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# "TO STUDY THE ANTHROPOMETRIC CHANGES DURING PREGNANCY"

**Roshni Singh**
Research Scholar

**Dr. Mamta Khapediya**

**Assistant Professor**
**(Home Science),Mata Jijabai Govt. P.G. College,**
Moti Tabela, Indore (M.P)

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## INTRODUCTION

Pregnancy is the time when one or more babies grow inside a woman's uterus. It can result from natural conception through vaginal intercourse or from assisted reproductive technology. Pregnancy can end in a live birth, miscarriage, abortion, or stillbirth, typically occurring around 40 weeks from the last menstrual period. This period is known as the gestational age, which is slightly over nine months. Implantation happens about 8–9 days after fertilization. An embryo refers to the developing baby in the first seven weeks after implantation, while the term fetus is used up until birth.

Early signs of pregnancy can include missed periods, sore breasts, morning sickness, increased hunger, implantation bleeding, and frequent urination. Pregnancy tests can confirm pregnancy, and contraception methods are used to prevent it.

Pregnancy is divided into three trimesters of about three months each. The first trimester involves fertilization and embryo development. Miscarriages are most likely during this time. In the second trimester, the mother may begin to feel fetal movement. By 28 weeks, over 90% of babies can survive outside the womb with good medical care, but those born this early may face serious health issues.

Good prenatal care can lead to better pregnancy results. Nutrition is key for the baby's growth, and prenatal care includes avoiding drugs and alcohol, exercising, and regular health check-ups. Pregnancy complications may include high blood pressure, gestational diabetes, and severe nausea. Ideally, labor begins at term, which ranges from 37 to 42 weeks. Babies born

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before 37 weeks are preterm and face more health risks. Inducing labor before 39 weeks is generally not advised unless medically necessary.

Most pregnant women experience various symptoms that indicate pregnancy, such as breast tenderness and morning sickness. Key early signs include the presence of human chorionic gonadotropin (hCG) in blood and urine, a missed menstrual period, and implantation bleeding. Other physical signs are increased basal body temperature, Chadwick's sign (bluish discoloration of the cervix), Goodell's sign (softening of the cervix), and Hegar's sign (softening of the uterine isthmus).

Pregnancy can also lead to hormonal changes causing pigmentation of the linea alba, known as linea nigra, and darkening of the nipples and areolas. Additional signs may include stretch marks, varicose veins, peripheral edema, gum bleeding, and melasma. Other common symptoms consist of constipation, back pain, pelvic girdle pain, headaches, and changes in food preferences. Pregnant women may also experience urinary tract infections and disrupted sleep. Each pregnancy is unique, and not all women will have the same symptoms. Most common signs do not significantly impact daily activities or pose serious health threats.

During pregnancy, a woman's body undergoes many normal changes. The uterus grows larger and may lower in position near the end of pregnancy. Notable changes also occur in the breasts, with larger and darker areolae. Key hormonal changes include rising levels of progesterone and estrogens, which stop the menstrual cycle. Having a full-term pregnancy at a young age reduces the risk of certain cancers, and this risk decreases further with each additional full-term pregnancy.

As early as the second trimester, the fetus is seen as a successful allograft because it is genetically different from the mother. Increased immune tolerance during pregnancy helps prevent the mother's body from reacting against the fetus. Women with RhD negative blood carrying a RhD positive fetus should receive a Rho(D) immune globulin shot to prevent Rhesus disease.

In the first trimester, women experience a significant increase in minute ventilation, and the womb can grow to the size of a lemon by eight weeks. Common early symptoms include nausea and tender breasts. Braxton Hicks contractions, which are practice contractions, may start around six weeks but are usually not felt until later.

Throughout pregnancy, a woman's total blood volume increases, especially in the third trimester. Maternal activity and sleep positions can influence fetal development due to potential

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restrictions in blood flow. For instance, lying flat may compress a major blood vessel, which can be relieved by lying on the left side.

Most weight gain occurs in the third trimester, and the woman's abdomen changes shape as the fetus prepares for birth. The fetal head may drop into position, which eases upper abdominal pressure but increases the need to urinate and pressure on the pelvic floor. The timing of this head engagement varies, particularly between first and subsequent pregnancies.

Anthropometric measurements are noninvasive assessments of the body, important for evaluating nutritional status in both children and adults according to the CDC. They are mainly used in children to check health status, nutritional adequacy, and growth patterns, which are essential for assessing a child's well-being. In adults, these measurements help evaluate health, dietary status, and future disease risks, as well as diagnose obesity and determine body composition.

Key elements of anthropometry include height, weight, head circumference, body mass index (BMI), body circumferences (waist, hip, limbs), and skinfold thickness. Accurate repeated measurements can reveal medical, nutritional, or social issues in children. Abnormal results in pediatric cases need further investigation. Athletes can also benefit from these measures to enhance performance and detect potential medical issues like eating disorders. Furthermore, they are used to assess pregnant women's nutritional status and obesity in patients. Gestational weight gain (GWG) is a natural part of pregnancy, reflecting the growth of the fetus, placenta, and maternal tissues. The Institute of Medicine (IOM) concluded in 2009 that all women, including those with obesity, should gain some weight during pregnancy, with specific targets based on their pre-pregnancy weight. However, many pregnant women, regardless of their pre-pregnancy body mass index (BMI), gain too much weight and often retain more fat after giving birth. Excessive weight gain during pregnancy can lead to complications such as gestational diabetes, high blood pressure, and an increased likelihood of having a cesarean delivery, while too little weight gain can cause risks like preterm birth and low birth weight. Staying within recommended weight gain ranges can help reduce these risks and support better recovery after childbirth.

Research has shown that there is limited data connecting appropriate weight gain to body composition changes during pregnancy. Some studies have indicated that women who followed older IOM guidelines retained less fat postpartum, and differences in fat gain patterns were noted among women with varying weights. For overweight or obese women, excessive GWG was linked to greater fat retention compared to those who gained an adequate amount of

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weight. The 2009 guidelines differ from the 1990 recommendations, especially regarding the classification of women by weight. Given the rise in BMI among women entering pregnancy, further research is needed to evaluate whether current GWG targets effectively lower maternal fat stores during pregnancy.

Despite the intention for fat stores to support breastfeeding, women with higher BMIs often breastfeed less than those with normal BMIs, which can increase health risks in future pregnancies and long-term for the mother. Various methods exist to assess body composition, but measuring body composition during pregnancy poses challenges due to limitations in some methods and the complexities of distinguishing between maternal and fetal tissues. Anthropometric measurements, like weight and circumferences, remain practical for estimating body composition during pregnancy and can be effectively used in clinical settings.

Anthropometric measurements are important for monitoring health during pregnancy, especially without advanced technology. These measurements help predict neonatal outcomes, evaluate maternal nutrition, and identify potential complications.

Key clinical aspects include predicting neonatal health, as maternal weight, height, and body mass index (BMI) are linked to infant birth size, indicating risks like low birth weight or intrauterine growth retardation. They also assist in monitoring maternal nutrition through measures like Mid-Upper Arm Circumference (MUAC) and skinfold thickness. Additionally, high indicators in late pregnancy may signal risks for cesarean delivery and other complications.

Early detection of metabolic risks is possible with specific skinfold and MUAC measurements, allowing for timely intervention. Serial measurements of symphysis-fundal height (SFH) track fetal growth and may highlight issues like macrosomia or growth restriction. Essential tools include weight and height for BMI, MUAC for nutritional status, skinfold thickness for body fat assessment, and growth charts for comparing measurements.

Gestational weight gain during pregnancy affects infant birth weight. A strong link exists between how much weight a mother gains and the child's birth weight, with low maternal weight gain being a preventable cause of low birth weight (LBW). Many pregnant women do not gain the recommended amount of weight, either gaining too little or too much. Understanding maternal factors and body measurements is essential, as these can help predict the risk of low birth weight.

**Importance**

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Anthropometric measurements such as weight, height, circumferences, and skinfolds are important during pregnancy for several reasons. They help assess maternal nutrition, predict risks like gestational diabetes, preeclampsia, and low birth weight, guide nutritional advice, monitor body composition changes, and ensure healthy fetal development.

Key uses include nutritional assessment, risk prediction for complications, monitoring fetal growth, tracking body composition, and enabling early intervention. Common measurements used are Body Mass Index (BMI), Mid-Upper Arm Circumference (MUAC), skinfold thickness, and waist circumference. These simple and cost-effective methods allow healthcare providers to proactively manage pregnancies for better outcomes for mothers and babies.

**Objectives**

The objective of the study was to examine how changes in anthropometric indicators during pregnancy, including weight gain vary compare changes among body mass index (BMI) (kg/m2) groups and examine how the changes were associated with adequacy of gestational weight gain GWG.

**Sample size**

In this paper, 60 pregnant women have been selected by random sampling method.

**Variables**

In this paper, independent variable was pregnant women and dependent variables are anthropometric measurements such as height, weight, gestational weight gain and BMI.

**Methods**

This paper was a secondary analysis of data from a study conducted to examine the role of weight changes during pregnancy.

**Anthropometrics**

Maternal height was measured at baseline (<12 weeks). Weight was measured at baseline, 16-22 weeks of gestation (second visit) and at 26- 32 weeks of gestation (third visit) during pregnancy. GWG was calculated using the measured weight at baseline subtracted from the weight at visit 3.

**Result**

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Table presents the anthropometric measurements of 60 participants:

| S.no. | Anthropometric Indicators | Category | No. of samples | Percentage |
|---|---|---|---|---|
| 1. | Height | 140-150 cm | 14 | 23.3% |
| | | 150-160 cm | 27 | 45% |
| | | 160 cm and above | 19 | 31.6% |
| 2. | Weight | 40-50 kg | 22 | 36.6% |
| | | 50-60 kg | 27 | 45% |
| | | 60 kg and above | 11 | 18.3% |
| 3. | BMI (kg/m2) | 18.5-25 (normal) | 15 | 25% |
| | | 25-30 (overweight) | 18 | 30% |
| | | More than 30 (obese) | 27 | 45% |
| 4. | Gestational Weight Gain (GWG) | 3-4 kg | 12 | 20% |
| | | 4-6 kg | 25 | 41.6% |
| | | More than 6 kg | 23 | 38.3% |

From the above result, it was concluded that 23.3% of pregnant women have 140-150 cm height, 45% have 150-160 cm height and 31.6% have 160 and above height. Similarly 36.6% pregnant women have 40-50 kg weight, 45% have 50-60 kg weight and 18.3% have 60 and above weight.

25% pregnant women have 18.5-25 BMI, 30% have BMI between 25-30 and 45% have more than 30 and above BMI. 20% pregnant women gain 3-4 kg gestational weight, 41.6% women gain 4-6 kg weight and 38.3% women gain 6 kg and above gestational weight during pregnancy.

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**Discussion**

Pregnancy is a time that requires a lot of physical effort as the body changes significantly. It is essential for women to gain weight within the recommended range to support their health and their baby's health. In this study, variations in body changes during pregnancy were noted based on the weight status of women at the start of their pregnancy. Women with obesity generally experienced negative changes, gained less weight, and showed more variation in their measurements compared to women with normal or overweight BMI. Women who gained the right amount of weight had minimal fat gain and slight positive changes in their body measurements, while those who did not gain enough experienced negative changes. Greater fat gain was linked with excessive weight gain compared to adequate weight gain.

The data show that body changes during pregnancy vary based on a woman's early pregnancy BMI and relate to how adequately they gain weight. Women who gained the right amount had little fat gain and avoided negative changes, supporting current guidelines. Further studies are needed to confirm these results and examine how these changes relate to other health factors during pregnancy.

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