

## Correlation of maternal BMI with fetal adipose subcutaneous tissue

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### Abstract

Study objective was to test the relationship between maternal body mass index (BMI) and fetal abdominal subcutaneous fat tissue (ASCT) measured by ultrasound. The total number of pregnant women enrolled in the prospective study was 280. For all participants BMI was determined. Study participants underwent ultrasound exam at 32<sup>nd</sup> week of gestation and ASCT was measured. Positive correlation has been found between ASCT and maternal BMI ( $p < 0.01$ ,  $r = 0.1612$ ). The study showed that intrauterine growth and development is partially regulated by the maternal BMI.

**Keywords:** maternal BMI, fetal adipose subcutaneous tissue, ultrasound

### Introduction

Of the many probable insults throughout the fetal life, Hales and Barker favored undernourishment as the most likely root, though numerous factors could operate in a similar manner. The original theory<sup>1</sup> unnoticed the typical connection among maternal obesity, fetal macrosomia and augmented risk of obesity and diabetes for the offspring. A modern version of the thrifty phenotype hypothesis allows for this<sup>2</sup>. On the other hand, the relationships among maternal nutrition, fetal nutrition, neonatal size and later diabetes and obesity appear to be more complicated than originally proposed<sup>3</sup>. This may have important implications for preventive strategies<sup>4</sup>.

Anthropometric ultrasound measurements, analytic of fetal body composition of normal fetuses, have shown a distinctive exponential pattern of the growth profile during the second half of gestation, both in lean mass and in fat mass, suggesting that the measurement of fetal fat could provide a more sensitive and specific marker of abnormal fetal growth and consequently risk for obesity and diabetes in offspring.

Therefore, our study objective was to test the relationship between maternal body mass index (BMI) and fetal abdominal subcutaneous fat tissue (ASCT) measured by ultrasound.

## Korelacija maternalnog BMI sa fetalnim potkožnim masnim tkivom

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### Apstrakt

Studija je imala za cilj testiranje odnosa maternalnog indeksa telesne mase (BMI) i potkožnog masnog tkiva abdomena fetusa imerenog ultrazvučnim pregledom.

Studija preseka je obuhvatila 280 ispitanica u 32. nedelji trudnoće kojima je nakon merenja BMI ultrazvučno izmeren ASCT. Nađena je pozitivna korelacija maternalnog BMI i ASCT ( $p < 0.01$ ,  $r = 0.1612$ ).

Rezultati su pokazali da na intrauterini rast i razvoj utice i maternalni BMI.

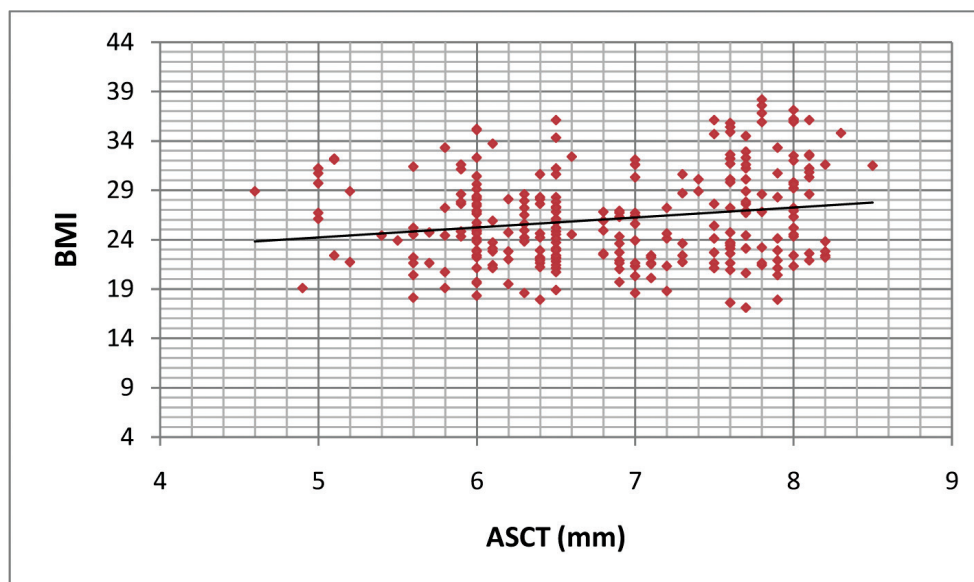
**Cljučne reči:** maternalni BMI, fetalno potkožno masno tkivo, ultrazvuk

## Materials and Methods

The prospecting study was carried out in secondary (Hospital for Gynecology and Obstetrics, Clinical Hospital Centre “Zemun”) and tertiary health care center (Clinic for Gynecology and Obstetrics, Clinical center of Serbia). Singleton pregnancy was an inclusion criterion, while confirmed fetal anomaly was exclusion criterion. The total number of pregnant women enrolled in the study was 280. For all participant of the study BMI was determined. Study participants underwent ultrasound exam at 32nd week of gestation and ASCT was measured. Measurements were taken from the inner to the outer aspect of the echogenic subcutaneous fat surrounding the abdomen at the level of the fetal kidneys. Statistical analysis of the data was performed using SPSS statistical software (IBM Corporation, Chicago, IL). Descriptive data were expressed as mean values with standard deviation. Categorical data is presented in absolute numbers with percentages. Correlation analysis was done by calculating Pearson product-moment correlation coefficient.

## Results

Mean year of age of study participants was  $27.91 \pm 4.82$ . Total of primigravida 121 (43.21%), 100 secundigravida (35.71%), 54 tercigravida (19.29%), 5 multigravida (1.79%) were enrolled in the study. Positive correlation has been found between ASCT and maternal BMI ( $p < 0.01$ ,  $r = 0.1612$ ), which is presented on Figure 1.



**Figure 1.** Correlation of maternal BMI and ASCT

## Conclusions

The ultrasound body-composition parameter measured in our study was fetal abdominal subcutaneous fat thickness. This non-traditional lean and fat mass parameter appeared to increase with maternal BMI. This observation was confirmed by identification of positive correlation between ASCT and maternal BMI. Intrauterine directive of adipogenesis might be an essential mechanism of the fetal origins of increased maternal BMI and offspring obesity. Fetal body fat rather than fetal body weight may possibly be the more relevant measurement to evaluate such relationships<sup>4</sup>. Our data might highlight the important influence of maternal BMI on fetal growth and body composition, which is in accordance with the other authors finding that overweight

risk is associated mainly with maternal obesity suggests that familial predisposition contributes to childhood growth in these offspring<sup>5</sup>. Intrauterine growth and development involves coordinated gene expression regulated by the milieu of the fetus, which is largely regulated by the mother.

Evaluation of the fetal nutritional state through estimation of fetal body composition by ultrasound, might improve the prediction of specific perinatal and offspring risks in conditions of fetal over-growth, so further studies are required in order to define and explain the correlation of maternal and fetal adipose tissue.

### **Literature**

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