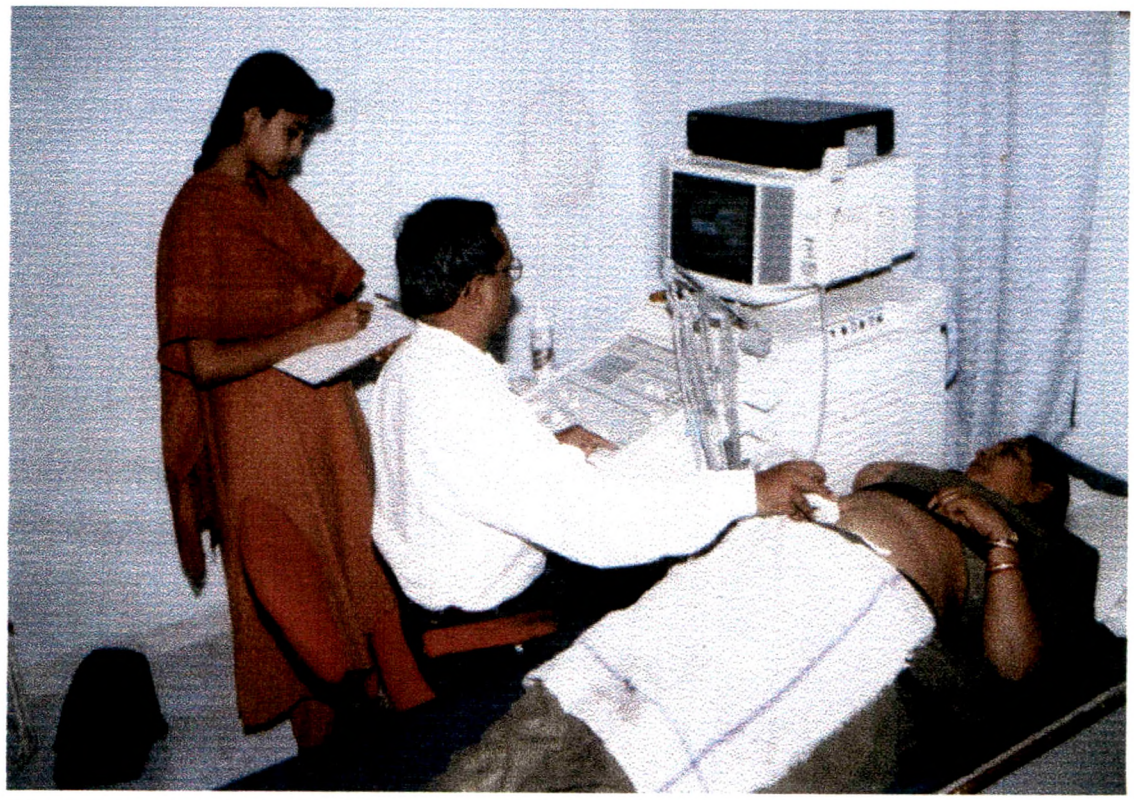
It is obvious from the table 2 results that all the sample pregnant women irrespective of their educational levels and family income levels found to have undergone ultrasonography atleast once during pregnancy period of 4-9 months because of the insistence of their respective gynaecologists. However, all the sample women irrespective of their educational levels and family income levels found to have given the explanation of knowing the normalcy of uterine contents for having undergone ultrasonography was followed by for the assessment of foetal growth (39-42 %); detection of foetal abnormalities (39-41 %); confirmation of pregnancy (17-22 %) and for the assessment of foetal position and forecasting types of delivery (15-19 %). No significant differences were found in the explanations given by the sample pregnant women for having undergone ultrasonography based on their educational levels and income levels. It is also heartening to note that none of the sample women have

Table 2 Explanations given by the sample pregnant women for having undergone ultrasonography

Explanations of Women	Percentage of women		Z Values	Percentage of women		Z Values
	High School educated (89)	College educated (81)		Income < Rs 10 000 (85)	Income > Rs 10 000 (85)	
Undergone ultrasonography on doctors' insistence For	100.00 (89)	100.00 (81)	---	100.00 (85)	100.00 (85)	---
Confirmation of pregnancy	22.47 (20)	17.28 (14)	1.25 NS	20.00 (17)	20.00 (17)	---
Assessment of foetal growth	39.32 (35)	41.97 (34)	0.33 NS	40.00 (34)	41.17 (35)	0.16 NS
Normalcy of uterine contents	100.00 (89)	100.00 (81)	---	100.00 (85)	100.00 (85)	---
Detection of foetal abnormalities	39.32 (35)	41.97 (34)	0.33 NS	40.00 (34)	41.17 (35)	0.16
Assessment of foetal position and forecasting type of delivery	15.73 (14)	18.51 (15)	0.75 NS	15.29 (13)	18.82 (16)	0.75 NS

NS – Non significant Figures in parenthesis indicate frequencies

given the explanation of knowing the sex of their foetuses or unborn babies for having undergone ultrasonography which inturn also indicates the respective (seven) sonologists morality not to disclose the sex of the foetuses to the concerned clients which can be considered as a very good social change for reducing the number of foeticide in Parbhani district.



Noting Down The Anthropometric Measurements Of
8 Months Old Foetus While Being Ultrasonography

Table 3 Intrauterine anthropometric measurements of foetuses of primigravida women based on their education

Foetal age (m)	Sample and mean age (W)		Mean anthropometric measurements of foetuses High school educated (Primigravida) (48)					College educated (Primigravida) (47)					Standards				
	HE	CE	Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)	Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)	Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)
4-5	11	9	190.00	2.76	3.63	18.69	15.16	186.77	2.28	3.90	14.22	11.56	---	2.30	3.80	13.60	11.60
(17.1)	(16.8)	(17.4)	±71.97	±1.42	±0.84	±14.84	±12.46	±63.20	±0.73	±0.48	±2.21	±1.57					
5-6	7	5	531.28	4.13	5.54	20.26	18.22	491.80	4.08	5.61	20.44	16.99	---	3.90	5.65	20.60	18.10
(22.7)	(23.1)	(22.4)	±126.58	±0.15	±0.43	±3.35	±0.87	±78.54	±0.37	±0.53	±1.17	±1.41					
6-7	5	5	736.60	4.72	6.51	24.21	19.18	832.00	4.67	6.62	23.86	20.12	---	4.60	6.40	23.50	21.00
(25.4)	(25.3)	(25.5)	±203.90	±0.64	±0.54	±2.09	±1.37	±225.54	±0.42	±0.87	±2.16	±1.67					
7-8	7	6	1466.28	5.54	7.68	28.70	25.75	1499.83	5.94	7.60	27.42	25.21	1541.92	5.80	7.70	28.00	26.30
(30.4)	(30.3)	(30.6)	±397.86	±0.35	±0.66	±1.85	±3.06	±286.27	±0.30	±0.53	±2.29	±1.19					
8-9	10	13	2509.50	6.42	8.43	31.20	29.47	2421.00	6.61	8.52	32.02	29.72	2293.85	6.70	8.60	31.00	30.20
(34.3)	(34.3)	(34.2)	±362.68	±0.32	±0.40	±1.33	±3.95	±354.34	±0.23	±0.34	±2.22	±2.37					
9	8	9	3097.66	7.29	9.02	33.07	31.98	3200.50	7.24	9.19	33.06	32.89	2990.00	7.56	8.40	33.00	33.90
(38.0)	(38.4)	(37.6)	±513.14	±0.36	±0.38	±1.53	±2.15	±290.69	±0.32	±0.32	±1.43	±1.77					

't' values

Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)
0.16 NS	0.21 NS	0.09 NS	0.77 NS	0.69 NS
1.23 NS	0.01 NS	0.02 NS	0.02 NS	0.19 NS
2.40*	0.01 NS	0.03 NS	0.05 NS	0.14 NS
0.61 NS	0.11 NS	0.02 NS	0.17 NS	0.07 NS
1.26 NS	0.05 NS	0.02 NS	0.10 NS	0.03 NS
1.28 NS	0.01 NS	0.03 NS	0.00 NS	0.11 NS

W – Weeks m – Months

NS – Non significant * - $P < 0.05$ level ** - $P > 0.01$ level

FL – Femur length BPD – Biparietal diameter HC – Head circumference AC – Abdominal circumference

HE – High school educated CE – College educated

The figures in the first column parenthesis indicate foetal age (in weeks) of the standards

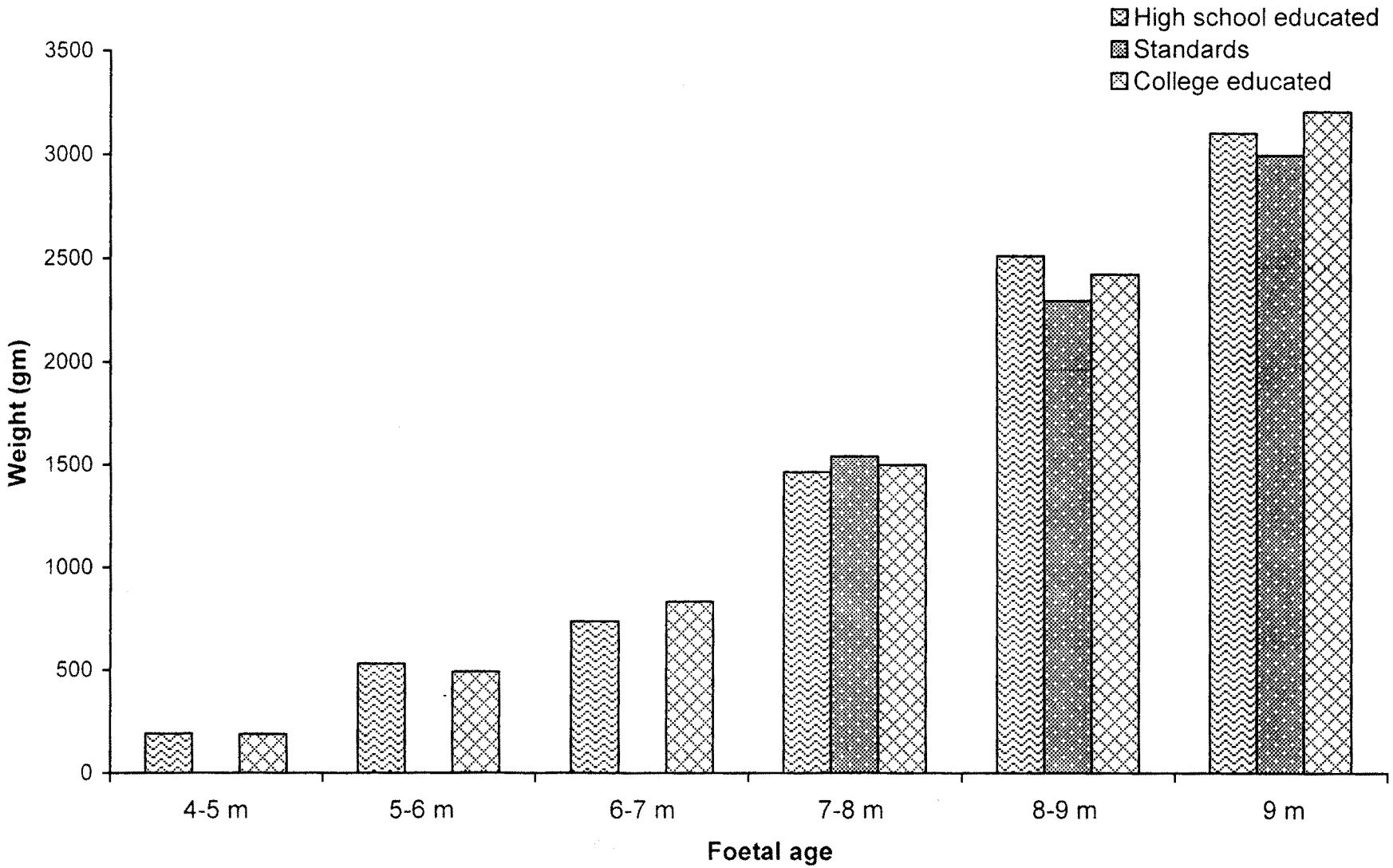


Fig 1 Comparision of mean weights of foetuses with standards and based on educational levels of primigravida women

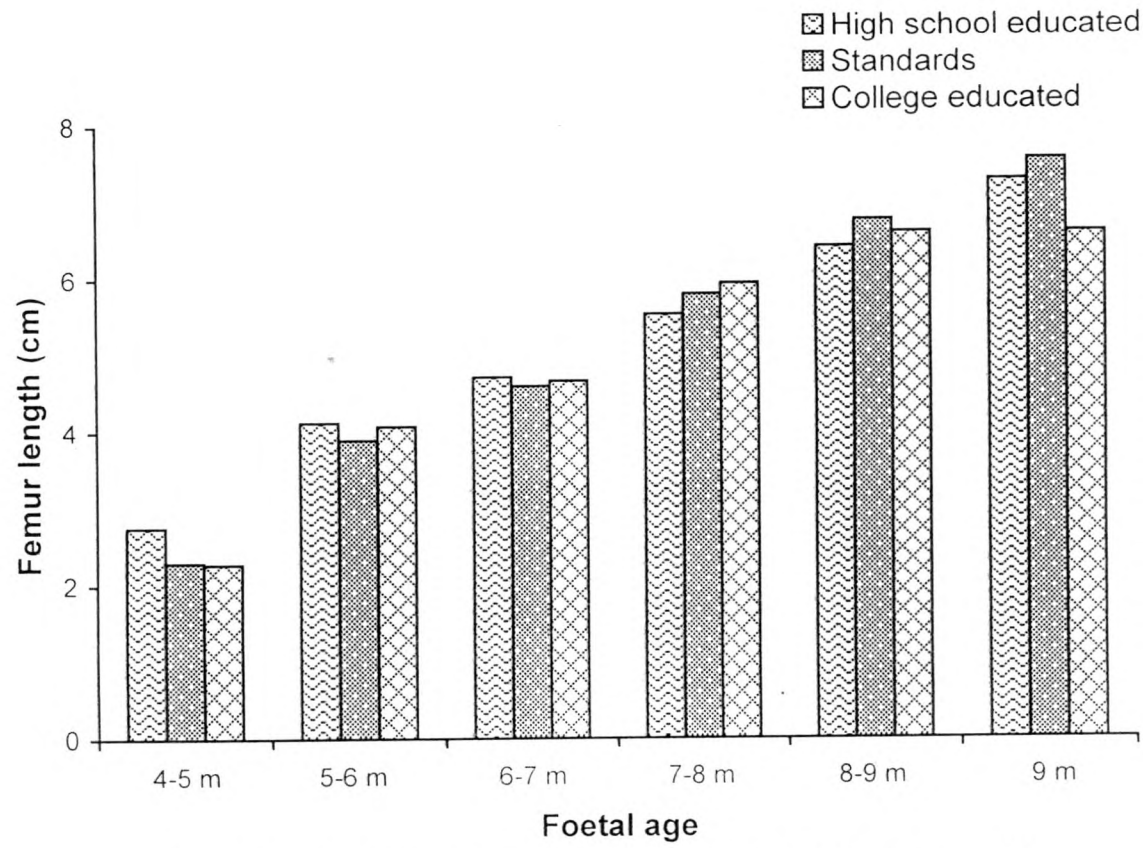


Fig 2 Comparision of mean femur lengths of foetuses with standards and based on educational levels of primigravida women

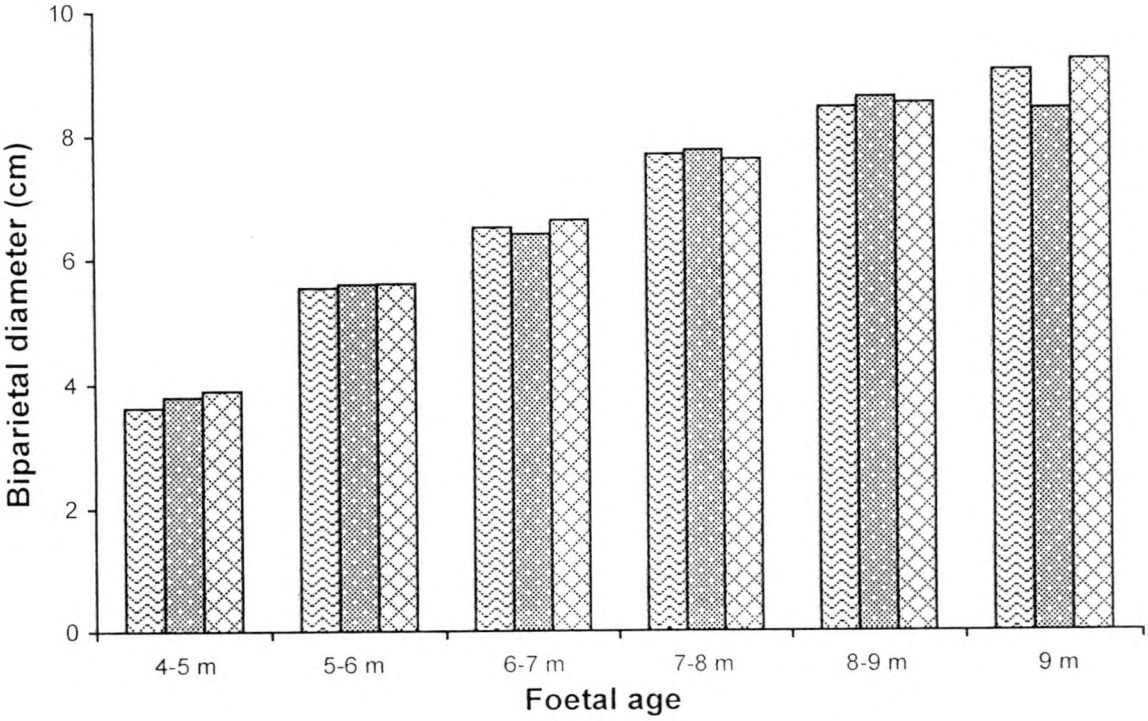


Fig 3 Comparis on of mean biparietal diameters of foetuses with standards and based on educational levels of primigrvida women

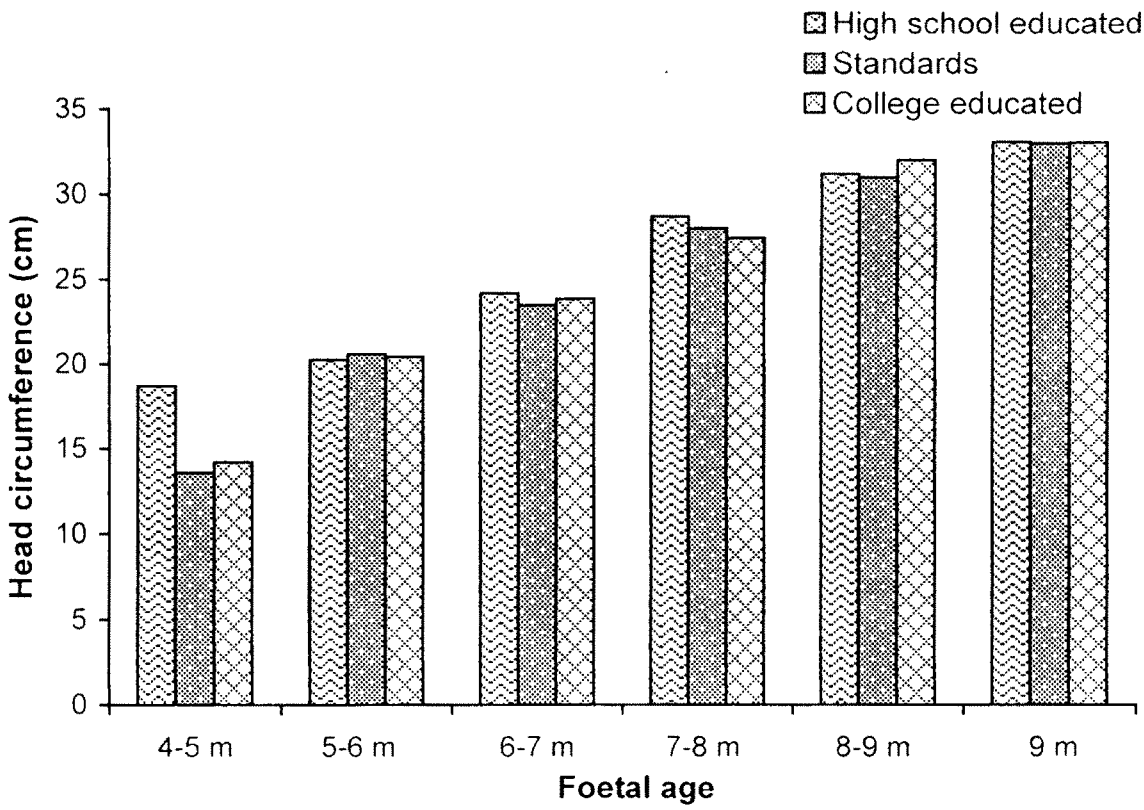


Fig 4 Comparision of mean head circumferences of foetuses with standards and based on educational levels of primigravida women

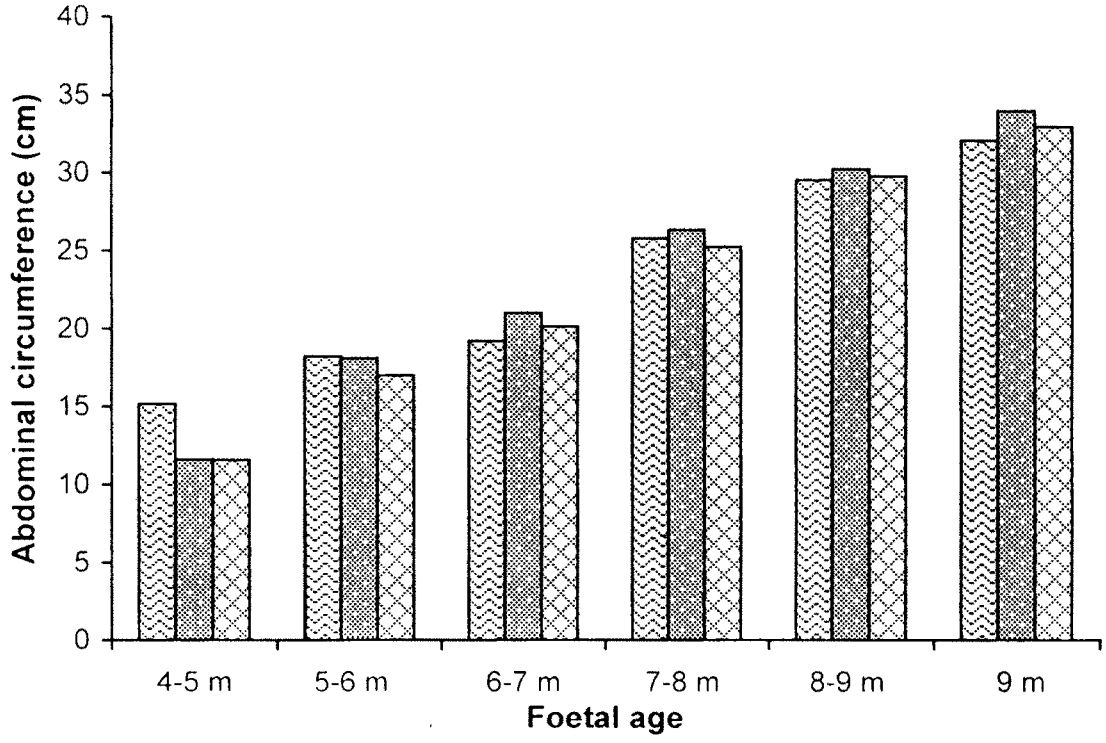


Fig 5 Comparision of mean abdominal circumferences of foetuses with standards and based on educational levels of primigravida women

4.2 Intrauterine Foetal Anthropometric Measurements Of Sample Pregnant Women Based On Their Education And Income

4.2.1 Intrauterine Foetal Anthropometric Measurements Of Primigravida Women Based On Their Education

Table 3 details about the intrauterine anthropometric measurements of foetuses of primigravida women based on their educational levels. It is clear from the results that none of the sample woman have undergone ultrasonography before 4 months of gestational age. All the anthropometric measurements of foetuses at different age groups were obtained from the ultrasonography scanning reports of the sample women. The 4-5 months old foetuses of high school educated primigravida women weighed 190.00 ± 71.97 gm while it was 186.77 ± 63.20 gm in college educated primigravida women. High school educated and college educated primigravida women's foetuses at the age of 5-6 months weighed respectively 531.28 ± 126.58 gm and 491.80 ± 78.54 gm. Their corresponding mean weights at the age of 6-7 months of both the groups were 736.60 ± 203.90 gm and 832.00 ± 225.54 gm; at 7-8 months were 1466.28 ± 397.86 gm and 1499.83 ± 286.27 gm, at 8-9 months were 2509.50 ± 362.68 gm and 2421.00 ± 354.34 gm and at 9 months age were 3097.66 ± 513.14 and 3200.50 ± 290.69 gm. (Fig 1). No significant differences were noticed in the high school educated and college educated primigravida women's foetal mean weights at different age levels except at the age of 6-7 months where college educated primigravida women's foetal weight was significantly more than their counterparts. The standards of intrauterine foetal weight were quoted only from 7 months by Sacher, Hansen and Lenstrup (1986). On comparison with the standards it was noted that the mean weights of the foetuses in primigravida women of both the educational

groups were slightly higher than the standards from 7 to 9 months which inturn clearly indicates the growing awareness of people about the significance of antenatal care and their concern about child development. These findings are in agreement with the findings reported by Bisssenden *et al.* in 1981, Devdas in 1976, Bhargava *et al.* in 1990, Naeye in 1990 and Sethi *et al.* in 1991.

The mean femur length of the foetuses of high school educated primigravida women was 2.76 $\pm$ 1.42 cm at 4-5 months and at 9 months it was 7.29 $\pm$ 0.36 cm. The corresponding values of the foetuses of the college educated primigravida women were 2.28 $\pm$ 0.73 cm and 7.24 $\pm$ 0.32 cm. (Fig 2). No significant differences were noted in the mean femur lengths of the foetuses of high school educated and college educated primigravida women. The sample foetuses' mean femur lengths were compared with the standards quoted by Jeanty, Rodesch, Delbeke, and Dumont (1984). On comparison with the standards it was noticed that the foetuses' mean femur lengths were slightly higher than the standards except at the age of 9 months. This denotes not only the good growth of foetuses but also no skeletal displasias in the foetuses of the high school educated and college educated primigravida women.

The mean biparietal diameter of the foetuses of high school educated primigravida women was 3.63 $\pm$ 0.84 cm at 4-5 months and at 9 months it was 9.02 $\pm$ 0.38 cm. The corresponding mean diameters of the foetuses of college educated primigravida women were 3.90 $\pm$ 0.48 cm and 9.19 $\pm$ 0.32 cm (Fig 3). No significant differences were noted in the mean biparietal diameters of the foetuses of high school and college educated primigravida women. The sample foetuses mean biparietal diameters were compared with the standards quoted by Kurtz, Wapner and Kurtz (1980). On

comparison with the standards it was found that the mean biparietal diameters were slightly lesser than the standards at the ages of 8-9 months and were higher than the standards at the ages of 4-5 months, 5-6 months and at 9 months. The mean biparietal diameter of the sample foetuses were slightly more than the standards which inturn indicates their good growth as well as no abnormalities in brain growth. From these results it could be concluded that maternal education has profound positive influence on the biparietal diameter of the foetuses of primigravida women.

The mean head circumference of the foetuses of high school educated primigravida women at 4-5 months was 18.69 $\pm$ 14.84 cm and it was 33.07 $\pm$ 1.53 cm at 9 months. The corresponding mean head circumferences of the foetuses of the college educated primigravida women were 14.22 $\pm$ 2.21 cm and 33.06 $\pm$ 1.43 cm. (Fig 4). No significant differences were found in the mean head circumferences of the foetuses of primigravida high school educated and college educated women. The sample foetuses' mean head circumferences were compared with the standards quoted by Hadlock, Deter, Harrist and Park (1982). On comparison with the standards it was noted that foetal mean head circumferences were slightly more than the standards at the ages of 4-5, 6-7, 7-8, 8-9 and at 9 months. At the age of 5-6 months it was nearly equal to the standards in both the groups which indicates that the sample pregnant women took proper antenatal care. The mean head circumference of the sample foetuses were higher than the standards which indicate that foetal brain growth was better in the sample pregnant women.

High school educated primigravida women's foetal mean abdominal circumference was 15.16 $\pm$ 12.46 cm at 4-5 months and at 9 months it was 31.98 $\pm$ 2.15 cm. The corresponding mean abdominal

circumferences of the foetuses of college educated primigravida women were 11.56 ± 1.57 cm and 32.89 ± 1.77 cm (Fig 5). No significant differences were noted in the mean abdominal circumferences of the foetuses of high school and college educated primigravida women. The sample foetuses mean abdominal circumferences were compared with the standards quoted by Hadlock, Deter, Harrrist and Park (1982). On comparison with the standards it was found that the mean abdominal circumferences were slightly lesser than the standards except at the age of 4-5 months.

The mean abdominal circumferences of foetuses of primigravida high school educated and college educated women were slightly lesser than the standard measurements, which inturn reflect good foetal growth and no abnormalities in foetal abdominal organs growth of the sample pregnant women.

Overall it could be concluded that there was good growth and no abnormalities in the foetuses of high school educated and college educated pregnant women as their mean weights, femur lengths, biparietal diameters, head circumferences and abdominal circumferences were almost in par with the standards. Maternal education did not make a significant difference in the mean anthropometric measurements of the foetuses of primigravida women. The reason for this could be the sample women's education minimum being high school level which might have been sufficient enough for taking proper antenatal care.

Table 4 Intrauterine anthropometric measurements of foetuses of multigravida women based on their education

Foetal age (m)	Sample and mean age (W)		Mean anthropometric measurements of foetuses High school educated (Multigravida) (41)					College educated (Multigravida) (34)					Standards				
	HE	CE	Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)	Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)	Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)
4-5	9	5	192.88	4.46	3.83	14.47	11.69	225.00	2.35	3.88	14.72	11.78	---	2.50	4.00	14.10	12.30
(17.6)	(17.5)	(17.7)	±55.76	±5.85	±0.83	±3.47	±2.73	±49.09	±0.35	±0.37	±2.04	±1.73					
5-6	5	5	538.00	4.05	5.57	21.00	17.68	550.40	3.92	5.71	20.45	17.62	---	3.90	5.70	20.80	18.20
(22.8)	(22.9)	(22.7)	±103.08	±0.38	±0.51	±1.52	±0.75	±106.59	±0.50	±0.71	±3.57	±1.31					
6-7	5	5	821.60	4.69	6.46	24.46	20.43	742.00	4.62	6.66	23.02	19.50	---	4.50	6.40	23.40	20.90
(25.3)	(25.6)	(25.0)	±169.74	±0.40	±0.42	±1.36	±1.09	±160.64	±0.41	±1.15	±0.84	±1.78					
7-8	6	8	1533.83	5.88	7.71	28.21	25.85	1629.50	6.05	7.73	29.40	26.62	1541.92	5.80	7.70	28.10	26.30
(30.4)	(30.4)	(30.4)	±289.9	±0.44	±0.27	±1.53	±2.02	±308.13	±0.56	±0.64	±1.66	±1.93					
8-9	10	5	2717.60	6.83	8.50	31.79	30.59	2697.20	7.00	8.63	31.63	31.35	2405.00	6.90	8.70	31.50	30.90
(35.0)	(34.8)	(35.2)	±284.63	±0.23	±0.35	±0.81	±1.79	±179.66	±0.18	±0.25	±0.95	±1.52					
9	6	6	3338.33	7.43	8.84	33.33	32.95	2896.00	7.27	9.05	32.95	32.13	2990.00	7.50	9.20	33.50	33.90
(38.0)	(37.9)	(38.2)	±361.85	±0.35	±0.31	±0.87	±2.11	±637.42	±0.34	±0.32	±0.93	±2.28					

't' values

Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)
1.57 NS	0.80 NS	0.01 NS	0.04 NS	0.01 NS
0.37 NS	0.04 NS	0.04 NS	0.08 NS	0.01 NS
2.01 NS	0.02 NS	0.05 NS	0.20 NS	0.14 NS
1.70 NS	0.04 NS	0.00 NS	0.15 NS	0.10 NS
0.27 NS	0.04 NS	0.03 NS	0.02 NS	0.12 NS
5.60**	0.04 NS	0.04 NS	0.04 NS	0.10 NS

W – Weeks m – Months

NS – Non significant * - $P < 0.05$ level ** - $P > 0.01$ level

FL – Femur length BPD – Biparietal diameter HC – Head circumference AC – Abdominal circumference

HE – High school educated CE – College educated

The figures in the first column parenthesis indicate foetal age (in weeks) of the standards

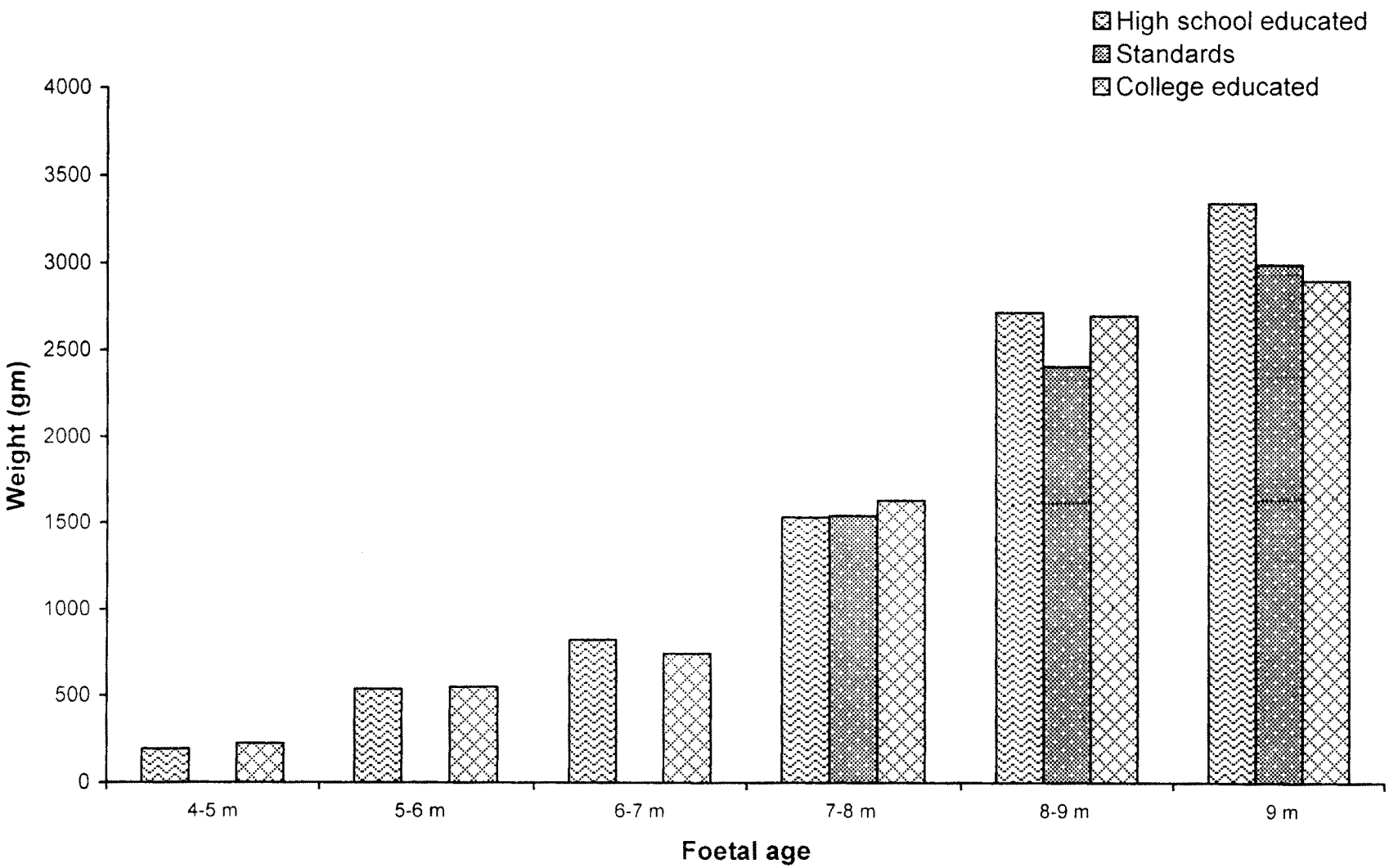


Fig 6 Comparis:on of mean weights of foetuses with standards and based on educational levels of multigravida women

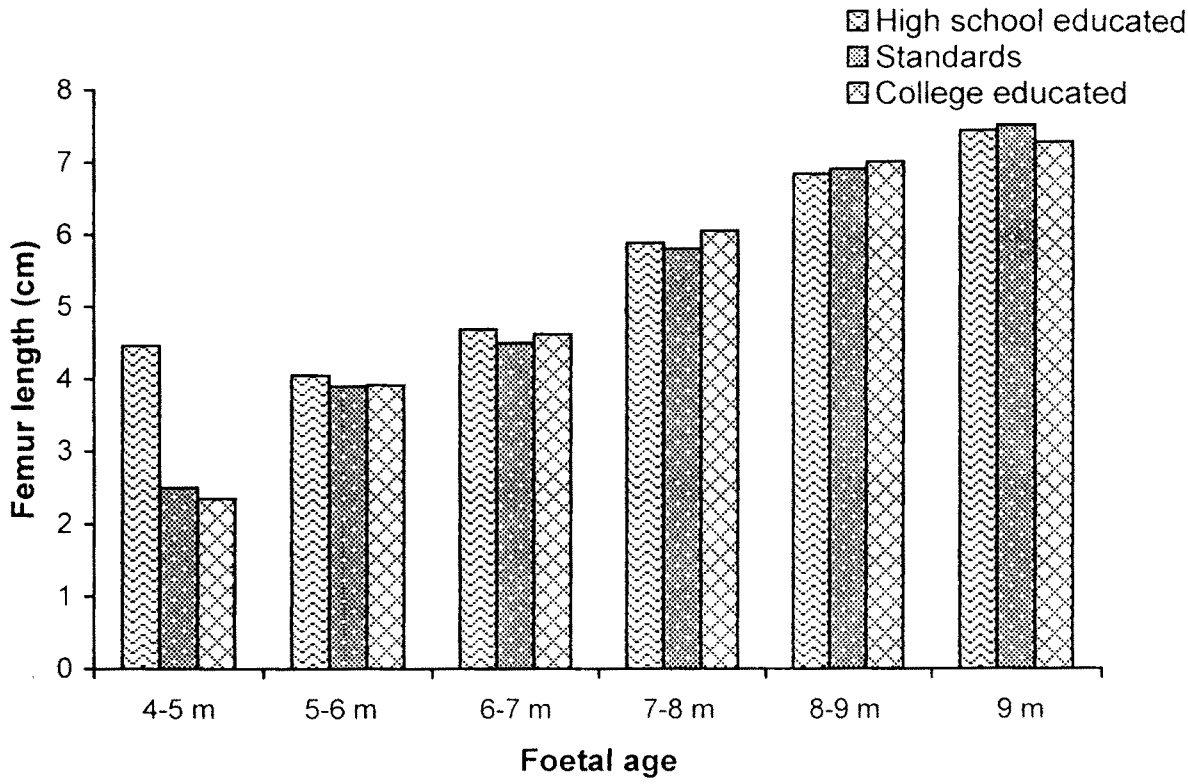


Fig 7 Comparis on of mean femur lengths of foetuses with standards and based on educational levels of multigravida women

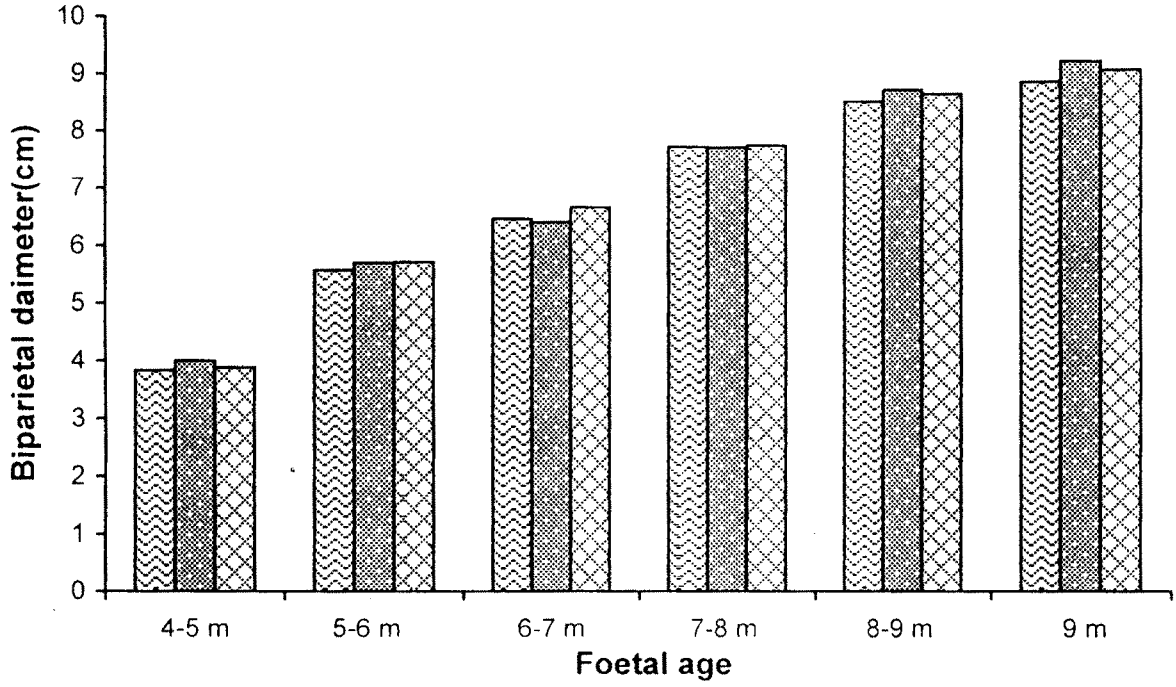


Fig 8 Comparis on of mean biparietal diameters of foetuses with standards and based on educational levels of multigravida women

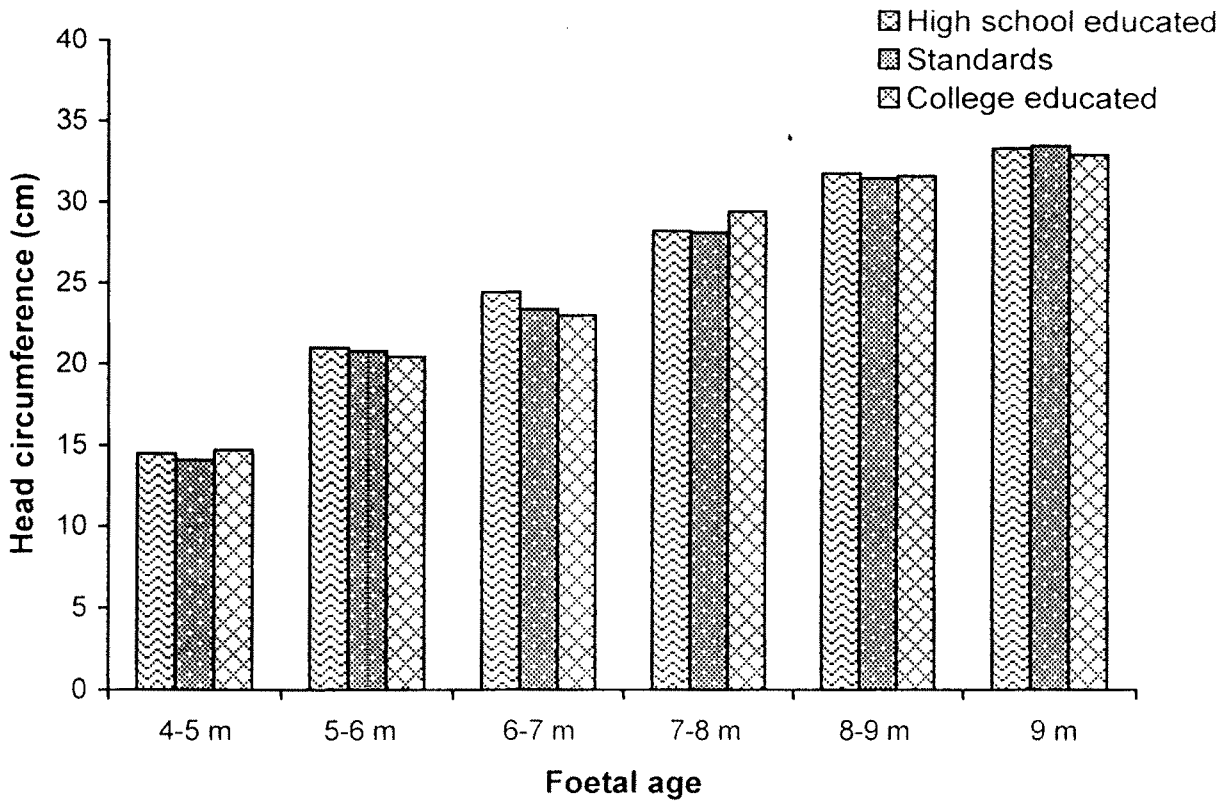


Fig 9 Comparision of mean head circumferences of foetuses with standards and based on educational levels of multigravida women

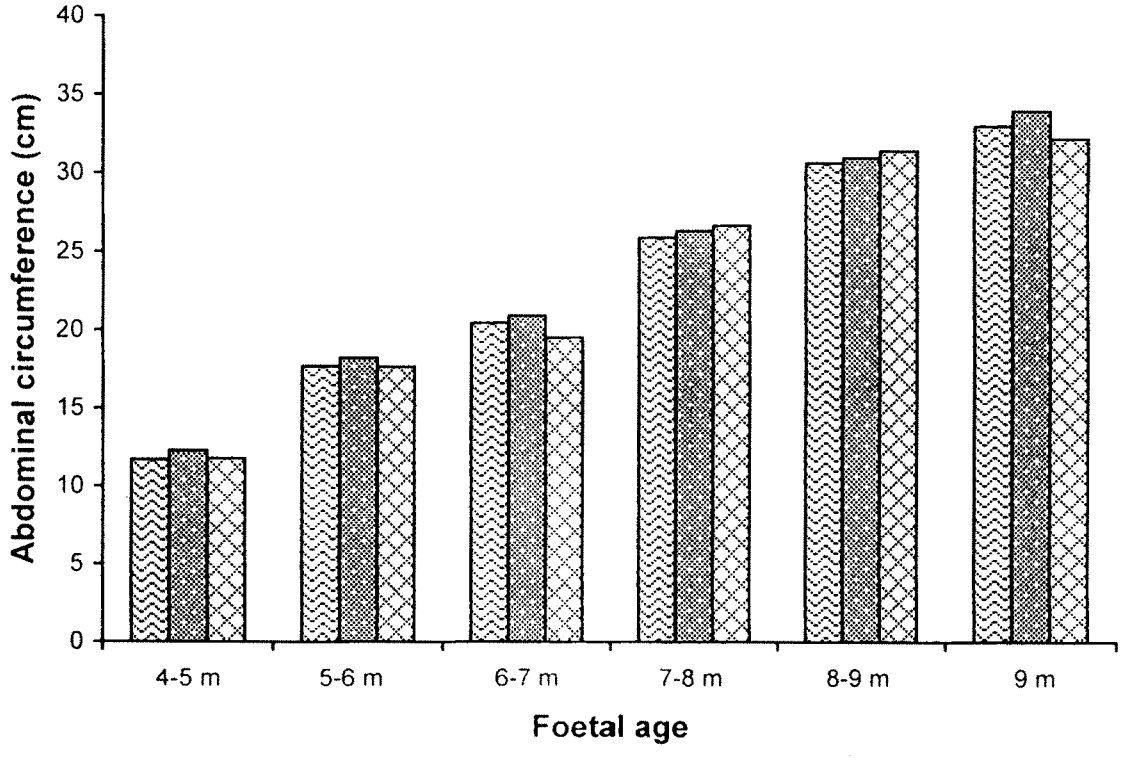


Fig 10 Comparision of mean abdominal circumferences of foetuses with standards and based on educational levels of multigravida women

4.2.2 Intrauterine Foetal Anthropometric Measurements Of Multigravida Women Based On Their Education

Table 4 indicates about the intrauterine foetal anthropometric measurements of multigravida women based on their educational levels. The results clearly indicate that 4-5 months old foetuses of high school educated multigravida women weighed 192.88 ± 55.76 gm while it was 225.00 ± 49.09 gm in college educated multigravida women. High school educated and college educated multigravida women's foetuses at the age of 5-6 months weighed respectively 538.00 ± 103.08 gm and 550.40 ± 106.59 gm. The corresponding mean weights at the age of 6-7 months were 821.60 ± 169.74 gm and 742.00 ± 160.64 gm; at 7-8 months were 1533.83 ± 289.91 gm and 1629.50 ± 308.13 gm; at 8-9 months were 2717.60 ± 284.63 gm and 2697.20 ± 179.66 gm and at 9 months age were 3338.33 ± 361.85 gm and 2896.00 ± 637.42 gm. (Fig 6). No significant differences were observed in the high school educated and college educated multigravida women's foetal mean weight at different age levels except at the age of 9 months where the foetal mean weight of high school educated multigravida women was significantly more than their counterparts of the college educated multigravida women. On comparison with the standards it was noted that foetal mean weights in both the groups were slightly more than the standards at the ages of 7-8 months and at 9 months and was lesser than the standards at the age of 8-9 months which inturn indicates awareness of people about the significance of antenatal care and their concern about child development.

The mean femur length of the foetuses of high school educated multigravida women was 4.46 ± 5.85 cm at 4-5 months and at 9 months it was 7.43 ± 0.35 cm. The corresponding values of the college educated

multigravida women were 2.35 ± 0.35 cm and 7.27 ± 0.34 cm (Fig 7). No significant differences were noted in the foetal mean femur lengths of the high school educated and the college educated multigravida women. On comparison with the standards it was found that the foetuses' mean femur lengths were slightly more than the standards at the ages of 5-6 months, 6-7 months and at 7-8 months and were nearly equal to the standards at the ages of 4-5 months, 8-9 months and at 9 months. This denotes not only the good growth of the foetuses but also no skeletal displasices in the foetuses of the high school educated multigravida women.

The mean biparietal diameter of the foetuses of high school educated multigravida women at 4-5 months was 3.83 ± 0.83 cm and at 9 months it was 8.84 ± 0.31 cm. The corresponding mean biparietal diameters of the foetuses of the college educated multigravida women were 3.88 ± 0.37 cm and 9.05 ± 0.32 cm. (Fig 8). No significant differences were noted in the mean biparietal diameters of the foetuses of high school educated and college educated multigravida women. On comparison with the standards it was found that mean biparietal diameters were nearly equal to the standards at the ages of 4-5 months, 5-6 months, 8-9 months and at 9 months and were more than the standards at the ages of 6-7 months and 7-8 months. The mean biparietal diameter of the sample foetuses were nearly equal to the standards which inturn indicates their good growth as well as no abnormalities in their brain. From these results it could be concluded that maternal education has profound positive influence on the foetal growth of the multigravida women.

The mean head circumference of the foetuses of high school educated multigravida women at 4-5 months was 14.47 ± 3.47 cm and it was 33.33 ± 0.87 cm at 9 months. The corresponding mean head circumferences

of the foetuses of the college educated multigravida women were 14.72 ± 2.04 cm and 32.95 ± 0.93 cm. (Fig 9). No significant differences were noted in the mean head circumferences of the foetuses of the high school educated and the college educated multigravida women. On comparison of the sample foetuses' mean head circumferences it was found that the foetal mean head circumferences of multigravida in both the groups were significantly more than the standards while they were equal to the standards at 5-6 months, 6-7 months, and at 9 months. The findings clearly denote that the sample women have adopted proper prenatal care practices. The mean head circumferences of the foetuses of multigravida women were slightly higher than the standards which inturn indicate that foetal brain growth was better in the multigravida women. When brain grows well children can become intellectual individuals.

The high school educated multigravida women's foetal mean abdominal circumference at 4-5 months age was 11.69 ± 2.73 cm and it was 32.95 ± 2.11 cm at 9 months. The corresponding mean abdominal circumference of their counterparts were 11.78 ± 1.73 cm and 32.13 ± 2.28 cm (Fig 10). No significant differences were noted in the mean abdominal circumferences of the foetuses of high school educated and college educated multigravida women. Foetal mean abdominal circumferences were compared with the standards and it was found that the mean abdominal circumferences of the sample foetuses were slightly lesser than the standards at the ages of 4-5 months, 5-6 months, 6-7 months, 8-9 months and at 9 months except at the age of 7-8 months, which inturn focuses on the need of mass education on sound prenatal care practices. The mean abdominal circumferences of the foetuses of multigravida high school educated and college educated women were slightly lesser than the standard

measurements, which inturn reflect average foetal growth and no abnormalities in the foetal abdominal organs of the sample pregnant women. Overall it could be inferred that no significant differences were observed between the intrauterine anthropometric measurements of the foetuses of high school educated and college educated multigravida women. The possible reason for this could be the sample women might have had the required level of education i.e. high school education for taking proper antenatal care. Most of the intrauterine anthropometeric measurements of foetuses were almost equal to the standards and a few measurements at different age ranges were even slightly more than the standards besides having no abnormalities in them which is very heartening finding in the foetuses of high school educated and college educated pregnant women. Family monthly income found to have no influence on the intrauterine foetal anthropometric measurements of the multigravida women having family monthly income below Rs 10 000 and above Rs 10 000. The reason for this could be the sample families having Rs 5000 as the minimum level of monthly income, which might have been enough for giving proper antenatal care to the sample women. The results also infer that majority of the intrauterine foetal anthropometric measurements were almost in par with the standards which inturn indicate good growth and no abnormalities in foetuses of the sample women. This might be due to the growing awareness of people about the antenatal care for wellbeing of children.

4.2.3 Intrauterine Foetal Anthropometric Measurements Of The Primigravida Women Based On Their Family Monthly Income

Table 5 details about the intrauterine foetal anthropmentic measurements of the primigravida women based on their family income

Table 5 Intrauterine anthropometric measurements of foetuses of primigravida women based on their income

Foetal age (m)	Sample and mean age (W)		Mean anthropometric measurements of foetuses Income below Rs 10 000 (Primigravida) (46)					Income above Rs 10 000 (Primigravida) (49)					Standards				
	IB	IA	Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)	Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)	Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)
4-5	8	12	166.37	2.70	3.42	19.57	15.78	203.33	2.44	3.97	14.74	12.05	---	2.30	3.70	13.30	11.50
(16.9)	(16.1)	(17.7)	±70.43	±1.75	±0.92	±17.74	±14.84	±62.17	±0.58	±0.43	±1.57	±1.62					
5-6	7	5	487.57	4.02	5.40	19.69	17.57	553.00	4.23	5.81	21.24	17.90	---	3.90	5.70	20.80	18.20
(22.8)	(22.6)	(23.1)	±105.92	±0.14	±0.29	±3.03	±1.17	±106.72	±0.34	±0.56	±1.63	±1.45					
6-7	5	5	733.60	4.58	6.34	23.55	19.36	835.00	4.81	6.82	24.52	19.94	---	4.60	6.40	23.50	21.00
(25.4)	(24.9)	(25.9)	±205.51	±0.66	±0.37	±1.81	±1.26	±222.42	±0.33	±0.86	±2.29	±1.85					
7-8	7	6	1488.71	5.76	7.58	27.22	25.03	1473.66	5.68	7.72	29.15	26.06	1541.92	5.80	7.70	28.00	26.30
(30.4)	(30.3)	(30.6)	±267.97	±0.37	±0.53	±2.18	±1.26	±431.63	±0.41	±0.68	±1.52	±3.20					
8-9	13	10	2402.15	6.46	8.37	31.80	29.18	2534.00	6.62	8.63	31.49	30.16	2293.85	6.70	8.60	31.00	30.20
(34.3)	(34.1)	(34.5)	±381.06	±0.28	±0.35	±2.35	±3.60	±315.19	±0.28	±0.34	±1.16	±2.30					
9	6	11	3159.33	7.28	9.02	33.03	32.00	3138.81	7.26	9.14	33.08	32.63	2990.00	7.60	9.20	33.50	33.90
(38.0)	(38.0)	(38.0)	±306.31	±0.23	±0.13	±0.98	±1.50	±476.65	±0.39	±0.43	±1.67	±2.23					

't' values

Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)
1.92 NS	0.11 NS	0.20 NS	0.82 NS	0.70 NS
2.02 NS	0.07 NS	0.12 NS	0.24 NS	0.05 NS
2.56*	0.07 NS	0.13 NS	0.13 NS	0.09 NS
0.27 NS	0.02 NS	0.03 NS	0.25 NS	0.14 NS
1.87 NS	0.04 NS	0.06 NS	0.03 NS	0.12 NS
0.25 NS	0.00 NS	0.02 NS	0.00 NS	0.07 NS

W – Weeks m – Months

NS – Non significant * - P < 0.05 level ** - P > 0.01 level

FL – Femur length BPD – Biparietal diameter HC – Head circumference AC – Abdominal circumference

IB – Income below Rs 10 000 IA – Income above Rs 10 000

The figures in the first column parenthesis indicate foetal age (in weeks) of the standards

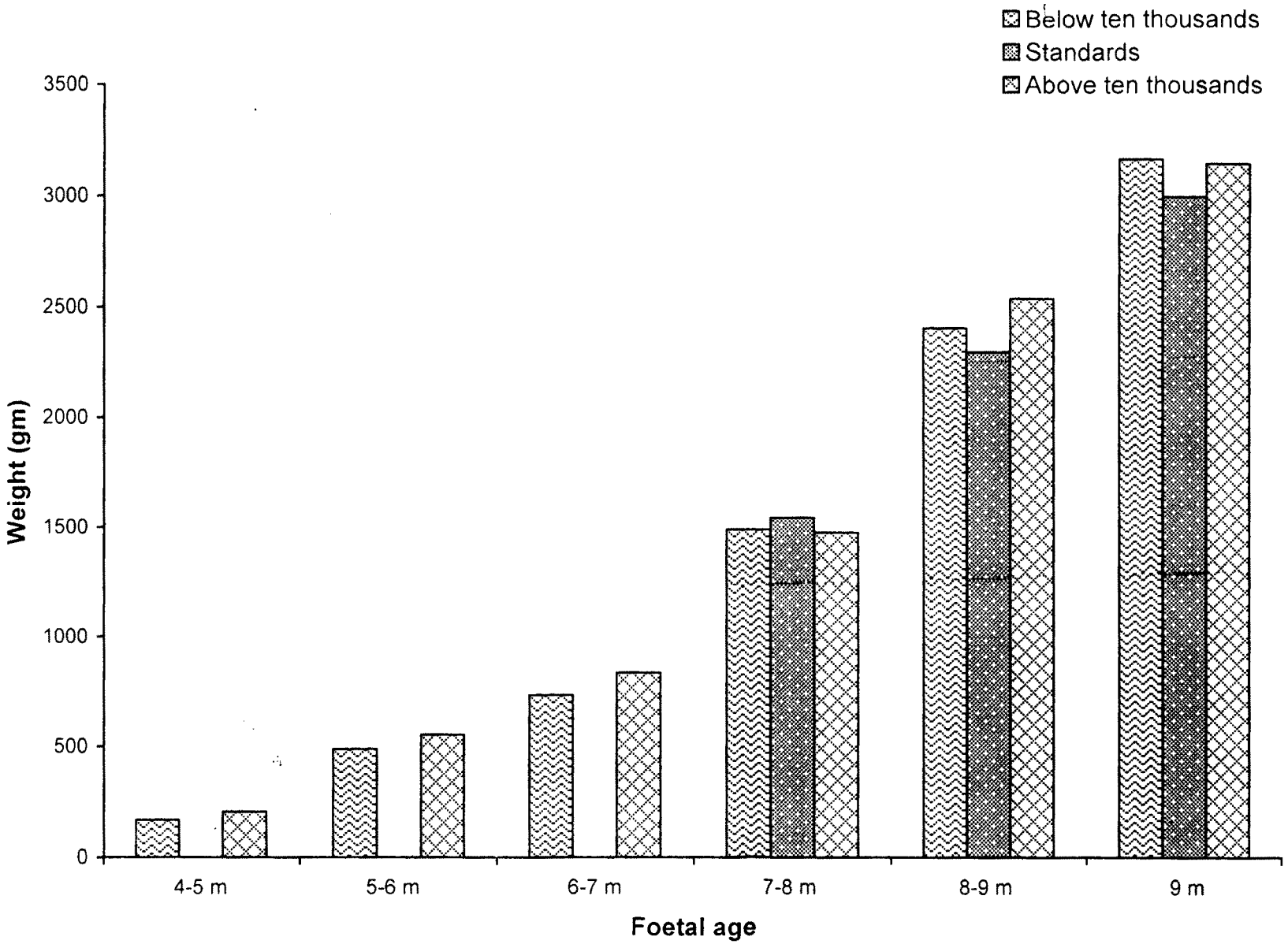


Fig 11 Comparis on of mean weights of foetuses with standards and based on family income levels of primigravida women

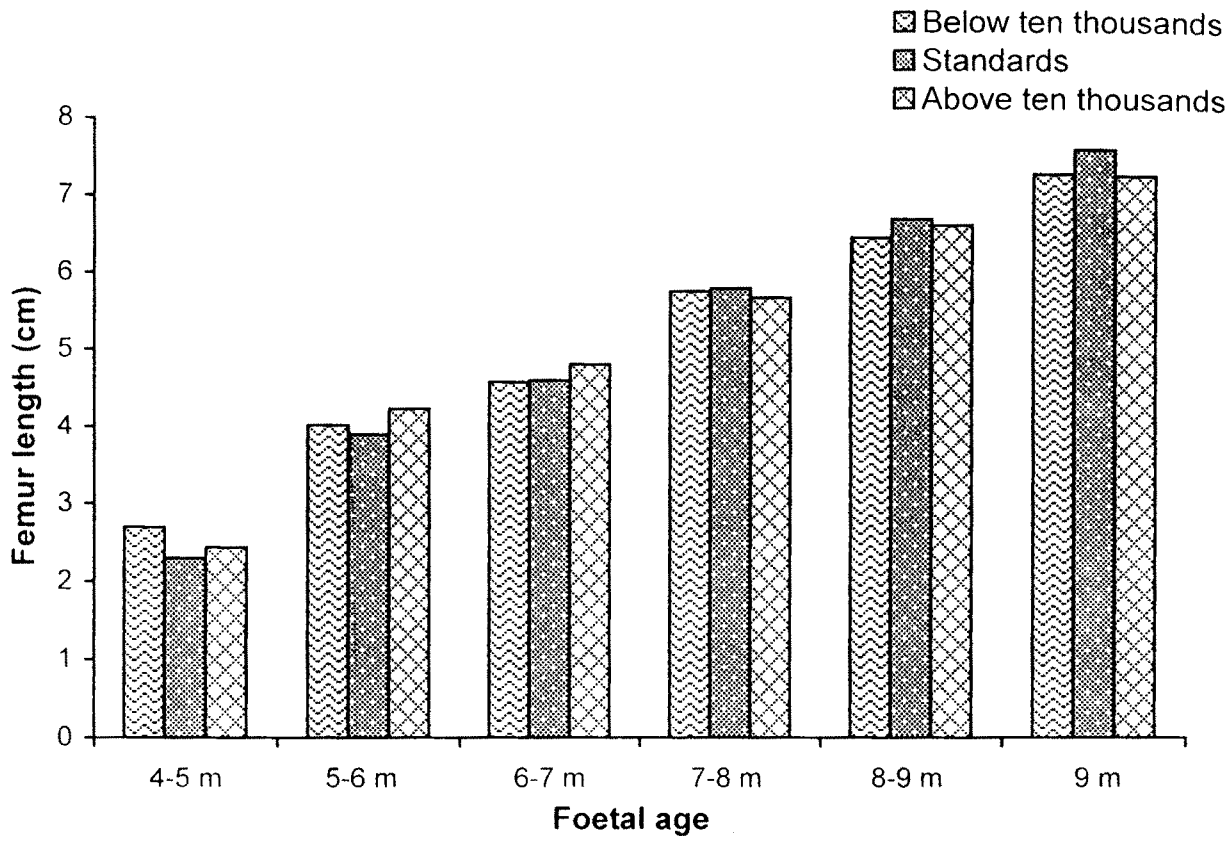


Fig 12 Comparis:on of mean femur lengths of foetuses with standards and based on family income levels of primigravida women

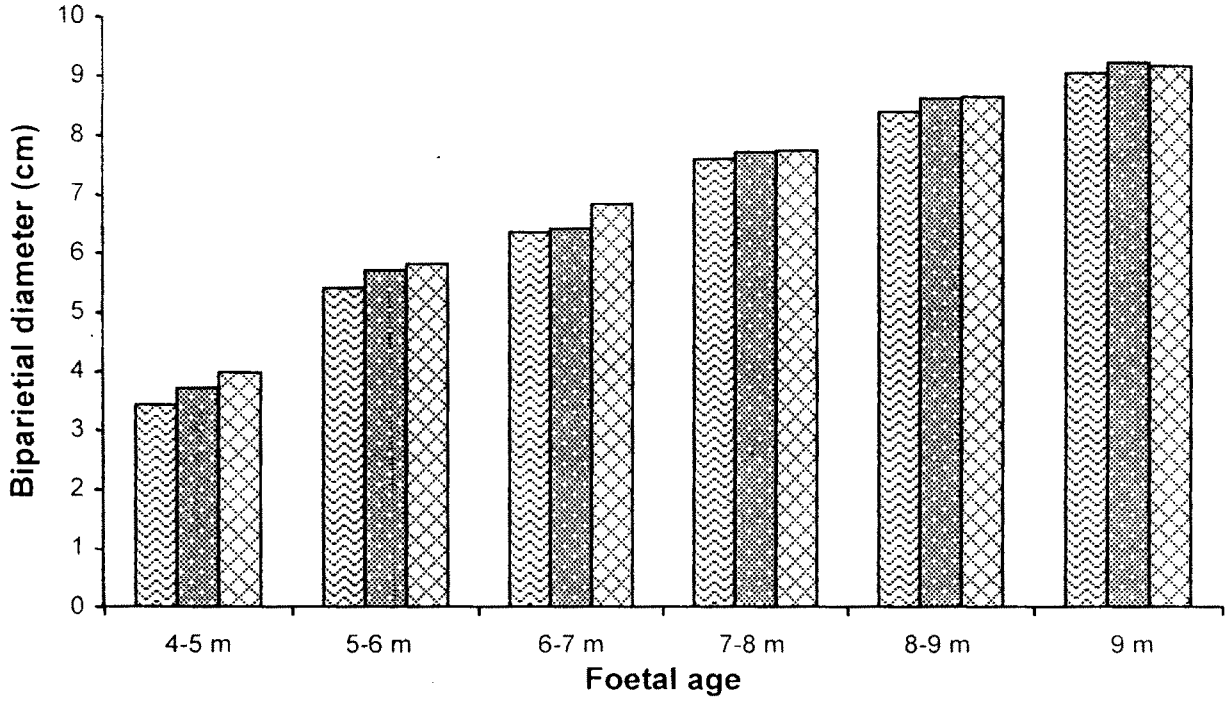


Fig 13 Comparis:on of mean biparietal diameters of foetuses with standards and based on family income levels of primigravida women

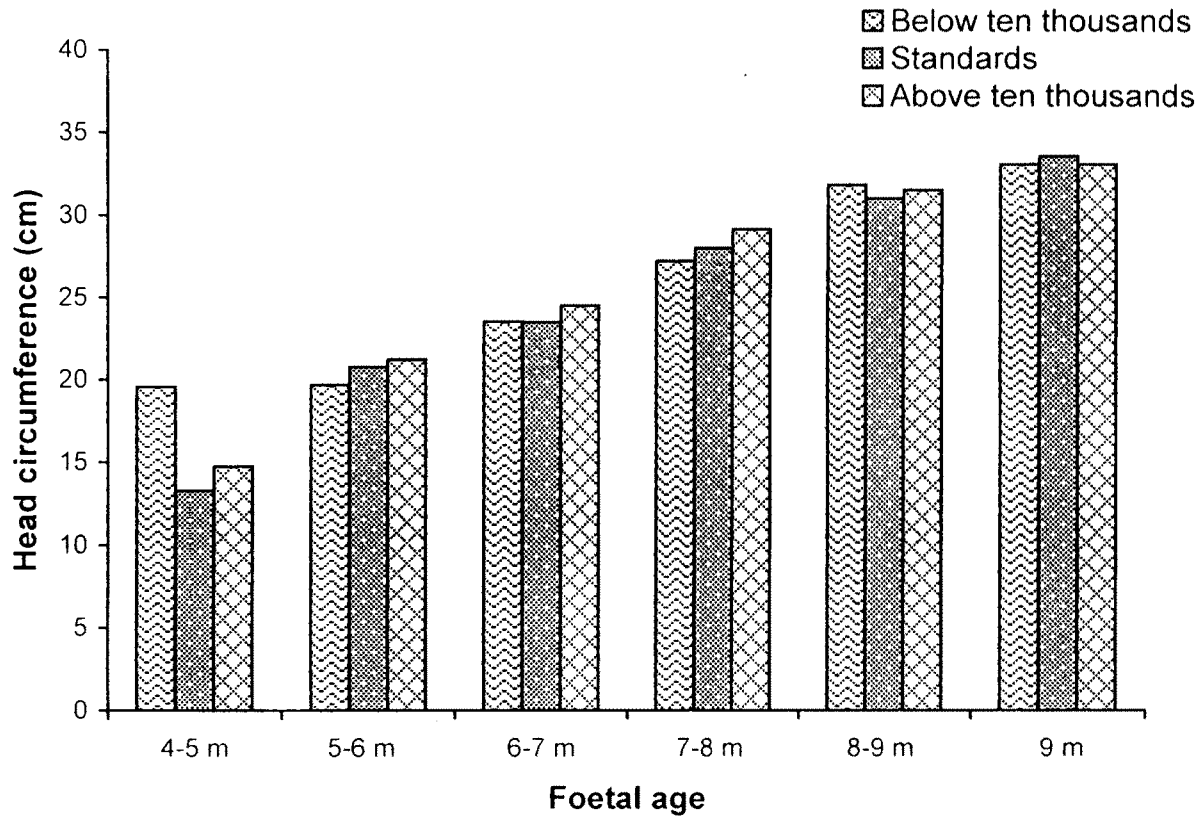


Fig 14 Comparision of mean head circumferences of foetuses with standards and based on family income levels of primigravida women

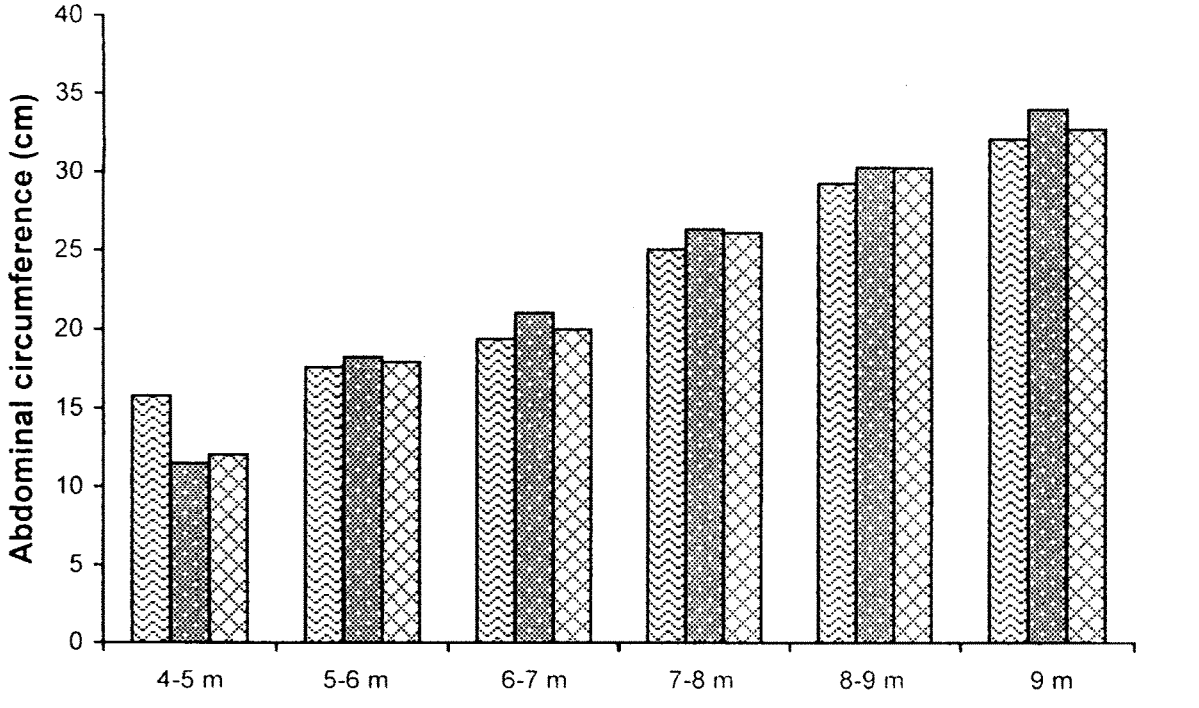


Fig 15 Comparision of mean abdominal circumferences of foetuses with standards and based on family income levels of primigravida women

levels. The 4-5 months old foetuses of primigravida women having income below Rs 10 000 weighed 166.37 ± 70.43 gm while it was 203.33 ± 62.17 gm in primigravida women having monthly income above Rs 10 000. The foetuses of primigravida women having family monthly income below Rs 10 000 and above Rs 10 000 weighed respectively 487.57 ± 105.92 gm and 553.00 ± 106.72 gm at the age of 5-6 months. The corresponding mean weights of the foetuses at the age of 6-7 months of both the groups were 733.60 ± 205.51 gm and 835.00 ± 222.42 gm; at 7-8 months were 1488.71 ± 267.97 gm and 1473.66 ± 431.63 gm; at 8-9 months were 2402.15 ± 381.06 gm and at 9 months it were 3159.33 ± 306.31 gm and 3138.81 ± 476.65 gm. (Fig 11). No significant differences were noticed in the mean weights of foetuses of primigravida women having monthly income below Rs 10 000 and income above Rs 10 000 at different age levels except at the age of 6-7 months, while the foetuses of primigravida women having income above Rs 10 000 weighed significantly more than their counterparts. On comparison with standards it was found that foetal mean weights in both the groups were significantly more than the standards at the ages of 8-9 months and at 9 months and at the age of 7-8 months they were lesser than the standards, which inturn clearly indicates the good foetal growth and growing awareness of people about the significance of antenatal care and concern about child development.

The mean femur length of the foetuses of primigravida women having family monthly income below Rs 10 000 was 2.70 ± 175 cm at 4-5 months and at 9 months it was 7.28 ± 0.23 cm. The corresponding values of the foetuses in the family monthly income group above Rs 10 000 were 2.44 ± 0.58 cm. (Fig 12). No significant differences were recorded in the mean femur lengths of the foetuses of primigravida women having income below

Rs 10 000 and income above Rs 10 000. The mean femur lengths of the sample foetuses were compared with the standards and it was found that in both the income groups mean femur lengths of foetuses were slightly more at the ages of 4-5 months, 5-6 months, 6-7 months and nearly equal to the standards at the ages of 7-8 months, 8-9 months and at 9 months. This denotes not only the good growth of foetuses but also no skeletal displasis in the foetuses of primigravida women having family monthly income below Rs 10 000 and above Rs 10 000.

The mean biparietal diameter of the foetuses of primigravida women having family monthly income below Rs 10 000 was 3.42 $\pm$ 0.92 cm at 4-5 months and at 9 months it was 9.02 $\pm$ 0.13 cm. The corresponding mean diameters of the foetuses of primigravida women having monthly income above Rs 10 000 were 3.97 $\pm$ 0.43 cm and 9.14 $\pm$ 0.43 cm. (Fig 13). No significant differences were noted in the mean biparietal diameters of the foetuses of primigravida women having income below Rs 10 000 and income above Rs 10 000. On comparison with the standards it was found that mean biparietal diameters were slightly lesser in the majority of the foetuses of primigravida women having family monthly income below Rs 10 000. On the contrary to it, they were slightly more than the standards at all the enlisted age groups except at 9 months in the primigravida women having income above Rs 10 000. Overall the mean biparietal diameter of the sample foetuses were nearly equal to the standards which inturn indicates good foetal growth as well as no abnormalities in foetal brain. From these results it could be concluded that family monthly income has profound positive influence on the biparietal diameter of the foetuses of primigravida women.

Mean head circumference of the foetuses of primigravida women having monthly income below Rs 10 000 was 19.57 ± 17.74 cm at 4-5 month age and it was 33.03 ± 0.98 cm at 9 months. The corresponding head circumferences of the foetuses of primigravida women having income above Rs 10 000 were 14.74 ± 1.57 cm and 33.08 ± 1.67 cm. (Fig 14). No significant differences were noted in the mean head circumferences of the foetues of primigravida women belonging to the monthly income groups of below Rs 10 000 and above Rs 10 000. On comparison with the standards it was noted that mean head circumferences of the foetuses of primigravida women of both the groups were slightly more than the standards at all the age ranges except at the age of 9 months. The mean head circumferences of the foetuses of primigravida women in both the income groups were slightly higher than the standards which inturn indicates the good foetal brain growth in the sample women.

The mean abdominal circumference of the foetuses of primigravida women having income below Rs 10 000 was 15.78 ± 14.84 cm and at 9 months it was 32.00 ± 1.50. The corresponding mean abdominal circumferences of the foetuses of primigravida women having income above Rs 10 000 were 12.05 ± 1.62 cm and 32.63 ± 2.23 cm. (Fig 15). No significant differences were noted in the mean abdominal circumferences of the foetuses of primigravida women having income below Rs 10 000 and above Rs 10 000. On comparison with the standards it was noted that the mean abdominal circumferences of the foetuses in both the groups were slightly lesser than the standards except at 4-5 months. The mean abdominal circumference of the foetuses of primigravida women having family monthly income below Rs 10 000 and above Rs 10 000 were slightly lesser than the standard measurements which in turn reflect average foetal growth

and no abnormalities in foetal abdominal organs of the sample pregnant women. Overall it could be concluded that family monthly income found to have no influence on the intrauterine foetal anthropomtric measurements of the primigravida women. The reason could be the sample families having Rs 5000 as the minimum level of monthly income, which might have been enough for giving proper antenatal care to the sample women. The results also infer that majority of the sample foetuses' intrauterine anthropometric measurements were almost in par with the standards, which inturn indicates good growth and no abnormalities in the foetuses of sample pregnant women. This might be due to the growing awareness of the people about the antenatal care for wellbeing of children.

4.2.4 Intrauterine Foetal Anthropometric Measurements Of Multigravida Women Based On Their Family Monthly Income

Table 6 details about the intrauterine foetal anthropometric measurements of multigravida women based on their family monthly income levels. The 4-5 months old foetuses of multigravida women having income below Rs 10 000 weighed 184.11 $\pm$ 53.60 gm while it was 240.80 $\pm$ 33.62 gm in multigravida women having income above Rs 10 000. Foetuses of multigravida women having income below Rs 10 000 and above Rs 10 000 at the age of 5-6 months weighed respectively 538.00 $\pm$ 103.08 gm and 520.50 $\pm$ 95.86 gm. The corresponding mean weights at the age of 6-7 months of both the groups were 874.00 $\pm$ 163.64 gm and 753.00 $\pm$ 195.43 gm; at 7-8 months were 1731.60 $\pm$ 206.77 gm and 1553.50 $\pm$ 303.17 gm; at 8-9 months were 2783.00 $\pm$ 289.74 gm and 2628.28 $\pm$ 174.48 gm; and at 9 months age were 3046.57 $\pm$ 482.88 gm and 3216.00 $\pm$ 669.03 gm. (Fig 16). No significant differences were noticed in both the

Table 6 Intrauterine anthropometric measurements of foetuses of multigravida women based on their income

Foetal age (m)	Sample and mean age (W)		Mean anthropometric measurements of foetuses Income below Rs 10 000 (Multi gravida) (39)					Income above Rs 10 000 (Multigravida) (36)					Standards				
	IB	IA	Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)	Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)	Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)
4-5	9	5	184.11	4.39	3.77	14.04	11.41	240.80	2.47	4.00	15.48	12.28	---	2.50	4.00	14.40	12.30
(17.6)	(17.2)	(18.0)	±53.60	±5.87	±0.80	±3.37	±2.67	±33.62	±0.39	±0.43	±1.99	±1.73					
5-6	5	4	538.00	4.05	5.57	21.00	17.68	520.50	3.85	5.42	19.35	17.15	---	3.90	5.60	20.70	18.10
(22.7)	(22.9)	(22.6)	±103.08	±0.38	±0.51	±1.52	±0.75	±95.86	±0.55	±0.42	±3.02	±0.91					
6-7	5	7	874.00	4.95	6.93	24.26	20.51	753.00	4.47	6.42	23.82	19.92	---	4.60	6.40	23.60	21.10
(25.5)	(26.0)	(25.1)	±163.64	±0.25	±1.02	±1.49	±1.65	±195.43	±0.41	±0.51	±1.35	±1.63					
7-8	5	8	1731.60	6.11	7.86	29.58	27.41	1553.50	5.99	7.70	28.84	26.01	1625.45	5.90	7.70	28.00	26.60
(30.7)	(31.4)	(30.1)	±206.77	±0.24	±0.23	±1.22	±0.91	±303.17	±0.59	±0.62	±1.63	±1.96					
8-9	8	7	2783.00	6.93	8.54	31.85	30.54	2628.28	6.84	8.53	31.60	31.18	2460.71	6.80	8.60	31.50	30.80
(34.9)	(35.0)	(34.9)	±289.74	±0.25	±0.32	±0.76	±1.97	±174.48	±0.20	±0.35	±0.94	±1.36					
9	7	5	3046.57	7.36	8.89	33.04	31.49	3216.00	7.34	9.02	33.22	34.02	3033.42	7.50	9.20	33.50	33.80
(37.9)	(38.7)	(37.1)	±482.88	±0.36	±0.29	±0.97	±2.13	±669.03	±0.35	±0.38	±0.92	±1.05					

't' values

Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)
1.04 NS	0.73 NS	0.08 NS	0.26 NS	0.17 NS
0.53 NS	0.07 NS	0.04 NS	0.25 NS	0.08 NS
2.99*	0.15 NS	0.13 NS	0.06 NS	0.09 NS
3.10**	0.03 NS	0.04 NS	0.09 NS	0.19 NS
2.10 NS	0.02 NS	0.02 NS	0.03 NS	0.08 NS
2.14 NS	0.00 NS	0.03 NS	0.10 NS	0.31 NS

W – Weeks m – Months

NS – Non significant * - P < 0.05 level ** - P > 0.01 level

FL – Femur length BPD – Biparietal diameter HC – Head circumference AC – Abdominal circumference

IB – Income below Rs 10 000 IA – Income above Rs 10 000

The figures in the first column parenthesis indicate foetal age (in weeks) of the standards

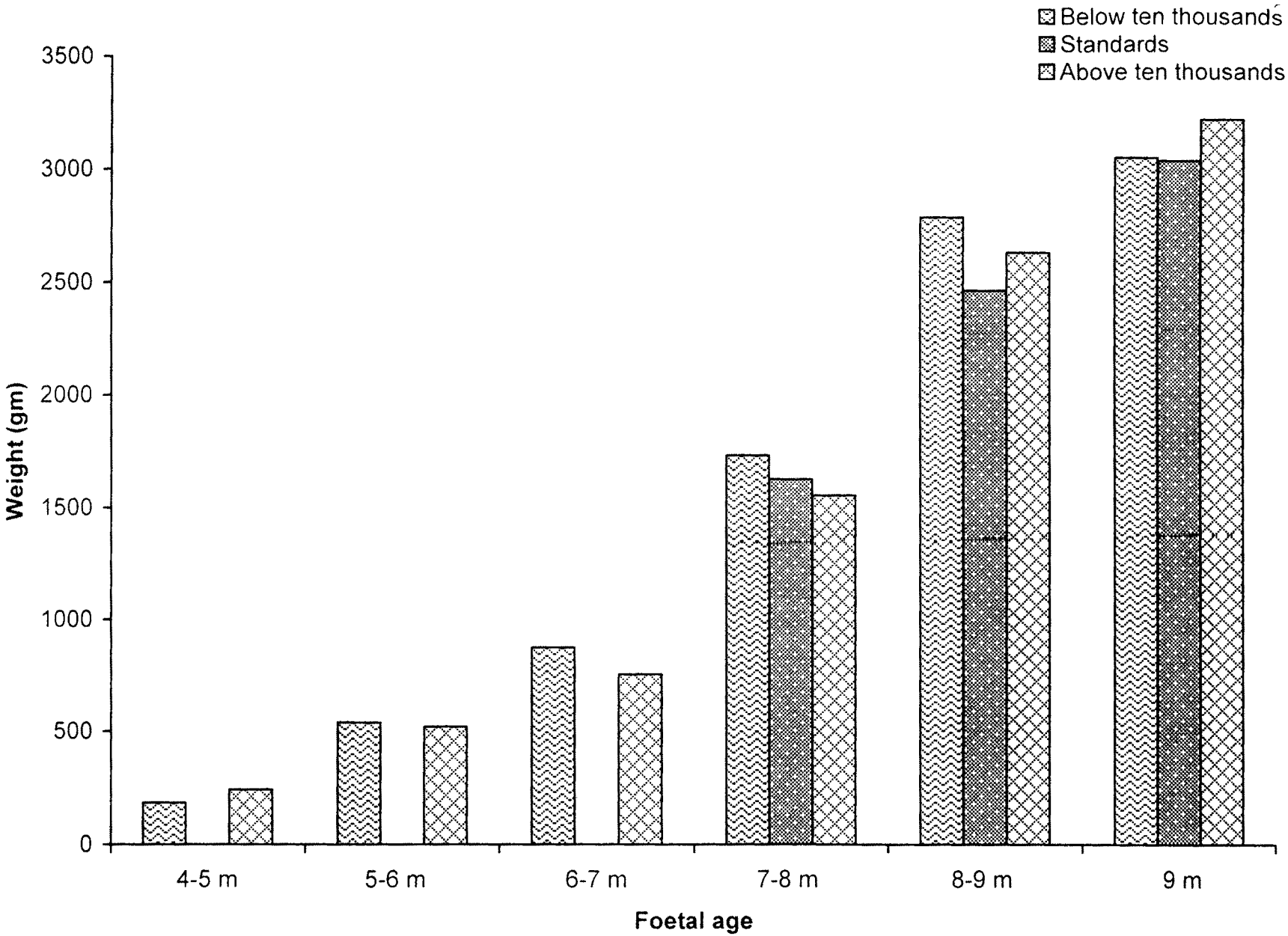


Fig 16 Comparision of mean weights of foetuses with standards and based on family income levels of multigravida women

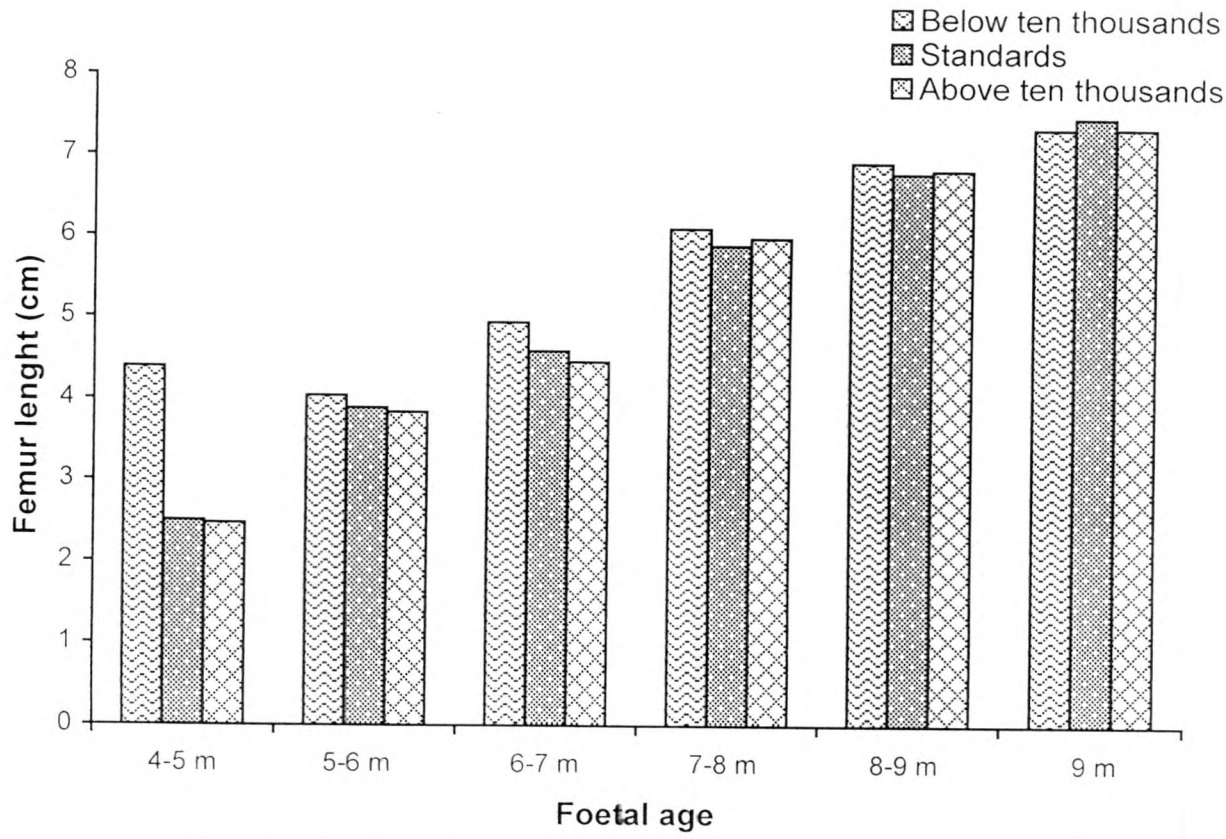


Fig 17 Comparision of mean femur lengths of foetuses with standards and based on family incone levels of multigravida women

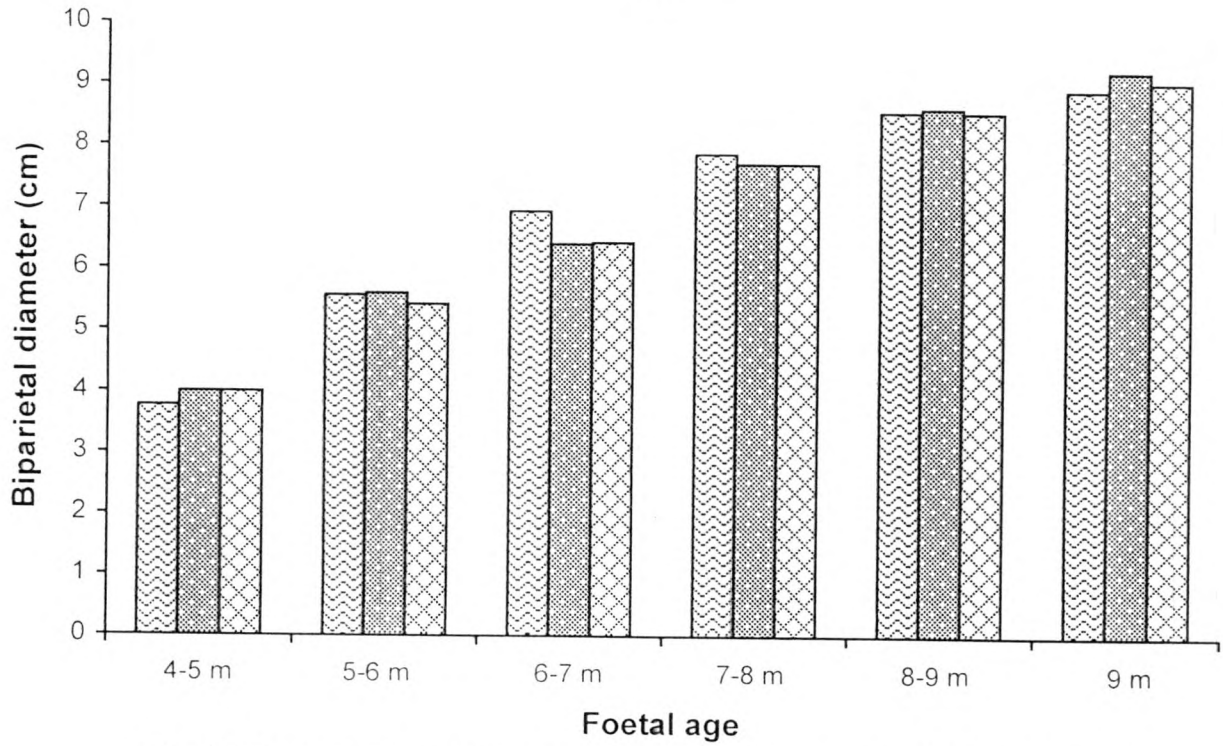


Fig 18 Comparision of mean biparietal diameters of foetuses with standards and based on family income levels of multigravida women

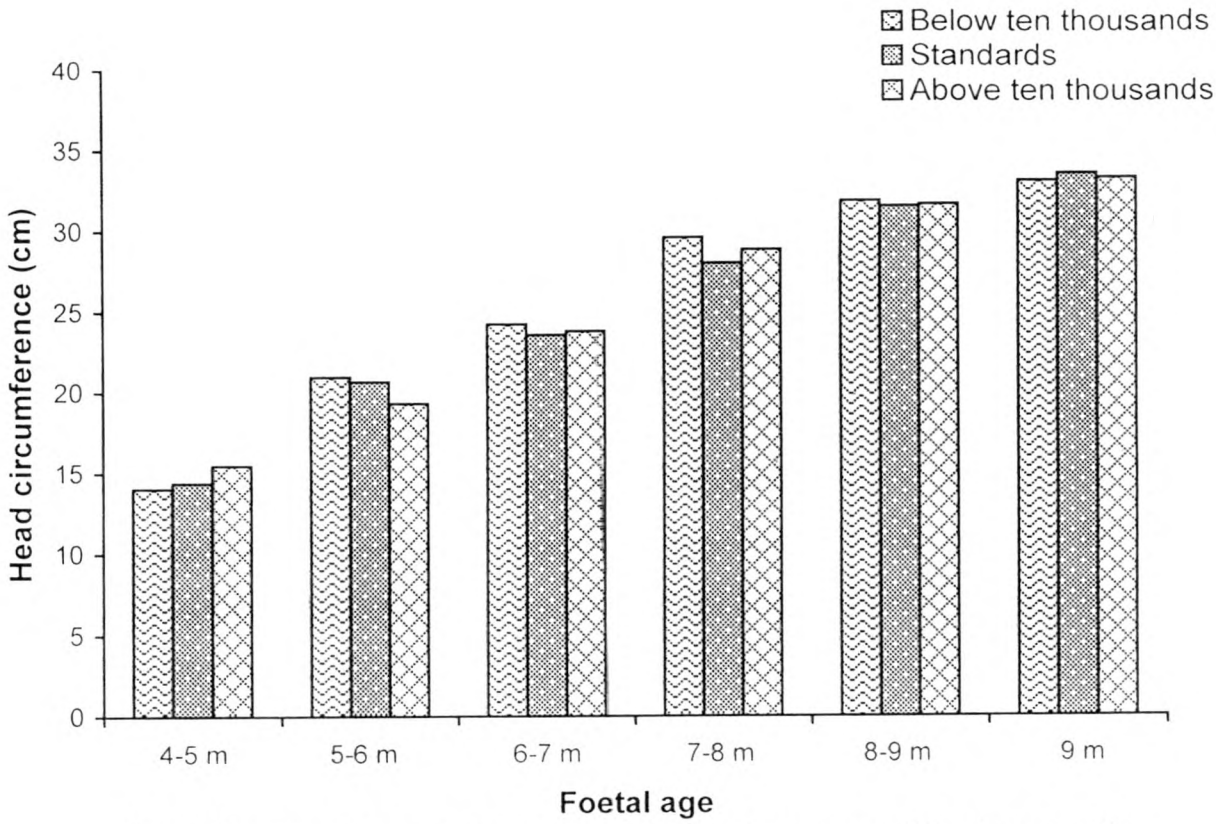


Fig 19 Comparision of mean head circumferences of foetuses with standards and based on family income levels of multigravida women

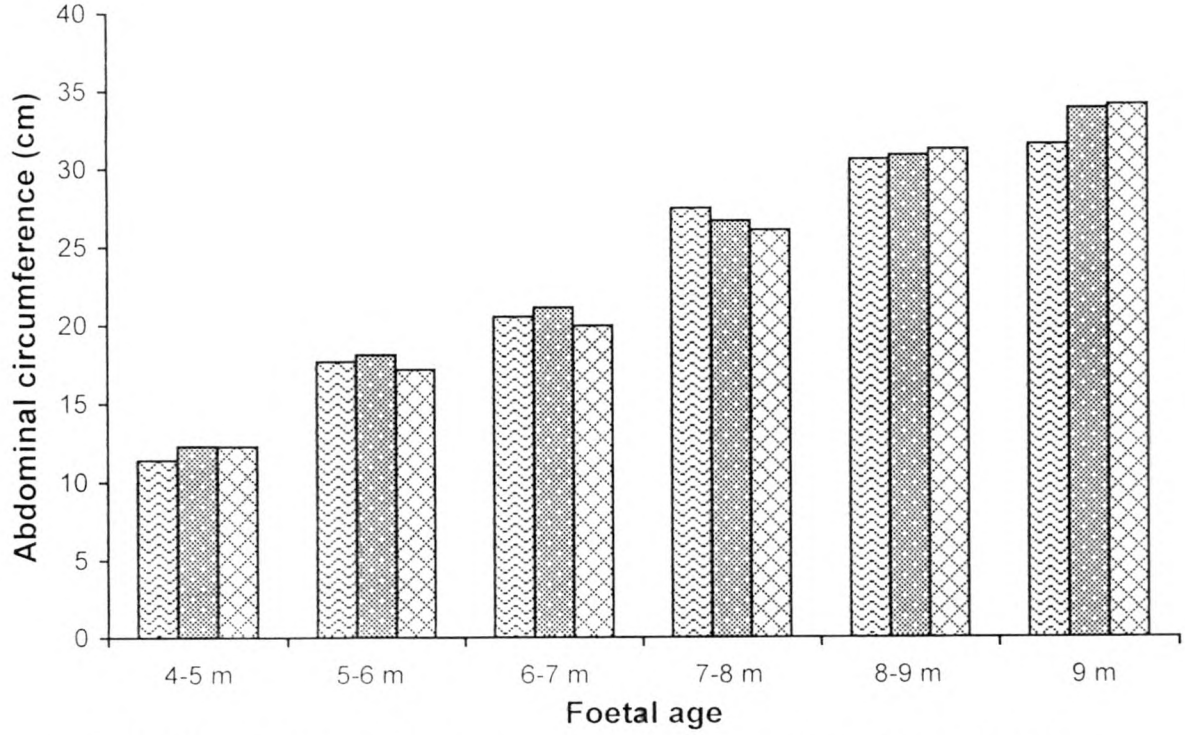


Fig 20 Comparision of mean abdominal circumferences of foetuses with standards and based on family income levels of multigravida women

income groups' multigravida women's foetal mean weights at the age levels of 4-5 months, 5-6 months, 8-9 months and 9 months, while the differences were significant at 6-7 months and 7-8 months as the foetuses of multigravida women having monthly income below Rs 10 000 weighed significantly more than their counterparts. On comparison with the standards it was noticed that the mean weights of the foetuses in multigravida women of both the income groups were significantly more than the standards, while it was vice-versa with respect to the foetuses of 7-8 months old, which inturn clearly indicates the growing awareness of people about the significance of antenatal care and their concern about child development and good foetal growth. The findings are in agreement with the findings reported by Devdas in 1976 and Scholl in 1987.

The mean femur length of the foetuses of multigravida women having income below Rs 10 000 was 4.39 $\pm$ 5.87 cm at 5-6 months and at 9 months it was 7.36 $\pm$ 0.36 cm. The corresponding values of their counterparts were 2.47 $\pm$ 0.39 cm and 7.34 $\pm$ 0.35 cm. (Fig 17). No significant differences were noted in the mean femur lengths of the foetuses of multigravida women based on their family monthly income groups. On comparison with the standards it was found that the foetal mean femur lengths of multigravida women were nearly similar to the standards in the family monthly income above Rs 10 000 and were slightly more than the standards in the family income below Rs 10 000. This denotes not only the good growth of foetuses but also no skeletal displasis in the foetuses of the multigravida women having monthly income below Rs 10 000 and above Rs 10 000.

The mean biparietal diameter of the foetuses of multigravida women having income below Rs 10 000 at 4-5 months was 3.77 $\pm$ 0.80 cm

and at 9 months it was 8.89 ± 0.29 cm. The corresponding mean biparietal diameters of their counterparts were 4.00 ± 0.43 cm and 9.02 ± 0.38 cm (Fig 18). No significant differences were noted in the mean biparietal diameter of the foetuses of multigravida women based on their family income levels. On comparison with the standards it was found that mean biparietal diameters of these foetuses were almost similar to the standards and at the age of 5-6 months they were nearly equal to the standards. The mean biparietal diameters of the foetuses of multigravida women were nearly equal to the standards which inturn indicates their good growth and no abnormalities in their brain. From these results it could be concluded that family monthly income has profound positive influence on the biparietal diameter of the foetuses of multigravida women.

The mean head circumference of the foetuses of multigravida women having income below Rs 10 000 at 4-5 months age was 14.04 ± 3.37 cm and at 9 months it was 33.04 ± 0.97 cm. The corresponding mean head circumference of the foetuses of multigravida women having income above Rs 10 000 were 15.48 ± 1.99 cm and 33.22 ± 0.92 cm (Fig 19). No significant differences were noted between the mean head circumference of the foetuses of multigravida women having monthly income below Rs 10 000 and income above Rs 10 000. On comparison with the standards it was found that mean head circumferences of the sample foetuses in both the groups were slightly more than the standards at the ages of 7-8 months, 8-9 months and at 9 months and they were nearly upto the standards at the ages of 5-6 and 6-7 months. As the foetuses' mean head circumferences were slightly higher than the standards they inturn indicate that foetal brain growth was better in the sample pregnant women.

The mean abdominal circumference of the foetuses of multigravida women having income below Rs 10 000 at 4-5 months age was 11.41 ± 2.67 cm and it was 31.49 ± 2.13 cm at 9 months. The corresponding mean abdominal circumferences of their counterparts were 12.28 ± 1.73 cm and 34.02 ± 1.05 cm (Fig 20). No significant differences were noted in the mean abdominal circumfernces of the foetuses of multigravida women having monthly income below Rs 10 000 and income above Rs 10 000. The sample foetuses' mean abdominal circumferences were compared with the standards and it was found that they were slightly lesser than the standards, while they were almost similar to the ages of 7-8 months and 8-9 months in both the income groups. The mean abdominal circumference of foetuses of multigravida women having income below Rs 10 000 and above Rs 10 000 were slightly lesser than the standard measurements, which inturn reflect good foetal growth and no abnormalities in abdominal organs of the foetuses of the sample women. Overall it could be concluded that family monthly income found to have no influence on the intrauterine foetal anthropomtric measurements of the multigravida women. The reason could be the sample families having Rs 5000 as the minimum level of monthly income, which might have been enough for giving proper antenatal care to the sample women. The results also infer that majority of the sample foetuses' intrauterine anthropometric measurements were almost in par with the standards quoted by various scientists in the book on Foetal growth – Ultrasongraphy in Obstetrics and Gynaecology which inturn indicates good growth and no abnormalities in the foetuses of sample pregnant women. This might be due to the growing awareness of the people about the antenatal care for wellbeing of children.

Table 7 Mean gains in intrauterine foetal weight during 5-9 months based on sample women's order of gravida and education

Foetal age range (months)	Mean gain in foetal intrauterine weight (gm)			
	Primigravida		Multigravida	
	High school educated (48)	College educated (47)	High school educated (41)	College educated (43)
5-6	341.28	305.03	345.12	325.40
6-7	205.35	340.20	283.60	191.60
7-8	729.68	667.83	712.23	887.50
8-9	1043.22	921.17	1183.77	1067.70
9	588.16	779.50	620.73	198.80

Table 8 Mean gains in intrauterine foetal weight during 5-9 months based on sample women's order of gravida and family income

Foetal age range (months)	Mean gain in foetal intrauterine weight (gm)			
	Primigravida		Multigravida	
	Income below Rs 10 000 (46)	Income above Rs 10 000 (49)	Income below Rs 10 000 (39)	Income above Rs 10 000 (36)
5-6	321.20	349.67	353.89	279.70
6-7	246.03	282.00	336.00	232.50
7-8	755.11	638.66	857.60	800.50
8-9	913.44	1060.34	1051.40	1074.78
9	757.18	604.81	263.57	587.72

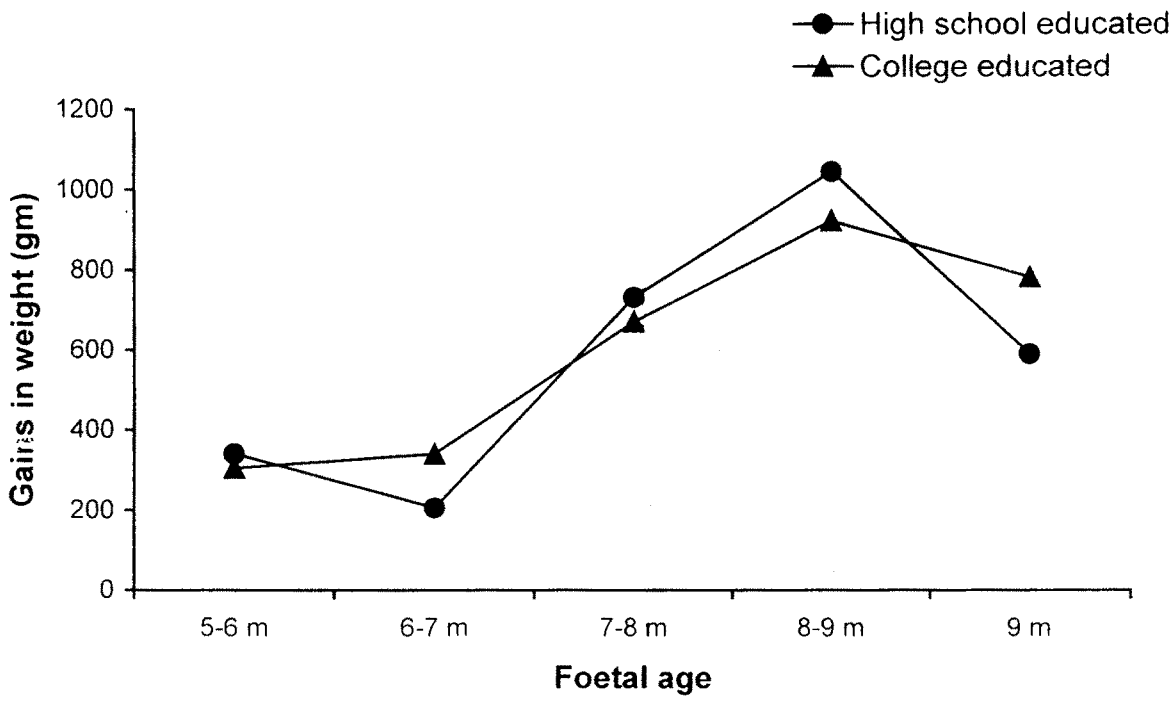


Fig 21 Mean gains in intrauterine foetal weight of primigravida women based on order of gravida and education

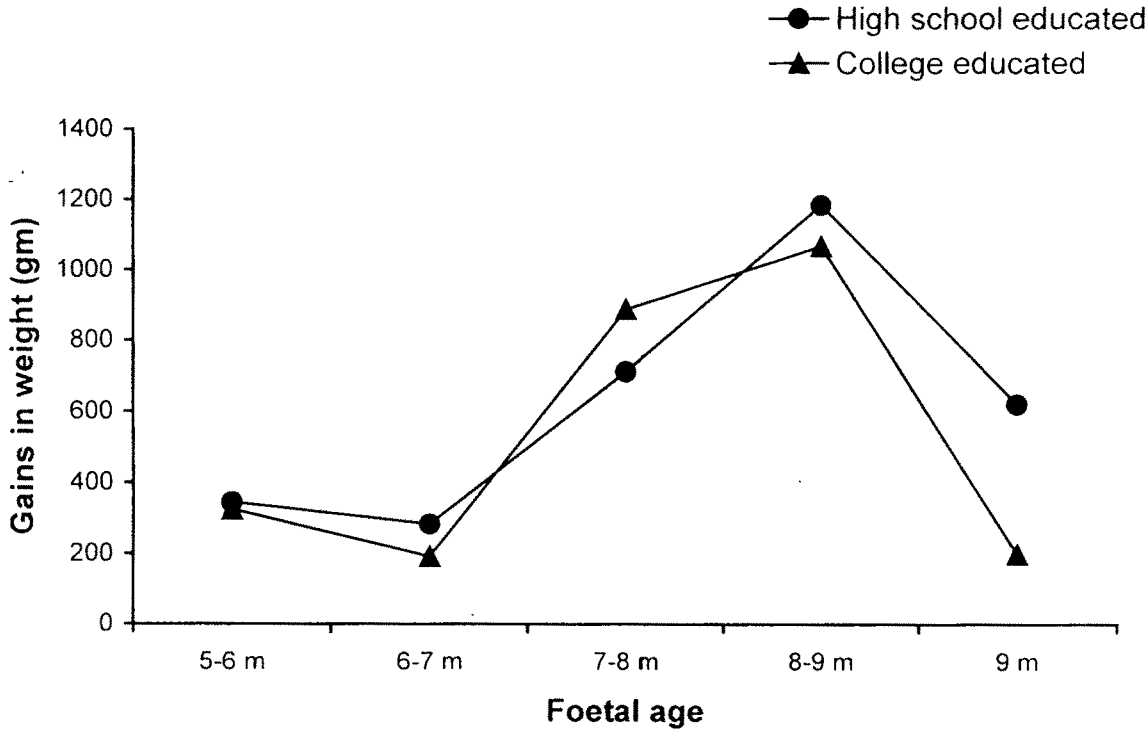


Fig 22 Mean gains in intrauterine foetal weight of multiigravida women based on order of gravida and education

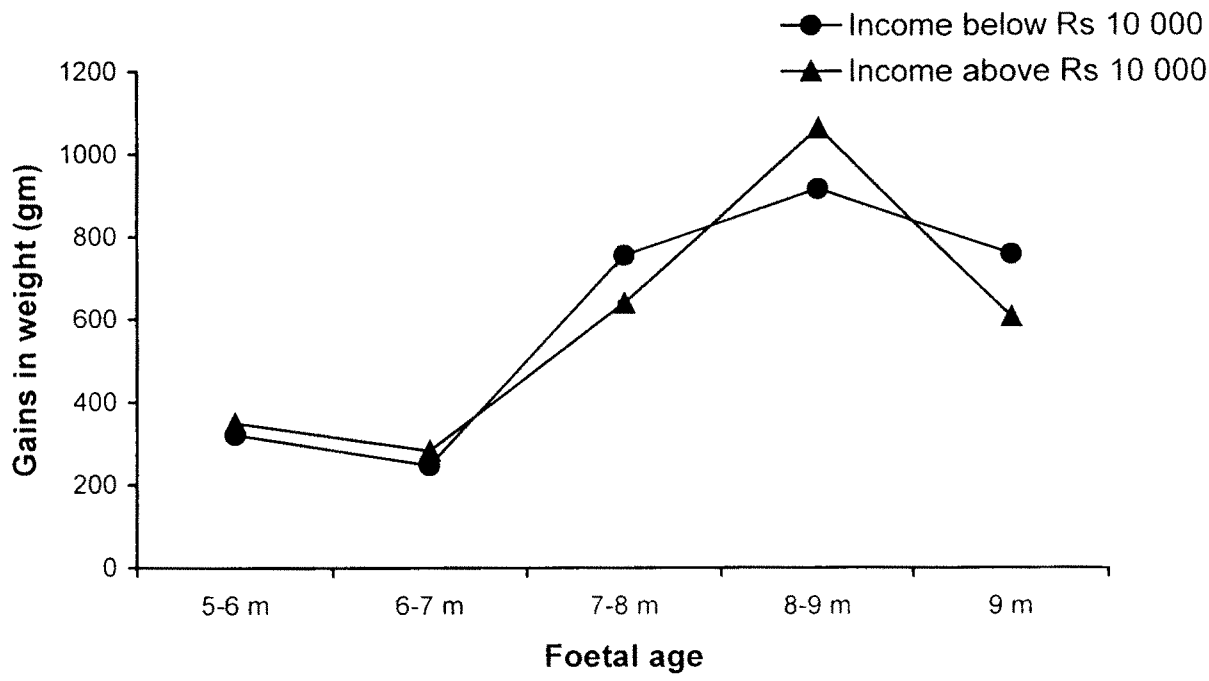


Fig 23 Mean gains in intrauterine foetal weight of primigravida women based on order of gravida and family income

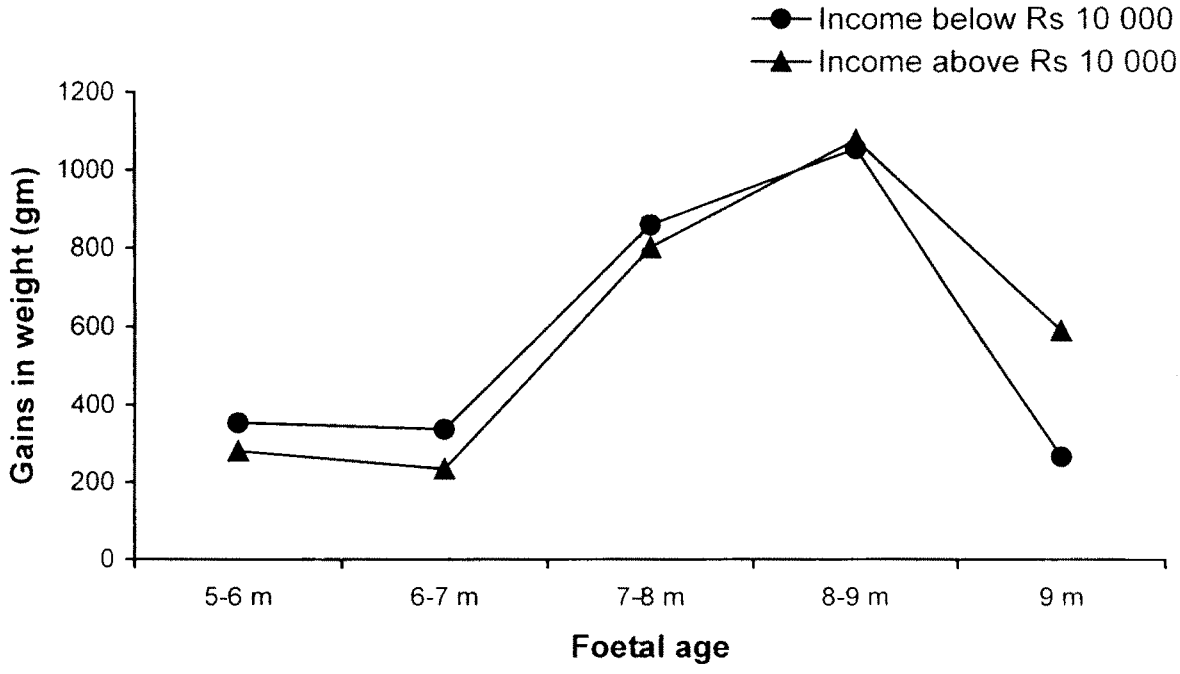


Fig 24 Mean gains in intrauterine foetal weight of multigravida women based on their order of gravida and family income

4.3 Mean Gains In Intrauterine Foetal Weight And Head Circumference During Pregnancy Period Of 5-9 Months

4.3.1 Mean Gains In Intrauterine Foetal Weight During 5-9 Months Based On Sample Women's Order Of Gravida And Education

Table 7 depicts the mean gains in intrauterine foetal weight during 5-9 months based on the sample women's order of gravida and education. With respect to primigravida it was noted that maximum mean gains in foetal weight of 1043.22 gm and 921.17 gm was found in 8-9 months old foetuses of high school educated and college educated women respectively followed by 729.68 gm and 667.83 gm at 7-8 months, 588.16 gm and 779.50 gm after 9th month, 341.28 gm and 305.05 gm at 5-6 months and 205.35 gm and 340.20 gm at 6-7 months. Fig 21 indicates very clearly that there was relatively more gain in the intrauterine mean weight of foetuses of high school educated primigravida women as compared to the foetuses of their counterparts between 5-6 months, 7-8 months and 8-9 months while it was just viceversa at foetal age ranges of 6-7 months and after 9th month.

With respect to multigravida it was found that maximum mean weight gains of 1183.77 gm and 1067.70 gm were found in 8-9 months foetuses of high school educated and college educated women respectively followed by 712.23 gm and 887.50 gm at 7-8 months, 620.73 gm and 198.80 gm after 9th month, 345.12 gm and 325.40 gm at 5-6 months and 283.60 gm and 191.60 gm at 6-7 months. Fig 22 clearly denotes that mean gains in intrauterine foetal weight were relatively more in high school educated multigravida women as compared to the foetuses of the college educated multigravida women at all studied foetal age ranges except at 7-8 months

which was found to be viceversa. From the above results it could be concluded that overall the mean gains in foetal intrauterine weight were relatively more in high school educated multigravida women as compared to their counterparts of the college educated multigravida women irrespective of their order of gravida. It could also be deduced that after 9th month of pregnancy, there was tremendous decrease in the mean gains of intrauterine foetal weight of women belonging to both the educational groups irrespective of their order of gravida which in turn advocates the great need of educating masses about antenatal care in general and also particularly in the end of second trimester as well as after 9th month of pregnancy.

4.3.2 Mean Gains In Intrauterine Foetal Weight During 5-9 Months Based On Sample Women's Order Of Gravida And Family Monthly Income

Table 8 denotes the mean gains in intrauterine foetal weight during 5-9 months based on the sample women's order of gravida and family income. With respect to primigravida women it was noted that maximum mean gains of 913.44 gm and 1060.34 gm were found in 8-9 months old foetuses of women having monthly income below Rs 10 000 and above Rs 10 000 respectively followed by 757.18 gm and 604.81 gm after 9th month, 755.11 gm and 638.66 gm at 7-8 months, 321.20 gm and 349.67 gm at 5-6 months and 246.03 gm and 282.00 gm at 6-7 months. Fig 23 very clearly denotes that relatively there was more gain in the intrauterine mean weight of foetuses of primigravida women having income above Rs 10 000 between 5-6 months, 6-7 months and 8-9 months while it was viceversa at foetal age ranges of 7-8 months and after 9th month.

With respect to multigravida women's foetuses it was found that maximum mean gains of 1051.40 gm and 1074.78 gm were found in 8-9 months old foetuses of the women having income below Rs 10 000 and above Rs 10 000 respectively followed by 857.60 gm and 800.50 gm at 7-8 months, 263.57 gm and 587.72 gm after 9th month, 353.89 gm and 379.70 gm at 5-6 months and 336.00 gm and 232.50 gm at 6-7 months. Fig 24 very clearly indicates that mean gains in intrauterine foetal weight were relatively more in multigravida women having income below Rs 10 000 as compared to the foetuses of women having income above Rs 10 000 at the age ranges of 5-6 months, 6-7 months and 7-8 months except at 8-9 months and after 9th month which were viceversa. From the above results it could be concluded that overall the mean gains in intrauterine foetal weight were better in both the income groups irrespective of their order of gravida. It could be deduced that after 9th month of pregnancy there was a tremendous decrease in the mean gains of intrauterine foetal weight of women belonging to both the income levels irrespective of their order of gravida which inturn advocates the great need of educating masses about antenatal care in general and also in particular during the end of second trimester as well as after 9th month of pregnancy.

4.3.3 Mean Gains In Intrauterine Foetal Head Circumference During 5-9 Months Based On Sample Women's Order Of Gravida And Education

Table 9 illustrates mean gain in intrauterine foetal head circumference during 5-9 months based on the sample women's order of gravida and education. It is very clear from the results that the maximum mean gain of 4.49 cm was noted in the intrauterine head circumference of

Table 9 Mean gains in intrauterine foetal head circumference during 5-9 months based on sample women's order of gravida and education

Foetal age range (months)	Mean gain in foetal intrauterine head circumference (cm)			
	Primigravida		Multigravida	
	High school educated (48)	College educated (47)	High school educated (41)	College educated (43)
5-6	1.57	6.22	6.57	5.73
6-7	3.95	3.42	3.46	2.57
7-8	4.49	3.56	3.75	6.38
8-9	2.50	4.60	3.58	2.23
9	1.87	1.04	1.54	1.32

Table 10 Mean gains in intrauterine foetal head circumference during 5-9 months based on sample women's order of gravida and family income

Foetal age range (months)	Mean gain in foetal intrauterine head circumference (cm)			
	Primigravida		Multigravida	
	Income below Rs 10 000 (46)	Income above Rs 10 000 (49)	Income below Rs 10 000 (39)	Income above Rs 10 000 (36)
5-6	0.12	6.50	6.96	3.87
6-7	3.86	3.28	3.26	4.47
7-8	3.67	4.63	5.32	5.02
8-9	4.58	2.34	2.27	2.76
9	1.23	1.59	1.19	1.62

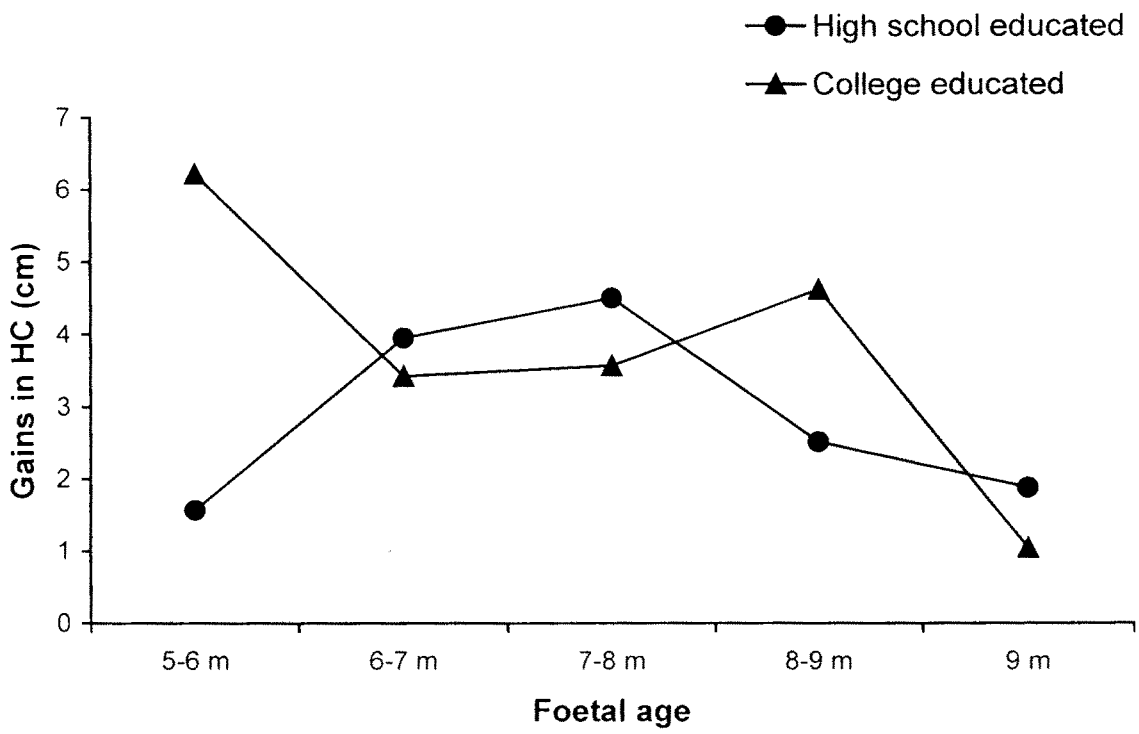


Fig 25 Mean gains in intrauterine foetal head circumfernce of primigravida women based on order of gravida and education

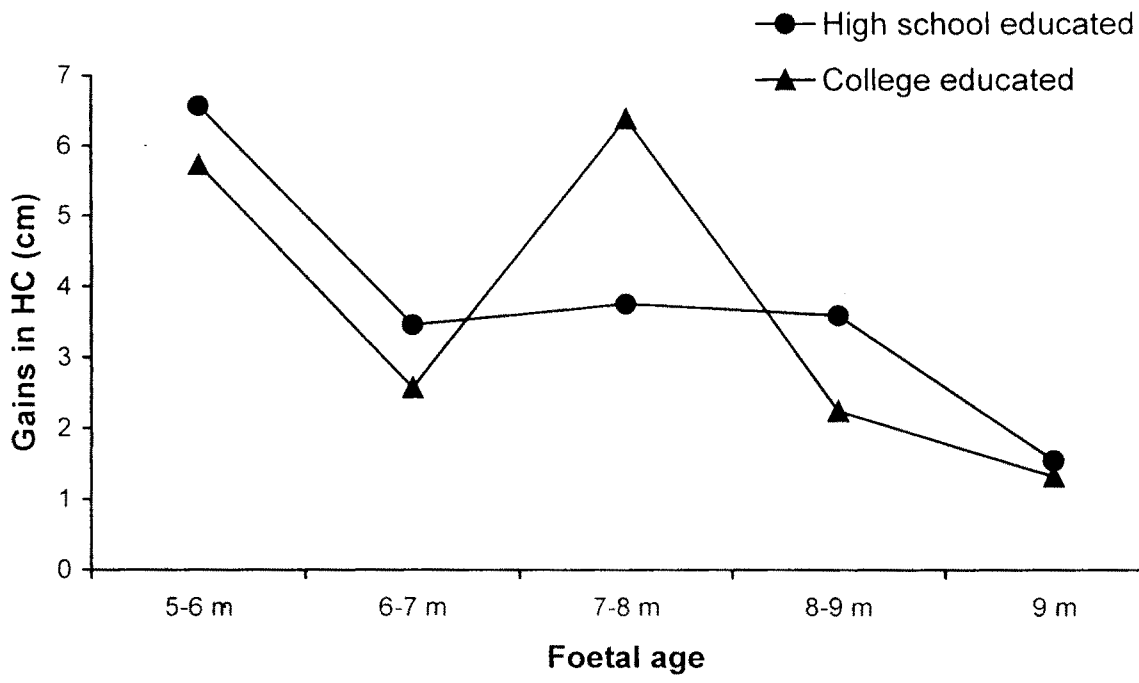


Fig 26 Mean gains in intrauterine foetal head circumference of multigravida women based on order of gravida and education

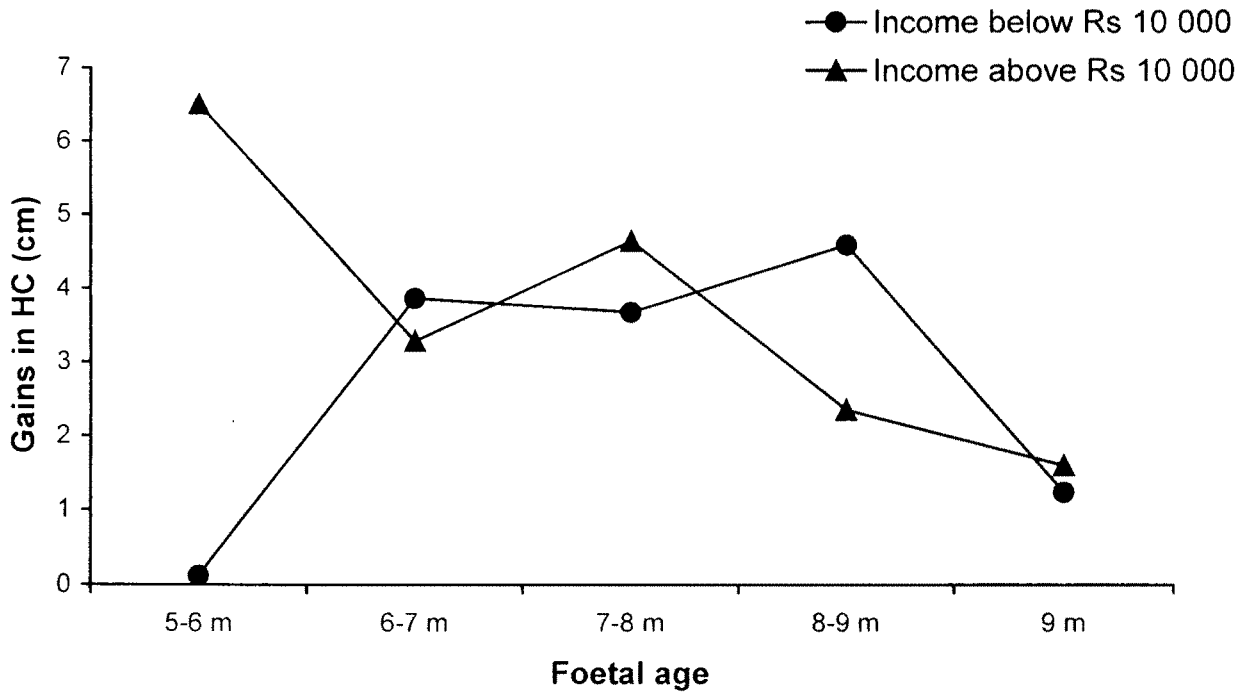


Fig 27 Mean gains in intrauterine foetal head circumference of primigravida women based on order of gravida and family income

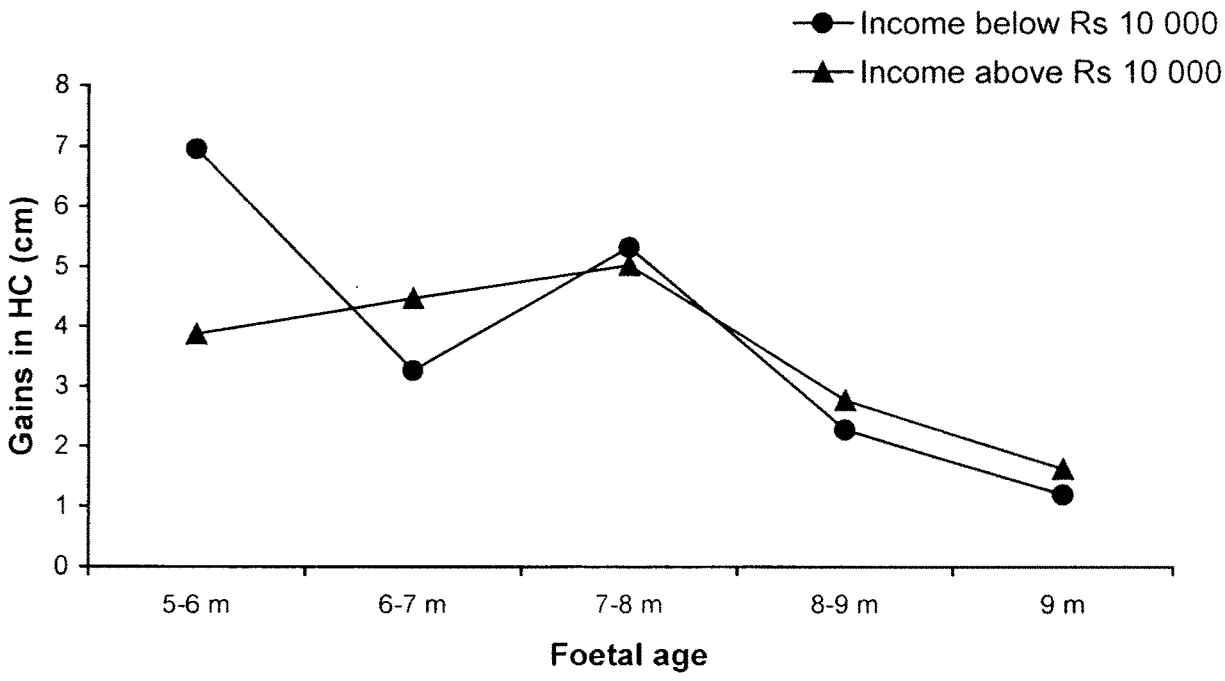


Fig 28 Mean gains in intrauterine foetal head circumference of multigravida women based on order of gravida and family income

7-8 months old foetuses of high school educated primigravida women followed by mean gain of 3.95 cm at 6-7 months, 2.50 cm at 8-9 months, 1.87 cm after 9th month and 1.57 cm at 5-6 months. The corresponding mean gains in the intrauterine head circumference of the foetuses of the college educated primigravida women were 3.56 cm, 3.42 cm, 4.60 cm, 1.04 cm and 6.22 cm. Fig 25 exhibits that the mean gains in intrauterine foetal head circumference of the high school educated primigravida women were significantly more at the foetal age ranges of 6-7 months, 7-8 months and after 9th month as compared to the foetuses of the college educated primigravida women while it was viceversa at 5-6 months and 8-9 months of foetal age ranges.

With respect to multigravida it was found that maximum mean gain of 6.57 cm was noticed in the intrauterine head circumference of 5-6 months foetuses of the high school educated multigravida women followed by mean gain of 3.75 cm at 7-8 months, 3.58 cm at 8-9 months, 3.46 cm at 6-7 months and 1.54 cm after 9th month. The corresponding mean gains in the intrauterine head circumference of the foetuses of college educated multigravida women were 5.73 cm, 6.38 cm, 2.23 cm, 2.57 cm and 1.32 cm. Fig 26 illustrates that the mean gains in the intrauterine foetal head circumference of the high school educated multigravida women were significantly more at the foetal age ranges of 5-6 months, 6-7 months, 8-9 months and after 9th month as compared to the foetuses of the college educated multigravida women while it was viceversa at 7-8 months age range. From the above results it could be concluded that the mean gains in intrauterine foetal head circumference were significantly more in the high school educated women as compared to their counterparts of the college educated women irrespective of their order of gravida. It could be deduced

from the results that after 9th month of pregnancy there was a tremendous decrease in the mean gain of intrauterine foetal head circumference of the women belonging to both the educational groups irrespective of their order of gravida which inturn advocates the great need of educating masses about antenatal care in general.

4.3.4 Mean Gains In Intrauterine Foetal Head Circumference During 5-9 Months Based On Sample Women's Order Of Gravida And Family Monthly Income

Mean gains in intrauterine foetal head circumference during 5-9 months based on sample women's order of gravida and family income are depicted in table 10. It is very clear from the results that at 8-9 months the maximum mean gain of 4.58 cm was noted in the intrauterine head circumference of the foetuses of primigravida women having income below Rs 10 000 followed by mean gain of 3.86 cm at 6-7 months; 3.67 cm at 7-8 months; 1.23 cm after 9th month and 0.12 cm at 5-6 months. The corresponding mean gains in the intrauterine head circumference of the foetuses of women having income above Rs 10 000 were 2.34 cm, 3.28 cm, 4.63 cm, 1.59 cm and 6.50 cm. Fig 27 illustrates that the mean gains in the intrauterine foetal head circumference of the primigravida women having income above Rs 10 000 were significantly more at the foetal age ranges of 5-6 months, 7-8 months and after 9th month as compared to the foetuses of the primigravida women having income below Rs 10 000 while it was viceversa at 6-7 months and 8-9 months foetal age ranges.

With respect to multigravida it was noted that the maximum mean gain of 6.96 cm was noted in the intrauterine head circumference of 5-6 months old foetuses of the women having income above Rs 10 000

followed by mean gain of 5.32 cm at 7-8 months, 3.26 cm at 6-7 months, 2.27 cm at 8-9 months and of 1.19 cm after 9th month. The corresponding mean gains in the intrauterine foetal head circumference of multigravida women having income above Rs 10 000 were 3.87 cm, 5.02 cm, 4.47 cm, 2.76 cm, and 1.62 cm. Fig 28 denotes that the mean gains of the intrauterine foetal head circumference of multigravida women having income above Rs 10 000 were slightly more at the foetal age ranges of 6-7 months, 8-9 months and after 9th month as compared to the foetuses of multigravida women having income below Rs 10 000 which were viceversa at 5-6 months and 7-8 months age ranges. From the above results it could be concluded that overall the mean gains in intrauterine foetal head circumference were relatively better in women having income above Rs 10 000 as compared to their counterparts of the women having income below Rs 10 000 irrespective of their order of gravida. It could also be deduced from the results that after 9th month of pregnancy, there was a tremendous decrease in the mean gains of intrauterine foetal head circumference of women belonging to both the income groups irrespective of their order of gravida which inturn advocates the great need of educating masses about antenatal care in general.

4.4 Correlation Between Family & Maternal Background Variables And Foetal Anthropometric Measurements

The correlation computed between family & maternal background variables and anthropometric measurements of foetuses are shown in table 11. With respect to the family variables it was found that monthly income and environment in families had significant positive correlation with foetal weight while family size had significant negative correlation with it which inturn indicates that with increase in family

Table 11 Correlations between family & maternal background variables and foetal intrauterine anthropometric measurements

Family and maternal background variables	Foetal intrauterine anthropometric measurements				
	Weight (gm)	FL (cm)	BPD (cm)	HC (cm)	AC (cm)
Family					
Size	0.19*	0.15 NS	0.07 NS	0.10 NS	0.14 NS
Income	0.48**	0.46**	0.63**	0.13 NS	0.62**
Environment	0.28**	0.28**	0.44**	0.03 NS	0.38**
Maternal					
Gestational age	0.80**	0.82**	0.11 NS	0.74**	0.73**
Chronological age	0.54**	0.51**	0.67**	0.15 NS	0.68**
Education	0.59**	0.55**	0.87**	0.09 NS	0.76**
Employment	-0.17 NS	-0.13 NS	-0.35**	-0.06 NS	-0.22*
Order of gravida	0.11 NS	0.08 NS	0.21*	0.01 NS	0.17 NS
Weight	0.59**	0.54**	0.88**	0.09 NS	0.76**
Height	0.47**	0.48**	0.67**	0.08 NS	0.60**
Spacing between pregnancies	0.47**	0.40**	0.67**	0.06 NS	0.59**
Work load	-0.16 NS	-0.15 NS	-0.20*	-0.01 NS	-0.19 *
Health status	0.38**	0.31**	0.57**	0.09 NS	0.51**
Attitudes towards pregnancies	0.09 NS	0.04 NS	0.18 NS	0.08 NS	0.09 NS
Mental health	0.38**	0.31**	0.57**	0.09 NS	0.51**
Hb level	0.44**	0.34**	0.89**	0.31**	0.51**
Previous obstetric history	0.07 NS	0.08 NS	0.21*	0.09 NS	0.10 NS

NS – Non significant, * - $P < 0.05$ level, ** - $P > 0.01$ level.
FL – Femur length, BPD – Biparietal diameter, HC – Head circumference,
AC – Abdominal circumference.
Table 'r' value – 0.25

monthly income there was increase in foetal weight, which might be due the increase in family income the members might have taken better care of the nutritional and medical needs of their pregnant women and the better the family environment the more the foetal weight was. With increase in family size there was decrease in foetal weight. However family size did not have significant correlation with foetal femur length, biparietal diameter, head circumference and abdominal circumference. On the other hand family income and family environment had significant positive correlation with the femur length, biparietal diameter and abdominal circumference of foetuses and they found to have no significant correlation with head circumference of the foetuses. Overall it could be concluded that income and environment of families play a significant positive role in foetal growth. These findings are in agreement with the results reported by Bissenden *et al.* (1981), Aykroyd (1967), Bhargava *et al.* (1981), Naeye (1990) and Sethi *et al.* (1991).

With respect to the maternal variables it was assessed that gestational age, chronological age, education, weight, height, spacing between pregnancies, haemoglobin level, physical and mental health of the pregnant women were found to have significant positive correlation with foetal weight while maternal employment and workload had significant negative correlation with the foetal weight. Order of gravida, positive attitudes towards pregnancy and previous obstetric history of pregnant women were found to have no significant correlation with foetal weight. Foetal femur length was positively correlated with gestational age, chronological age, education, weight, height, spacing between pregnancies, physical and mental health, haemoglobin level of the pregnant women was significantly negatively correlated with maternal employment and workload. Order of gravida, positive attitudes towards pregnancy and previous

obstetric history of the pregnant women found to have no significant correlation with it. Biparietal diameter of the foetuses was significantly negatively correlated with maternal employment & workload while it was significantly positively correlated with maternal chronological age, education, order of gravida, weight, height, spacing between pregnancies, physical and mental health and past obstetric history. On the other hand no significant correlation was found between biparietal diameter of foetuses and with gestational age and positive attitudes of women towards pregnancy.

The head circumference of foetuses found to have significant positive correlation only with gestational age and haemoglobin level and it was significantly negatively correlated with maternal employment and workload. This clearly indicates that for the proper foetal brain growth the pregnant women must take care of their haemoglobin levels, must take enough rest and reduce their work load. Foetal head circumference found to be not significantly correlated with maternal chronological age, education, order of gravida, weight, height, spacing between pregnancies, physical and mental health, attitudes towards pregnancy and previous obstetric history.

Abdominal circumference of foetuses was significantly positively correlated with gestational age, maternal chronological age, education, weight, height, spacing between pregnancies, physical and mental health and haemoglobin level and it was significantly negatively correlated with maternal employment and workload. Foetal abdominal circumference was not significantly correlated with order of gravida, attitudes towards pregnancy and previous obstetric history. These results indicate that maternal age, education, weight, height, haemoglobin level, physical and mental health and gestational age positively influenced foetal growth, while

their workload and employment during pregnancy negatively influenced foetal growth. Maternal attitudes towards pregnancy and previous obstetric history found to have no significant influence on foetal growth. Most of these findings are in line with the findings reported in the studies of Gopalan and Rao (1972), Winick (1985), Naeye (1978), Quignley (1979), Bhargava *et al.* (1983), Campbell (1986), Raymond *et al.* (1993).

4.5 Correlation Between Intrauterine Foetal Weight And Foetal Other Body Measurements

Table 12 Correlation between intrauterine foetal weight and foetal other body measurements

Foetal body Measurements	Correlation with foetal weight (r values)
Biparital diameter (x_1)	0.924**
Head circumference (x_2)	0.934**
Abdominal circumference (x_3)	0.942**
Femur length (x_4)	0.932**

The Cobb Douglas relation is

$$\text{Log } Y = \text{Log } a + b1 \text{ Log } x_1 + b2 \text{ Log } x_2 + b3 \text{ Log } x_3 + b4 \text{ Log } x_4$$

$$\text{Log } Y = -5.8840 + 0.255 \text{ Log } x_1 + 0.490 \text{ Log } x_2 + 1.3263 \text{ Log } x_3 + 0.485 \text{ Log } x_4$$
$$(0.331) \quad (0.414) \quad (0.274)^{**} \quad (0.269)$$

$R^2 = 0.899$

** - Significant at probability 0.01 level

$R^2 = 0.899$ i.e. 89.99 % of variation is accounted for these variables

Table 12 indicates the correlation between foetal weight and its other body measurements. It is obvious from 'r' values that biparietal diameter, head circumference, abdominal circumference and femur length of foetuses are significantly positively correlated with foetal weight. Which inturn indicates that one can be assured of the total or wholesome growth of the foetuses once foetal weight is found to be good, as a very significant parameter for assessing its total growth. These results are in coincidence with the findings of Owen *et al.* (1996) and London *et al.* (1989).

4.6 Antenatal Care Practices Adopted For Sample Women And Details Of Their Newborn

4.6.1 Antenatal Care Practices Adopted For The Sample Women

Table 13 denotes that irrespective of the gravida 79 per cent high school educated and 98 per cent college educated pregnant women reported to have undergone regularly antenatal checkup. Significantly a higher percentage of college educated sample women had undergone regularly antenatal check up as compared to their counterparts. All the college educated and high school educated pregnant women found to have checked up weight gain, haemoglobin level, Rh factor during pregnancy in addition to taking TT vaccination. About 95-99 per cent women in both the groups found to have checked up blood pressure followed by urine test (61-70 %) and dental check up (21-53 %). Irrespective of the order of pregnancy significantly a higher percentage of the college educated pregnant women found to have undergone dental check up and antenatal check up as compared to the high school educated pregnant women. During pregnancy significantly a higher percentage of the primigravida college educated women have undergone antenatal check up regularly, urine test and dental

Table 13 Antenatal care practices adopted for the sample women

Health care practices	Percentage of women						Z values			Percentage of women						Z values		
	High school educated (89)			College educated (81)						Income < Rs 10 000 (85)			Income > Rs 10 000 (85)					
	PG (48)	MG (41)	IP (89)	PG (47)	MG (34)	IP (81)	HPG vs CPG	HMG vs CMG	IP Vs IP	PG (46)	MG (39)	IP (85)	PG (49)	MG (36)	IP (85)	BPG vs APG	BMG vs AMG	IP Vs IP
Regular antenatal check up	81.25 (39)	75.60 (31)	78.65 (70)	97.87 (46)	97.05 (33)	97.53 (79)	2.66**	3.66**	6.33**	80.43 (37)	71.79 (28)	76.47 (65)	95.91 (47)	94.44 (34)	95.29 (81)	2.50*	2.87**	3.80**
Blood pressure	95.83 (46)	95.12 (39)	95.50 (85)	100.0 (47)	97.05 (33)	98.76 (80)	---	0.50 NS	3.00**	97.82 (45)	94.87 (37)	96.47 (82)	97.95 (48)	97.22 (35)	97.64 (83)	---	1.00 NS	---
Weight gain	100.0 (48)	100.0 (41)	100.0 (89)	100.0 (47)	100.0 (34)	100.0 (81)	---	---	---	100.0 (46)	100.0 (39)	100.0 (85)	100.0 (49)	100.0 (36)	100.0 (85)	---	---	---
Urine test	52.08 (25)	70.73 (29)	60.67 (54)	72.34 (34)	67.64 (23)	70.37 (57)	2.22*	0.30 NS	1.66 NS	58.69 (27)	66.66 (26)	62.35 (53)	73.46 (36)	72.22 (26)	72.94 (62)	1.66 NS	0.60 NS	1.66 NS
TT vaccination	100.0 (48)	100.0 (41)	100.0 (89)	100.0 (47)	100.0 (34)	100.0 (81)	---	---	---	100.0 (46)	100.0 (39)	100.0 (85)	100.0 (49)	100.0 (36)	100.0 (85)	---	---	---
Haemoglobin	100.0 (48)	100.0 (41)	100.0 (89)	100.0 (47)	100.0 (34)	100.0 (81)	---	---	---	100.0 (46)	100.0 (39)	100.0 (85)	100.0 (49)	100.0 (36)	100.0 (85)	---	---	---
Blood group	100.0 (48)	100.0 (41)	100.0 (89)	100.0 (47)	100.0 (34)	100.0 (81)	---	---	---	100.0 (46)	100.0 (39)	100.0 (85)	100.0 (49)	100.0 (36)	100.0 (85)	---	---	---
Rh factor	100.0 (48)	100.0 (41)	100.0 (89)	100.0 (47)	100.0 (34)	100.0 (81)	---	---	---	100.0 (46)	100.0 (39)	100.0 (85)	100.0 (49)	100.0 (36)	100.0 (85)	---	---	---
Dental checkup	22.91 (11)	19.51 (8)	21.34 (19)	46.80 (22)	61.76 (21)	53.08 (43)	2.66**	4.66**	5.33**	21.73 (10)	30.76 (12)	25.88 (22)	48.97 (24)	47.22 (17)	48.23 (41)	3.37**	1.10 NS	2.85**
Special diet	27.08 (13)	21.95 (9)	24.71 (22)	48.93 (23)	35.29 (12)	43.20 (35)	2.33*	1.40 NS	2.71**	26.08 (12)	12.82 (5)	20.00 (17)	48.97 (24)	41.66 (15)	45.88 (39)	2.44*	3.62**	4.16**
Sufficient rest	91.66	80.48	86.51	97.87	91.11	96.29	1.50 NS	2.33*	3.33**	93.17	82.05	88.23	93.87	91.66	92.94	---	1.28 NS	1.33 NS

Continued on next page

	(44)	(33)	(77)	(46)	(32)	(78)				(43)	(32)	(75)	(46)	(33)	(79)			
Suitable & loose Clothes	25.00 (12)	26.82 (11)	25.84 (23)	51.06 (24)	41.17 (14)	46.91 (38)	2.88**	1.50 NS	3.00**	26.08 (12)	20.51 (8)	23.52 (20)	55.10 (27)	47.22 (17)	51.76 (44)	3.22**	2.70**	14.40**
Avoiding travelling	12.50 (6)	14.63 (6)	13.48 (12)	21.27 (10)	20.58 (7)	20.98 (17)	1.28 NS	0.75 NS	1.40 NS	19.56 (9)	20.51 (8)	20.00 (17)	22.44 (11)	11.11 (4)	17.64 (15)	0.37 NS	---	0.60 NS
Reducing work – load	33.33 (16)	24.39 (10)	29.21 (26)	48.93 (23)	55.88 (19)	51.85 (42)	1.68 NS	3.10 NS	3.14**	19.56 (9)	25.64 (10)	22.35 (19)	55.10 (27)	52.77 (19)	54.11 (46)	4.50**	1.40 NS	4.57**
Caring of personal hygiene	14.58 (7)	12.19 (5)	13.48 (12)	29.78 (14)	17.64 (6)	24.69 (20)	2.14*	0.71 NS	2.20*	10.86 (5)	12.82 (5)	11.76 (10)	34.69 (17)	16.66 (6)	27.05 (23)	3.42**	0.57 NS	3.20**

Figures in parentheses indicate frequencies

NS – Non significant * - $P < 0.05$ level. ** - $P > 0.01$ level

PG – Primigravida MG – Multigravida IP – Irrespective of number of pregnancies

HPG – High school educated primigravida HMG – High school educated multigravida

CPG – College educated primigravida CMG – College educated multigravida

BPG – Income below Rs 10 000 primigravida BMG – Income below Rs 10 000 multigravida

APG – Income above Rs 10 000 primigravida AMG – Income above Rs 10 000 multigravida

check up besides taking good diet as compared to the primigravida high school educated women. While in the remaining antenatal check ups such differences were not noted among them. Significantly a higher percentage of multigravida college educated sample women found to have undergone antenatal check ups regularly, dental check up and took sufficient rest as compared to their counterparts who were high school educated.

With regard to the special diet during pregnancy it was noted that only 43 per cent college educated and 25 per cent high school educated pregnant women consumed special diet irrespective of their order of gravida. Significantly a higher percentage of primigravida high school educated women as well as college educated women irrespective of their order of gravida found to have consumed special diet as compared to their counterparts, while such significant difference was not noted in the multigravida sample women. Majority of the women irrespective of their order of gravida and educational level found to take sufficient rest during pregnancy. Significantly higher percentage of multigravida high school educated women as well as college educated women irrespective of gravida found to have taken sufficient rest as compared to their counterparts while based on primigravida such significant difference was not noted. Besides the above aspects of care 29 per cent and 52 per cent sample women irrespective of the gravida reported to have less workload during pregnancy respectively, use of suitable and loose clothes (25-84 % and 46-91 %), caring of personal hygiene (13.48 % and 24.69 %) and avoiding travelling (13.48 % and 20.98 %). Significantly higher percentage of college educated primigravida women took care of clothes and hygiene during pregnancy as compared to their counterparts who were high school educated while no significant differences were found among the multigravida women based on

their educational level. Irrespective of the gravida significantly higher percentage of college educated women took care of clothes, hygiene, workload during pregnancy as compared to the high school educated women. Overall it could be inferred that more number of college educated women took better care of antenatal check ups, diet, rest, hygiene, workload and avoided travelling during pregnancy as compared to the high school educated pregnant women. A few significant differences were noted among them based on their order of gravida.

Based on the family monthly income levels of the sample women, it was noted that irrespective of the gravida all the pregnant women in both the income groups found to have checked up weight, haemoglobin level, blood, Rh factor and also have taken TT vaccination during pregnancy. In addition to it above 96 per cent pregnant women having family monthly income below Rs 10 000 checked up blood pressure followed by urine test (62.35 %) and dental check up (25.88 %). The corresponding percentages of the women having income above Rs 10 000 were 97.64, 72.94 and 48.03 . With respect to the special diet during pregnancy it was noted that 20 percent pregnant women having family monthly income below Rs 10 000 and 46 per cent pregnant women having family monthly income above Rs 10 000 found to take up special diet during pregnancy. Significantly a higher percentage of pregnant women having monthly income above Rs 10 000 found to take special diet during pregnancy irrespective of the order of gravida and based on order of gravida as compared to their counterparts in the family monthly income group below Rs 10 000. Majority of the pregnant women in both the income groups found to have taken enough rest during pregnancy. No significant difference was found in it between these groups. Fifty four per cent pregnant women in the

family monthly income group of above Rs 10 000 found to have taken care of workload followed by clothes (51.76 %) personal hygiene (27.05 %) and avoided travelling during pregnancy (17.64 %). The corresponding percentages for the same in the monthly income group of below Rs 10 000 were 22.35, 23.52, 11.76 and 20.00. Few significant differences were noted among these income groups' women in the enlisted aspects of care based on order of gravida as well as irrespective of the order of gravida. Some of these findings are in line with the results reported by Shankar (1962), Madhunath (1974), Pendse and Giri (1983) and Kaur (1991).

4.6.2 Concerns Of The Sample Pregnant Women About Their Unborn Babies

The concerns of the sample women about their unborn babies are depicted in table 14. Irrespective of their order of pregnancies and family monthly income their common concerns about their unborn babies found to be health & growth, normalcy, gender & number of foetuses besides their prospective types of birth. Irrespective of the order of gravida 79 per cent and 98 per cent high school educated and college educated pregnant women were concerned about health & growth of their unborn babies respectively followed by types of their prospective birth (62.92 % and 59.28 %), foetal normalcy (24.2 % and 51.85 %), number of foetuses present in uterus (13.48 % and 20.98 %) and gender of foetuses (11.23 % and 14.81 %). Significantly a higher percentage of the college educated pregnant women were concerned about the health & growth status of their unborn babies as well as about their normalcy as compared to the pregnant women, educated up to high school level. With respect to primigravida women no significant differences were found between the sample women's concerns about the

Table 14 Concerns of the sample pregnant women about their unborn babies

Concerns about foetus	Percentage of women						Z values			Percentage of women						Z values		
	High school educated (89)			College educated (81)						Income < Rs 10 000 (85)			Income > Rs 10 000 (85)					
	PG (48)	MG (41)	IP (89)	PG (47)	MG (34)	IP (81)	HPG vs CPG	HMG vs CMG	IP vs IP	PG (46)	MG (39)	IP (85)	PG (49)	MG (36)	IP (85)	BPG vs APG	BMG Vs AMG	IP vs IP
Health & growth	81.25 (39)	75.60 (31)	78.65 (70)	97.87 (46)	97.05 (33)	97.53 (79)	2.66**	3.66**	6.33**	80.43 (37)	71.79 (28)	76.47 (65)	95.91 (47)	94.44 (34)	95.29 (81)	2.50*	2.87**	3.80**
Normalcy	33.33 (16)	24.39 (10)	29.21 (26)	48.93 (23)	55.88 (19)	51.85 (42)	1.66 NS	3.10**	3.14**	19.56 (9)	25.64 (10)	22.35 (19)	55.10 (27)	52.77 (19)	54.11 (46)	4.50**	1.40 NS	4.57**
Gender	10.41 (5)	12.19 (5)	11.23 (10)	14.89 (7)	14.70 (5)	14.81 (12)	0.80 NS	0.28 NS	0.75 NS	17.39 (8)	12.82 (5)	15.29 (13)	8.16 (4)	13.88 (5)	10.58 (9)	---	0.14 NS	1.25 NS
Number	12.50 (6)	14.63 (6)	13.48 (12)	21.27 (10)	20.58 (7)	20.98 (17)	1.28 NS	0.75 NS	1.40 NS	19.56 (9)	20.51 (8)	20.00 (17)	22.44 (11)	11.11 (4)	17.64 (15)	0.37 NS	---	0.60 NS
Birth	75.00 (36)	48.78 (20)	62.92 (56)	61.70 (29)	55.88 (19)	59.28 (48)	1.75 NS	0.63 NS	0.42 NS	76.08 (35)	46.15 (18)	62.35 (53)	63.26 (31)	58.33 (21)	61.17 (52)	1.62 NS	1.09 NS	0.16 NS

Figures in parentheses indicate frequencies

NS – Non significant * - $P < 0.05$ level. ** - $P > 0.01$ level

PG – Primigravida MG – Multigravida IP – Irrespective of number of pregnancies

HPG – High school educated primigravida HMG – High school educated multigravida

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unborn babies based on their educational levels except a higher percentage of college educated pregnant women were concerned about the foetal health & growth as compared to their counterparts. With respect to the multigravida women it was noted that a higher percentage of the college educated multigravida women were concerned about health & growth and normalcy of their unborn babies as compared to the high school educated multigravida women and such differences were not found in the remaining enlisted concerns about foetuses.

Based on income levels of the sample women, it was recorded that irrespective of order of pregnancy 76 and 95 per cent pregnant women belonging to family monthly income group of below Rs 10 000 and above Rs 10 000 respectively were concerned about their unborn babies health & growth followed by types of their prospective birth (62.35 % and 61.17 %), foetal normalcy (22.35 % and 54.11 %), number of foetuses present in uterus (20.00 % and 17364 %) and gender of foetuse (15.29 % and 10.58 %). Z values indicate that no significant differences were noted between the income groups in the concerns of pregnant women about their foetuses irrespective of their order of pregnancy except more number of pregnant women belonging to family monthly income above Rs 10 000 were concerned about health, growth and normalcy of foetuses as compared to their counterparts. Similar trend of findings were noted in the primigravida women belonging to both the income groups. On the other hand significantly a higher percentage of multigravida pregnant women having monthly income above Rs 10 000 were concerned only about foetal health and growth as compared to their counterparts in the income group below Rs 10 000. While such significant differences were not found in the remaining enlisted concerns of foetuses.

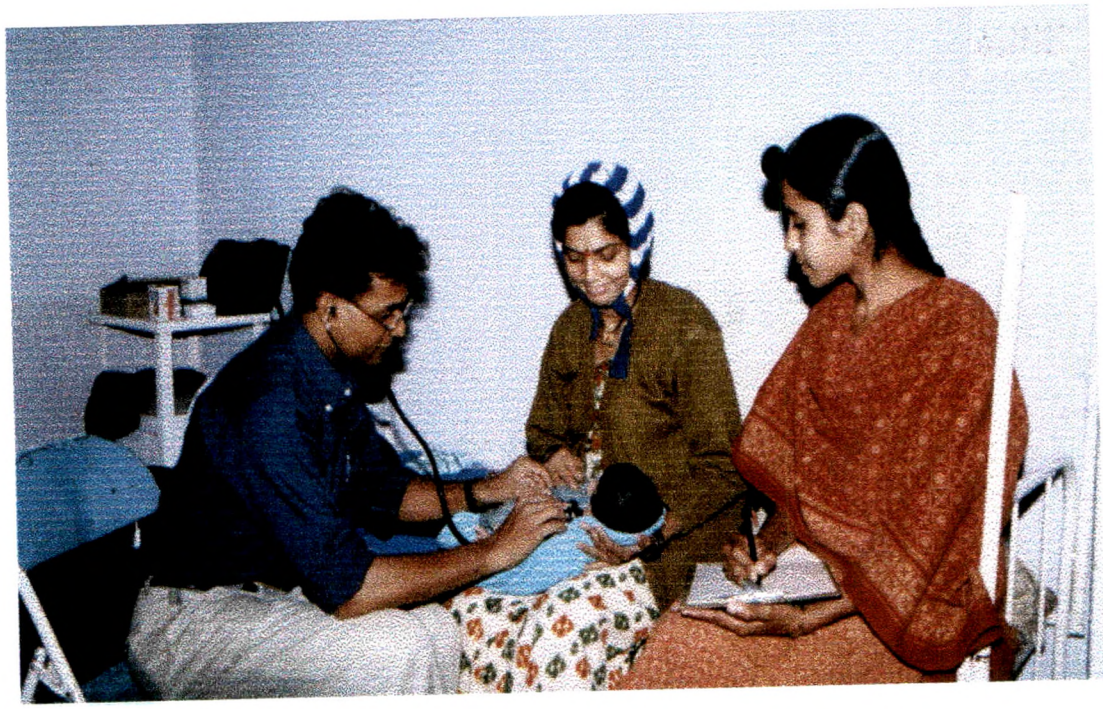
Overall it could be concluded that significantly higher percentage of the college educated pregnant women and pregnant women in the family monthly income group of above Rs 10 000 were concerned about foetal growth and normalcy as compared to their counterparts based on their order of gravida and irrespective of gravida.

4.6.3 Details Of The Newborn Of The Sample Women

Efforts were also made to follow up the sample pregnant women even after their full term out of keen interest (i.e. immediately after their confinement) to collect information about few aspects of all the sample foetuses after their birth.

It is obvious from the table 15 results that 68 per cent high school educated and college educated sample women reported to have normal deliveries irrespective of their order of gravida and the remaining of them reported to have caesarian section deliveries. No significant differences were noted in the types of deliveries of the sample women based on their educational levels as well as their order of gravida. This results conclude that majority of the sample foetuses were normal born. Similar trend of results were noted in the types of delivery of women based on their family monthly income levels as well as their order of gravida. However, significantly a higher percentage of the women having family monthly income below Rs 10 000 found to have caesarian section deliveries as compared to their counterparts in the family income group of above Rs 10 000.

With regard to the sex of the newborn babies it was found that 61-67 per cent sample women delivered male babies irrespective of their order of gravida, educational levels and family monthly income levels, while



Interviewing The Doctor and The Sample Women
Two Days After Her Delivery

Table 15 Details of the newborn of the sample women

Details of newborn	Percentage of women						Z values			Percentage of women						Z values		
	High school educated (89)			College educated (81)						Income < Rs 10 000 (85)			Income > Rs 10 000 (85)					
	PG (48)	MG (41)	IP (89)	PG (47)	MG (34)	IP (81)	HPG vs CPG	HMG vs CMG	IP vs IP	PG (46)	MG (39)	IP (85)	PG (49)	MG (36)	IP (85)	BPG vs APG	BMG vs AMG	IP vs IP
Types of birth																		
Normal	66.66 (32)	70.73 (29)	68.53 (69)	61.70 (29)	76.47 (26)	67.90 (55)	0.55 NS	0.06 NS	0.16 NS	65.21 (30)	74.35 (29)	69.41 (59)	63.26 (31)	72.22 (26)	67.05 (57)	0.22 NS	0.22 NS	0.33 NS
Cesarean	33.33 (16)	29.26 (12)	31.46 (28)	38.29 (18)	23.52 (8)	32.09 (26)	0.55 NS	0.66 NS	0.16 NS	34.78 (16)	25.64 (10)	30.58 (26)	16.32 (8)	27.77 (10)	21.17 (18)	2.25**	0.22 NS	1.50 NS
Sex																		
Male	54.16 (26)	70.73 (29)	61.79 (55)	70.21 (33)	67.64 (23)	69.13 (56)	1.77 NS	0.30 NS	1.33 NS	54.34 (25)	74.35 (29)	63.52 (54)	69.38 (34)	63.88 (23)	67.05 (57)	1.66 NS	1.10 NS	0.66 NS
Female	45.83 (22)	29.26 (12)	38.20 (34)	29.78 (14)	32.35 (11)	30.86 (25)	1.77 NS	0.30 NS	1.33 NS	45.65 (21)	25.64 (10)	36.47 (31)	30.61 (15)	36.11 (13)	32.94 (28)	1.66 NS	1.10 NS	0.66 NS
Birth weight																		
Above 2.5 kg	72.91 (35)	87.80 (36)	79.77 (71)	93.61 (44)	79.41 (27)	87.65 (71)	3.00**	1.00 NS	2.00*	78.26 (36)	79.48 (31)	78.82 (67)	87.75 (43)	88.88 (32)	88.23 (75)	1.28 NS	1.12 NS	2.00*
Below 2.5 kg	27.08 (13)	12.19 (5)	20.22 (18)	6.38 (3)	20.58 (7)	12.34 (10)	---	1.00 NS	2.00*	21.73 (10)	20.51 (8)	21.17 (18)	12.24 (6)	11.11 (4)	11.76 (10)	1.28 NS	---	2.50*

Figures in parentheses indicate frequencies

NS – Non significant * - $P < 0.05$ level. ** - $P > 0.01$ level

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the remaining 30-38 per cent of them delivered female babies. No significant differences were noted in the sex of new born based on the sample women's order of gravida, educational levels and family monthly income levels. It was also found out that none of the sample women have undergone ultrasonography scanning or any other tests for knowing foetal sex either to continue or discontinue their current pregnancy which is a very good sign and also is a surprising finding as by chance the member of male babies born to the sample women was nearly double to the number of female babies born to them.

With respect to the birth weight of newborn it was noted that irrespective of order of gravida 79 per cent high school educated pregnant women and pregnant women having family monthly income below Rs 10 000 delivered babies having weight above 2.5 kg at birth while it was 88 per cent for the college educated pregnant women and pregnant women having family monthly income above Rs 10 000. The remaining pregnant women of all the groups delivered babies having weight below 2.5 kg at birth. Significantly a higher percentage of college educated pregnant women and the pregnant women having income above Rs 10 000 delivered babies having weight above 2.5 kg at birth as compared to their counterparts and they were viceversa with respect to the babies having weight below 2.5 kg at birth. These results also depict the positive significant influence of maternal education and family monthly income on birth weight of newborn. These findings are in line with the findings of Kloosterman (1970) and Bhatia (1981).

SUMMARY

Chapter 5

SUMMARY

The study entitled **Intrauterine Growth Of Foetus And Factors Influencing It** was carried out on the randomly selected 170 pregnant women undergone ultrasonography from Parbhani town of Marathwada region. The objectives of the study were

- To study antenatal care practices adopted for the pregnant women
- To study intrauterine growth of foetuses in women during pregnancy
- To find out association between foetal growth and the selected background variables of pregnant women

The data pertaining to the study were collected by personally interviewing the pregnant women and their respective sonologists & gynaecologists; by taking anthropometric measurements of pregnant women as per the standard procedures and by perusing ultrasonography and maternity clinic reports.

Family Background Information Of Pregnant Women

Irrespective of order of gravida, education and income, majority of the sample pregnant women belonged to urban area. No significant differences were found in the areas of residence of the sample women. Forty one to fifty eight percent each primigravida and multigravida high school educated sample women belonged to joint and nuclear families and the corresponding percentages of the college educated women were 47-58 and 41-53. No significant differences were recorded in it. Relatively a higher percentage of the sample women belonged to small size families followed by

middle size and large size families. No significant differences were noted in them between the groups. Irrespective of their education and family income a majority of the sample women were non employed and were in the age range of 18-25 yrs. Few significant differences were noted in them. Significantly a higher percentage of the primigravida sample women having monthly income above Rs 10 000 belonged to joint families as compared to their counterparts in the monthly income below Rs 10 000 and it was viceversa with respect to the nuclear families.

Explanations Of The Women For Undergoing Ultrasonography

Knowing the normalcy of uterine contents was the common reason for all the sample women for undergoing ultrasonography followed by for the assessment of foetal growth (39-42 %); detection of foetal abnormalities (39-41 %); confirmation of pregnancy (17-22 %) and for the assessment of foetal position and forecasting types of delivery (15-19 %). No significant differences were found in them between the groups based on maternal education and family monthly income.

Intrauterine Anthropometric Measurements Of Foetuses

All the anthropometric measurements of foetuses at different age groups were obtained from the ultrasonography scanning reports of the sample women. The 4-5 months old foetuses of high school educated primigravida women weighed 190.00 $\pm$ 71.97 gm while it was 186.77 $\pm$ 63.20 gm in college educated primigravida women. At 9 months age they were 3097.66 $\pm$ 513.14 and 3200.50 $\pm$ 290.69 gm respectively. No significant differences were noticed in them. The mean femur length of the foetuses of high school educated primigravida women was 2.76 $\pm$ 1.42 cm at

4-5 months and at 9 months it was 7.29 ± 0.36 cm. The corresponding values of the foetuses of the college educated primigravida women were 2.28 ± 0.73 cm and 7.24 ± 0.32 cm. No significant differences were noted in them. The mean biparietal diameter of the foetuses of high school educated primigravida women was 3.63 ± 0.84 cm at 4-5 months and at 9 months it was 9.02 ± 0.38 cm. The corresponding mean diameters of the foetuses of the college educated primigravida women were 3.90 ± 0.48 cm and 9.19 ± 0.32 cm. No significant differences were recorded in them. The mean head circumference of the foetuses of high school educated primigravida women at 4-5 months was 18.69 ± 14.84 cm and it was 33.07 ± 1.53 cm at 9 months. The corresponding mean head circumferences of the foetuses of the college educated primigravida women were 14.22 ± 2.21 cm and 33.06 ± 1.43 cm. No significant differences were found in them. The high school educated primigravida women's foetal mean abdominal circumference was 15.16 ± 12.46 cm at 4-5 months and at 9 months it was 31.98 ± 2.15 cm. The corresponding mean abdominal circumferences of the foetuses of the college educated primigravida women were 11.56 ± 1.57 cm and 32.89 ± 1.77 cm. No significant differences were noticed in them. Similar trend of results were found in the intrauterine anthropometric measurements of the foetuses of women belonging to family income below Rs 10 000 and above Rs 10 000. Overall there was good growth and no abnormalities in the foetuses of the sample women irrespective of their education and family income.

With respect to primigravida it was noted that maximum mean gains in foetal weight of 1043.22 gm and 921.17 gm was found in 8-9 months old foetuses of the high school educated and college educated women respectively while maximum mean weight gains of 1183.77 gm and

1067.70 gm were found in 8-9 months foetuses of the high school educated and college educated multigravida women respectively. Maximum mean weight gains of 913.44 gm and 1060.34 gm were found in 8-9 months old foetuses of the primigravida women having monthly income below Rs 10 000 and above Rs 10 000 respectively while maximum mean gains of 1051.40 gm and 1074.78 gm were found in 8-9 months old foetuses of the multigravida women having income below Rs 10 000 and above Rs 10 000 respectively. It was deduced that after 9th month of pregnancy there was a tremendous decrease in the mean gains of intrauterine foetal weight of women belonging to both the income and educational groups. Maximum mean gain of 4.49 cm and 3.56 cm were noted in the intrauterine head circumference of 7-8 months old foetuses of the high school educated and college educated primigravida women respectively. On the other hand maximum mean gains of 6.57 cm and 5.73 cm were recorded in the head circumference of the high school educated and college educated multigravida women respectively. Maximum mean gain of 4.58 cm was noted in the intrauterine head circumference of the 8-9 months old foetuses of primigravida women having income below Rs 10 000 while it was 4.63 cm in the 7-8 months old foetuses of the primigravida women having income above Rs 10 000 while the maximum mean gains of 6.96 cm and 5.02 cm were noted respectively in the intrauterine head circumference of 5-6 months and 7-8 months old foetuses of the women having income above Rs 10 000. It was inferred that after 9th month there was tremendous decrease in the mean gains of intrauterine head circumferences of the foetuses of the women belonging to both the educational and family monthly income groups.

Family income and family environment found to have significant positive correlation with the femur length, biparietal diameter and abdominal circumference of the foetuses and they found to have no significant correlation with head circumference of the foetuses. Income and environment of families played a significant positive role in foetal growth. Gestational age, chronological age, education, weight, height, spacing between pregnancies, haemoglobin level, physical and mental health of the pregnant women were found to have significant positive correlation with foetal weight while maternal employment and workload had significant negative correlation with the foetal weight. Order of gravida, positive attitudes towards pregnancy and previous obstetric history of pregnant women were found to have no significant correlation with foetal weight. Foetal femur length was positively correlated with gestational age, chronological age, education, weight, height, spacing between pregnancies, physical & mental health and haemoglobin level of the pregnant women while it was significantly negatively correlated with maternal employment and workload. Order of gravida, positive attitudes towards pregnancy and previous obstetric history of the pregnant women found to have no significant correlation with it. Biparietal diameter of foetuses was significantly negatively correlated with maternal employment & workload while it was significantly positively correlated with maternal chronological age, education, order of gravida, weight, height, spacing between pregnancies, physical & mental health and past obstetric history. The head circumferences of foetuses were found to have significant positive correlation only with gestational age and haemoglobin level and it was significantly negatively correlated with maternal employment and workload. Abdominal circumference of the foetuses was significantly positively

correlated with gestational age, maternal chronological age, education, weight, height, spacing between pregnancies, physical & mental health and haemoglobin level and it was significantly negatively correlated with maternal employment and workload.

Antenatal Care Practices Of Sample Women And Details Of Newborn

Above 95 percent of the high school and college educated pregnant women found to have undergone nearly all the necessary antenatal medical checkups irrespective of their gravida. However significantly a higher percentage of the college educated primigravida and multigravida women found to have undergone all the necessary antenatal checkups as compared to their counterparts in high school educated group. Only 43 per cent college educated and 25 per cent high school educated pregnant women consumed special diet irrespective of their order of gravida. Significantly a higher percentage of the primigravida high school educated women as well as the college educated women irrespective of their order of gravida found to have consumed special diet as compared to their counterparts. Significantly higher percentage of the multigravida high school educated women as well as the college educated women irrespective of gravida found to have taken sufficient rest as compared to their counterparts while based on primigravida such significant difference was not noted. Irrespective of the gravida significantly a higher percentage of the college educated women took care of clothes, hygiene, workload during pregnancy as compared to the high school educated women. Based on their family monthly income few significant differences were noted in all the studied aspects of antenatal care practices of the sample women. Overall it was inferred that a higher percentage of the college educated women and women having family monthly income above

Rs 10 000 found to have taken better care of antenatal check ups, diet, rest, hygiene, workload and avoiding travelling during pregnancy.

With respect to primigravida women no significant differences were found between the sample women's concerns about the unborn babies based on their educational levels except a higher percentage of the college educated pregnant women were concerned about the foetal health & growth as compared to their counterparts. While a higher percentage of the college educated multigravida women were concerned about health & growth and normalcy of their unborn babies as compared to the high school educated multigravida women and such differences were not found in the remaining enlisted concerns about their foetuses. Significantly higher percentage of the college educated pregnant women and pregnant women in the family monthly income group of above Rs 10 000 were concerned about foetal growth and normalcy as compared to their counterparts based on their order of gravida and irrespective of gravida.

Majority of the newborn of the sample women were normal born. Sixty one to sixty seven per cent of the sample women delivered male babies irrespective of their order of gravida, educational levels and family monthly income levels, while the remaining 30-38 per cent of them delivered female babies. Irrespective of maternal education and family monthly income, majority of the sample women delivered babies having weight above 2.5 kg at birth.

IMPLICATIONS OF THE STUDY

The research study carried out on intrauterine growth of foetus and factors influencing it clearly indicates that maternal age, education, weight, height, spacing between pregnancies , health status, haemoglobin level and family's income & environment have significant positive correlation with foetal growth. As majority of the sample women have taken proper care during pregnancy their foetal intrauterine anthropometric measurements were nearly as per the standards. After the confinement of the sample women it was also found that majority of the sample women had normal deliveries and majority of their newborn weighed above 2.5 kg at birth. None of the newborn were abnormal and all of them were hale and healthy. These interesting findings are very useful to the students, researchers, policy makers as well as for the extension officers who are concerned about care of women and children. These findings are also useful in planning effective educational programmes for convincing emphatically the people about the need of caring girls right from childhood for helping them to attain optimum growth and to take proper care during pregnancy as healthy women can surely produce healthy babies having no deformities and defects. Children are not only the parental property but also the precious resources of nation at large. Healthy and normal children can build up healthy, happy and civilized society and nation. Therefore this study findings emphasize that children have to be cared and protected well right from conception.

INTRAUTERINE GROWTH OF FOETUS AND FACTORS INFLUENCING IT

Smita A Dakh
99 H – 12 M
M.Sc. (Home Science)
Specialization in CD & FR

Prof. V N Patnam
Professor & Head
Dept. of CD & FR

The study was carried out in Parbhani town on 170 randomly selected pregnant women, undergone ultrasonography. The data pertaining to the study were collected by personally interviewing the pregnant women and their respective sonologists and gynaecologists; by taking anthropometric measurements of pregnant women and from ultrasonography and maternity clinic reports. Majority of the sample foetuses' intrauterine anthropometric measurements were almost in par with the standards irrespective of the women's education and family monthly income. After 9th months there was tremendous decrease in the mean gains of foetal intrauterine anthropometric measurements irrespective of the women's educational and family monthly income levels. A few significant differences were found in the intrauterine anthropometric measurements of the foetuses based on order of gravida, maternal education and family income. Family income & environment; gestational age, maternal chronological age, weight, height, spacing between pregnancies, physical & mental health and haemoglobin level during pregnancy had significant positive correlation with intrauterine foetal growth. Significant positive correlation was also recorded between foetal weight and its biparietal diameter, head circumference, abdominal circumference and femur length. Overall the college educated pregnant women took better care during pregnancy as compared to the high school educated pregnant women. Majority of the women had normal deliveries and gave birth to normal & healthy babies.

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ANNEXURES

ANNEXURE – I

INTRAUTERINE DEVELOPMENT OF FOETUS AND FACTORS INFLUENCING IT

1. Name and address of pregnant woman

2. Age : yrs.

3. Caste : Religion : Tel No.

4. Type of family of pregnant woman : Nuclear / Joint / Extended

5. Family background

Family members	Education	Occupation	Monthly Income	Other sources of income

6. Family size of pregnant woman _____

7. Who counseled you or advised on general health & prenatal care in family and about what all aspects?

8. Educational level of pregnant woman _____

9. What was your age at menarche and how were the menstrual cycle? Regular or irregular? What were the reasons?

10. Give details of your health history before marriage

		Problems	Action taken
Reproductive health Mental health General physical health			

11. Occupation of pregnant woman _____

12. Job timings of pregnant woman

13. Type of job
    a) Part time / Full time / Hourly basis
    b) Sedentary work / Moderate work / Heavy work

14. Environment at working place

Surroundings	Working place
Hygienic / Unhygienic	Hygienic / Unhygienic
Pollution free / polluted	Pollution free / polluted
Well ventilated / cramped	Well ventilated / Cramped
Sanitary facility Yes / No	Sanitary facility Yes / No

15. Floor of working place of pregnant woman : Ground floor / 1st floor / 2nd floor / 3rd floor

16. Does your employer provide facilities or special consideration to you because of pregnancy ?

Avoids heavy work

Avoids travelling or tours

Provision of leave for ill health or any other problem sympathetically

Provision of rest period during work

Any other facility or consideration given to you _____

17. Anthropometric measurements of pregnant woman

Height : cm

Weight (kg) month wise :

1 st	2 nd	3 rd .....
4 th	5 th	6 th .....
7 th.....	8 th	9 th .....

18. Order of current pregnancy (inclusive of abortion)

Order	Age at pregnancy (Yrs)	Gap between consecutive Pregnancy	Type of delivery / abortion

19. Details of clinical investigation of current pregnancy and action taken

Particulars of investigations	Current pregnancy	Action taken

20. What are the reasons (medical & personal) for abortions if any ?

21. What types of special care are you taking during prenatal period ?

Diet

Health

Hygiene

1. Oral hygiene
2. Body hygiene
3. Clothes

Antenatal check ups (what all) undergone

Doctors consulted for taking antenatal care (details)

22. What is your meal pattern during pregnancy and details about consumed foods.

Routine pattern	General consumed foods & amount
Breakfast Lunch Snacks Dinner	

23. What was your general meal pattern before conception and foods consumed ?

Breakfast

Lunch

Snacks

Dinner

24. Describe your family environment (interpersonal relationships) specially during pregnancy ?

25. What type of privileges are you given due to pregnancy ?

26. What aspects of foetus and delivery you are concerned about ?

27. What type of work pressure you have during Pregnancy ?

28. What are your attitudes towards current pregnancy ?

29. For how many hours do you rest generally in a day ?

30. Details of outcome of current pregnancy

Foetal sex _____ Weight _____(kg)

Health status of neonate

31. Details about delivery of the current pregnancy

ULTRASONOGRAPHY ASSESSMENTS OF FOETUS

Number of foetuses	:	_____
Presentation of foetus	:	
Foetal weight (gm)	:	
Biparietal diameter (cm)	:	
Head circumference (cm)	:	
Abdominal circumference (cm)	:	
Femur length (cm)	:	
Foetal heart rate (b/m)	:	
Congenital anomalies	:	
Calculated gestational age	:	
Calculated expected date of delivery	:	

ANNEXURE – II

MATERNAL BACKGROUND AND INTRAUTERINE ANTHROPOMETRIC MEASUREMENTS OF SAMPLE FOETUSES

Sample number	Maternal age (yrs)	Education	Family Income	Order of gravida	Gestational age (wks)	Anthropometeric measurements				
						Wt (gm)	BPD (cm)	HC (cm)	AC (cm)	FL (cm)
1	27	10	7500	2	23	437	5.08	19.76	16.66	3.86
2	29	12	25000	2	22	446	5.3	19.1	16.9	3.5
3	30	15	18000	2	21.3	440	4.9	15.2	16	3.3
4	28	17	10000	1	15.5	118	3.3	9.8	9.2	1.2
5	26	17	35000	1	16.1	125	3.4	13	10.4	2.1
6	30	5	5000	2	35.3	2990	8.6	32.5	28	6.9
7	30	10	28000	2	35.4	2531	9	32.57	30.98	6.63
8	29	12	18000	2	35.1	2888	8.4	32.2	31.4	7.39
9	31	15	10000	2	36	3000	8.76	32	32.9	7.14
10	26	10	10000	2	37.3	3481	8.8	33	34.9	7.2
11	30	10	24000	2	36.5	3151	8.9	33	33.9	6.9
12	30	17	7500	2	38	2247	8.8	32.3	28.4	6.8
13	30	10	18000	2	29	1289	7.82	27.6	23.8	5.5
14	32	15	18000	2	29.1	1299	7.07	26.7	25.2	5.71
15	26	10	11000	2	24.5	678	6	22.9	19.5	4.2
16	30	5	6000	2	26.3	880	6.67	24.64	21.05	4.96
17	27	17	8000	1	22.3	480	5.7	20.4	16.7	3.8
18	35	5	10000	2	24	636	6	22.1	18.2	4.4
19	35	10	30000	2	36.4	3729	8.7	33.2	35.5	7.5
20	38	10	21000	2	34.3	2472	8.51	30.58	30.17	6.78
21	21	10	11000	1	24.4	750	5.94	22.13	19.8	4.52
22	20	5	5000	1	24.2	630	6.13	22.85	19.05	4.15
23	20	5	5000	2	18.4	230	4.2	16.4	12.8	2.6
24	24	15	10000	1	23.1	560	5.07	21.17	17.6	4.13

x

25	25	10	11000	2	34.6	2610	8	31.8	31.9	7
26	22	5	5000	2	33	2165	8	30.4	27.2	6.8
27	20	10	5500	2	17.4	156	4	14.2	11.7	2.4
28	19	10	10000	2	13	100	1.9	6	5	1.1
29	20	5	7500	1	16	150	3.6	13.33	10.1	2.23
30	24	15	16000	1	20	295	4.65	17	13.6	3.17
31	24	17	12000	2	18.4	239	3.9	15.73	13.24	2.67
32	19	12	13000	1	18	195	4.2	14.3	11.9	2.6
33	19	12	6000	1	30.2	1307	6.67	24.4	23.74	5.65
34	22	5	5000	2	18.1	180	3.9	15	13	2.6
35	19	5	7000	2	18.2	230	4.1	16	12.8	2.8
36	22	12	20000	1	18.4	228	4.2	16.4	12.8	2.6
37	25	15	18000	1	24	625	6.45	22	19.26	4.62
38	25	15	16000	1	21.1	419	5	18.7	15.7	3.7
39	20	10	5000	1	23	284	5.7	13	18.9	4.1
40	24	10	25000	2	28.2	1153	7.2	25.9	22.9	5.3
41	20	10	11000	1	19	239	4.13	15.73	13.24	2.67
42	18	10	30000	1	31.5	1132	7.01	28	21.5	5.7
43	25	10	5000	2	27	1050	6.8	26.5	21.2	5.2
44	13	10	6000	1	28.1	1237	7	25.6	24	5.3
45	19	10	10000	1	32.5	2026	7.9	29.3	28.8	6.1
46	25	5	11000	2	31.4	1900	7.8	27.6	27.2	6.3
47	19	5	5000	1	30.1	1465	7.76	29.4	25.2	5.3
48	23	5	5000	1	31.5	2000	8	28.7	26.9	6
49	20	10	19000	1	41.4	2179	8.33	30.28	28.23	6.72
50	20	10	9000	1	39	2914	9.02	33.66	30.91	7.55
51	25	15	8000	2	32	1997	8.21	31.32	28.68	6.1
52	24	15	12000	1	35	2875	8.7	32.7	33.2	6.5
53	22	15	10000	1	36	2930	8.6	36.7	33.4	6.7
54	20	10	8000	1	40.2	2876	8.8	32.1	31	7.4
55	24	15	45000	1	35	2500	8.69	31.29	30.7	6.89
56	22	15	6000	1	34.1	2199	8.7	30.9	28.9	6.5
57	21	17	16000	1	39.3	3561	9.7	35	35	7.4

58	24	15	25000	1	34.2	2105	8.9	31	28.3	6.4
59	24	15	20000	2	30.4	1800	8.9	30.8	28.8	7.3
60	21	12	15000	1	38.1	3022	9.6	34.1	32	7.3
61	25	10	6000	1	38.1	3700	9	34.7	32.2	7.1
62	25	10	20000	1	35.2	2636	8.8	31.3	30.6	7
63	20	10	5000	1	35	2985	8.6	32	19.1	6.2
64	20	5	5000	2	38.3	3000	8.8	33.6	30.2	7.7
65	20	5	12000	1	35	2870	8.7	33	33.2	6.2
66	22	5	9000	1	33.6	2245	8.5	29.6	30.7	6.4
67	22	5	5000	1	34	2190	8.2	32	28.8	6.4
68	22	10	8000	2	19.4	240	4.7	17.3	13.4	3.2
69	22	12	17000	2	32	1990	8.2	31.33	28.64	6.14
70	24	10	10000	2	15.6	120	3.2	12.7	10	2.0
71	30	8	10000	2	40	2927	8.45	32.29	31.41	7.39
72	26	12	20000	2	25.5	800	6.4	23.8	19.9	4.8
73	26	10	10000	1	28	1100	7.01	26.78	21.5	5.7
74	20	5	8000	1	13.4	110	1.78	16.3	15.22	6.7
75	21	10	15000	1	19.1	281	4.35	15.86	14.19	2.88
76	22	10	12000	1	24	636	6	22.1	18.2	4.4
77	22	12	10000	1	31.5	1674	7.99	29.64	25.16	6.27
78	22	12	15000	2	30.1	1470	7.36	29.3	25.23	5.74
79	20	15	10000	1	32.5	2040	8.21	31.3	28.6	6.1
80	25	12	12000	1	33.4	2100	8.33	30.28	28.23	6.72
81	21	5	15000	1	36.2	3055	8.76	32.08	32.98	7.14
82	24	12	30000	2	16.2	195	3.3	12	9.2	1.8
83	37	5	8000	2	35.4	2885	9.02	32.57	30.98	6.63
84	20	10	20000	1	15.5	120	3.3	12	9.2	1.8
85	20	5	5000	1	21.6	479	5.08	19.76	16.66	3.86
86	22	8	9000	2	23.1	556	5.67	21.17	17.65	4.13
87	18	5	5000	1	16.2	190	3.3	12	9.2	1.8
88	22	10	5000	1	23	630	5.19	20.9	18.19	4.2
89	27	12	20000	2	36	2645	8.87	32.2	32.88	6.82
90	30	15	8000	1	37	3000	9.12	32.54	30.42	7.43

91	27	10	20000	1	30.4	1130	8.91	31.5	30.9	5
92	22	5	5000	1	15.5	118	3.3	12	9.2	1.8
93	25	12	5000	2	40.2	2795	9.12	32.54	30.42	7.43
94	24	5	5000	1	19	290	4.65	17	13	3.17
95	32	12	24000	2	39.2	3940	9.2	34.6	34.6	7.8
96	24	12	20000	1	34.6	2644	8.5	30.6	31	6.8
97	26	15	15000	1	36.3	3012	9	31.5	32.5	7.1
98	22	12	9000	1	36	2936	8.7	36.6	33.3	6.6
99	22	5	12000	1	36	2900	8.87	32.28	32.8	6.22
100	25	5	9000	1	24.2	628	6.13	22.85	19.05	4.15
101	22	5	6000	2	39	3742	9.4	34.9	31.8	7.9
102	20	8	20000	1	37.5	3151	9.5	33.1	33.6	7
103	25	12	5000	1	31.1	1438	7.97	27.8	23.81	6.05
104	27	10	10000	2	18.4	240	4.13	15.73	13.24	2.67
105	25	12	15000	1	38.1	3020	8.9	31.48	30.92	6.84
106	25	10	7000	2	31.2	1801	7.66	28.4	27.2	6.23
107	26	12	26000	1	39.3	3739	9.3	34.9	35.1	7.84
108	20	10	5000	1	19.4	250	4.6	17.5	14.2	3.1
109	32	12	8000	2	38.3	3134	8.9	33	33.3	7.1
110	23	15	12000	1	33	2480	8	30.4	27.2	6.8
111	19	10	6000	1	34.4	2617	8	31.9	31	6.8
112	25	12	7000	2	34.6	2615	8.5	31.4	31	6.8
113	22	12	5000	1	33	1934	8	31.2	26.4	6.4
114	32	12	9000	1	37.2	3225	9.2	32.9	34.2	6.9
115	30	10	11000	2	36	3000	8.7	32.4	32.8	6.9
116	22	8	12000	2	34.3	2610	8.4	31.6	30.2	6.6
117	20	10	12000	1	26	655	7.2	26.2	18.2	4.9
118	19	9	5000	1	14.3	105	2.9	12	9.2	1.6
119	28	10	8000	2	35	3025	8.3	31.3	32.3	6.7
120	20	10	12000	1	37	2820	9.17	34.56	30.17	7.48
121	22	5	9000	2	31.2	1600	7.8	29.9	27.8	5.7
122	20	5	5000	1	23.3	500	5.7	22.1	19	4.1
123	19	12	22000	1	17.1	150	3.9	14.3	11.5	2.3

124	23	12	12000	1	18.3	235	4.3	15.7	12.5	2.8
125	23	12	20000	1	35.6	2560	9.2	33.1	28.9	6.9
126	23	10	25000	1	39.5	3943	9.6	34.8	35.5	8
127	28	15	25000	2	37.5	2235	9.6	33.3	33.2	7.42
128	30	12	15000	2	29	1200	7.1	28.1	24	5.5
129	19	7	8000	1	32.1	2026	7.9	29.3	28.8	6.1
130	30	10	6000	1	37	3241	9	32.3	33.3	7.3
131	20	7	9000	1	24.2	670	6.1	22.4	18.1	4.7
132	20	8	7000	2	31.6	1460	8	29.9	26.2	6.3
133	23	15	50000	1	18.1	220	3.9	15	12.8	2.8
134	22	10	12000	1	18.3	237	4.04	15.19	13.13	2.67
135	20	10	15000	2	24.3	630	6	23.6	19	4.4
136	24	12	15000	2	30.1	1480	7.36	29.3	25.23	5.74
137	26	10	12000	2	26.1	870	6.85	24.7	21.4	4.71
138	27	15	25000	1	24.1	640	6	22.1	18.2	4.4
139	28	15	20000	1	33.4	2170	8.33	30.28	28.23	6.72
140	24	12	12000	2	34.1	2530	8.25	30.08	29.39	7.18
141	24	12	15000	1	15.5	115	3.3	12.5	9.4	1
142	25	12	10000	2	18.4	240	4.2	16.4	12.8	2.6
143	22	15	20000	1	36.2	3025	8.76	32.08	32.98	7.14
144	24	10	10000	1	24	630	6.1	22.84	19.04	4.16
145	23	15	9000	1	30	1300	7.7	25	26.4	5.8
146	32	17	10000	2	31.2	1800	7.66	28.4	27.2	6.23
147	25	15	9000	2	17.1	161	3.8	13.1	10.8	2.2
148	20	12	12000	1	28	1150	7	25.2	22.5	5.03
149	20	12	8000	1	22.1	480	5.4	20.5	16	4
150	25	11	7000	2	27	1000	8.7	24	22.4	5.2
151	23	5	15000	1	19	240	4.4	16.9	13.3	2.8
152	25	12	15000	1	18.4	290	4.2	16.4	12.5	2.5
153	18	12	12000	2	22.5	435	5.5	20.6	17.3	4.3
154	20	5	8000	1	21.2	425	5.0	19.2	17.3	3.5
155	21	7	9000	1	23.2	636	6.01	22.8	18.6	4.4
156	25	12	20000	1	23.1	556	5.67	21.17	17.65	4.13

157	26	15	12000	1	24	640	5.9	22.0	18.1	4.5
158	26	12	15000	1	24.5	670	6.85	24.8	19.5	4.21
159	24	12	11000	2	27	980	8.0	27.0	21.0	5.2
160	21	12	9000	2	24.1	640	6.2	22.9	19.1	4.2
161	29	15	15000	1	24.1	635	6.0	22.1	18.2	4.4
162	26	12	10000	1	24.2	635	6.13	22.85	19.05	4.15
163	20	12	5000	1	31.2	250	7.8	29.9	27.8	5.7
164	25	12	5000	2	24.2	640	6.1	22.4	18.0	4.6
165	22	12	12000	2	31.6	2000	8.0	29.9	26.2	6.3
166	22	12	12000	2	29.5	1280	7.3	27.8	26.0	5.6
167	22	12	5000	1	35.6	2996	8.8	32.5	30.6	7.1
168	26	12	12000	1	36.2	3025	8.76	32.08	32.98	7.14
169	22	6	12000	2	29.5	1250	7.3	27.82	24.07	5.89
170	20	5	5000	2	36	2600	8.91	31.46	30.9	6.85

Keys

- 1 – Primigravida women
- 2 – Multigravida women
- Wt – Weight of foetuses in gm
- BPD – Biparietal diameter of foetuses in cm
- HC – Head circumference of foetuses in cm
- AC – Abdominal circumference of foetuses in cm
- FL – Femur length of foetuses in cm

MARATHWADA AGRICULTURAL UNIVERSITY
PARBHANI.

Place Dharwad

ANNEXURE-XI

Date : 2/3/2002

(Pl. see rule No. (A) (1)

FORMAT FOR THESIS EVALUATION REPORT FOR M.SC.

TO BE USED BY EXTERNAL EXAMINER.

Name of the student Shri MS Smita Abasaheb Dakh

Subject of M.Sc. Child development & family relationships The external examiner is advised to evaluate the thesis taking into consideration the following points.

1. The Choice of the problem and its importance :

Whether it is of academic importance or has Practical utility or otherwise ? — It is of academic importance

Does the title adequately indicate the work presented in the thesis ? — yes

2. Review of literature :

Whether the previous literature on the topic of research has been properly reviewed and is uptodate ? — yes

3. Methodology to be adopted :

Has the candidate used appropriate methods for carrying our his research work ? — yes ★

4. Planning and conduct of pot and field experiments.

Whether appropriate statistical design was used with replications ? — yes

5. Collection of data :

Whether the data collected were adequate to draw valid conclusions ? — The size of the sample should have been more

6. Interprotation and presentation of data :

A) Whether the data was properly analysed and interpreted ? — yes
(Use of Graphs, tables and photographs made)

B) Whether units of measurements, scientific and technical terms properly cited ? — yes

7. Bibliography :

a) Whether the bibliography is sufficient and relevant ? — good

b) Whether all the references cited in the text are incorporated in the bibliography and Vice-versa ? — Yes

Gramatical construction and typographical errors if any, May be pointed out :

* Sampling — What percent of radiology clinics were selected 7/? . A sample of 170/? formed the sample ?

I congratulate the student and the teacher for the good quality of research.

SENIOR SCIENTIST
A.I.C.R.P. (Child Development &
Family Relations
College of Rural Home Science
U.A.S. Dharwad-580 005