# Relationship between Visceral Obesity and Plasma Fibrinogen in Obese Children

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## BACKGROUND

The prevalence of obesity has significantly increased worldwide with concern of its negative consequences that start early in childhood **[1].** The excess of visceral adipose tissue is associated with hypertension, prothrombotic and pro-inflammatory states **[2].** Elevation in fibrinogen level may be a mechanism by which obesity increases the risk of cardiovascular disease and has been positively related to visceral fat and body mass index (BMI) in adults **[3].**

## OBJECTIVE

To find possible association between visceral obesity and plasma fibrinogen, as one of the cardiovascular risk factors, in obese children.

## METHODS

- This study was a cross-sectional case-control study conducted in Diabetes, Endocrine and Metabolism Pediatric Unit (DEMPU), Pediatric Hospital, Cairo University including 43 prepubertal obese children, between 7-12 yrs old (BMI ≥ 95$^{th}$ percentile for age and sex according to Egyptian growth charts) with simple obesity and 40 non-obese (15$^{th}$ < BMI < 85$^{th}$ percentile for age and sex) age and sex matched controls.
- All children included in the study (after obtaining written informed consents from their legal guardians) were subjected to a detailed history, complete physical examination (including blood pressure measurement and readings were plotted on Egyptian blood pressure curves) , anthropometric assessment (including weight, height, calculated BMI, waist circumference and hip circumference), body composition analysis (using the computerized Body Composition Analyzer – *Tanita bc 418)*, ultrasonographic measurement of visceral adipose tissue and subcutaneous fat and laboratory testing of fibrinogen (Clauss method).

## RESULTS

**Table (1): Anthropometric, clinical, laboratory and radiological data in obese and controls.**

| Parameters | Obese (N=43) | | Control (N=40) | | t | p value |
|---|---|---|---|---|---|---|
| | Mean | ±SD | Mean | ±SD | | |
| Age(year) | 9.81 | 1.81 | 9.10 | 1.64 | -1.87 | 0.065 |
| Anthropometric | | | | | | |
| Wt. SDS | 2.92 | 1.25 | 0.006 | 0.55 | -13.86 | 0.000** |
| Ht. SDS | -0.58 | 1.07 | -0.70 | 0.63 | -0.657 | 0.514 |
| BMI(kg/m²) | 30.89 | 4.29 | 17.92 | 1.56 | -18.52 | 0.000** |
| BMI SDS | 3.03 | -0.50 | 0.64 | 0.68 | -18.16 | 0.000** |
| Waist circumference(cm) | 89.80 | 10.29 | 57.42 | 4.52 | -18.76 | 0.000** |
| Hip circumference(cm) | 96.47 | 12.78 | 68.92 | 6.73 | -12.40 | 0.000** |
| Waist/Hip ratio (n <0.72) | 0.93 | 0.05 | 0.83 | 0.04 | -9.38 | 0.000** |
| Body composition | | | | | | |
| Fat percentage | 40.14 | 7.82 | 14.26 | 4.89 | -18.20 | 0.000** |
| BMR (kcal) | 1325.97 | 192.1 | 1094.50 | 118.76 | -4.28 | 0.000** |
| TBW (L) | 24 | 5.61 | 17.35 | 4.07 | -6.13 | 0.000** |
| Clinical | | | | | | |
| SBP(mmHg) | 114.60 | 9.25 | 100.70 | 6.14 | -8.12 | 0.000** |
| SBP SDS | 0.21 | 0.80 | - 0.92 | 0.45 | -7.94 | 0.000** |
| DBP(mmHg) | 78.42 | 11.24 | 63.23 | 5.98 | -7.76 | 0.000** |
| DBP SDS | 0.54 | 1.30 | -1.24 | 0.82 | -7.53 | 0.000** |
| Biochemical tests | | | | | | |
| FIB (mg/ml) | 14.5 | 5.1 | 2.90 | 0.52 | -14.83 | 0.000** |
| Radiological | | | | | | |
| VAT (cm) | 5.96 | 0.77 | 2.45 | 0.65 | -18.59 | 0.000** |
| SCF (cm) | 2.66 | 0.70 | 0.70 | 0.18 | -19.08 | 0.000** |

Wt. SDS (weight standard deviation score), Ht. SDS (height standard deviation score), BMI (body mass index), BMI SDS (body mass index standard deviation score), BMR (basal metabolic rate), TBW (total body water), SBP (systolic blood pressure), DBP (diastolic blood pressure), FIB (fibrinogen), VAT (visceral adipose tissue), SCF (subcutaneous fat) *P-value <0.05: significant ** P-value <0.001: highly significant.

- The mean fibrinogen level in obese group (14.5 +/- 5.1 mg/ml) was higher than the accepted normal range. Furthermore, it was significantly higher than that of control group (2.9 +/- 0.52 mg/ml) with a *p* value < 0.01. However, there was no statistically significant sex difference in obese group regarding fibrinogen level (p=0.925).
- Regarding the radiological findings, obese group had highly statistical significant differences in visceral fat (5.96+0.77 cm) and subcutaneous fat (2.66±0.70 cm); measured by ultrasound; than the control group (2.45±0.65 and 0.70±0.18 mg/ml respectively).
- When we correlated BP to BMI, VAT and SCF in the obese group, there was negative correlation between SBP and BMI (r = -0.028, p= 0.859), as well as DBP (r = -0.127, p= 0.418). SBP correlated weakly to SCF (r =0.01, p= 0.948), as well as DPB (r= 0.215, p= 0.167) with no statistical significance. However, there was positive correlation between SBP SDS and visceral fat (r=0.978, p < 0.01) as well as DBP SDS (r=0.976, p < 0.01).
- When we studied the correlation between fibrinogen (FIB) and other anthropometric, clinical, radiological parameters and body composition, results showed that in the obese group, FIB had significant positive correlation with BMI (P=0.032, r=0.327) **(Fig 1)**, fat percentage (P=0.05, r=0.301 ),VAT(P=0.035, r=0.323) **(Fig 2)** and SCF (P=0.05, r=0.301). Highly significant positive correlations with BMI SDS (P=0.007, r=0.402), Waist/Hip ratio (0.009, r=0.394) and DBP (P=0.006, r=0.416).

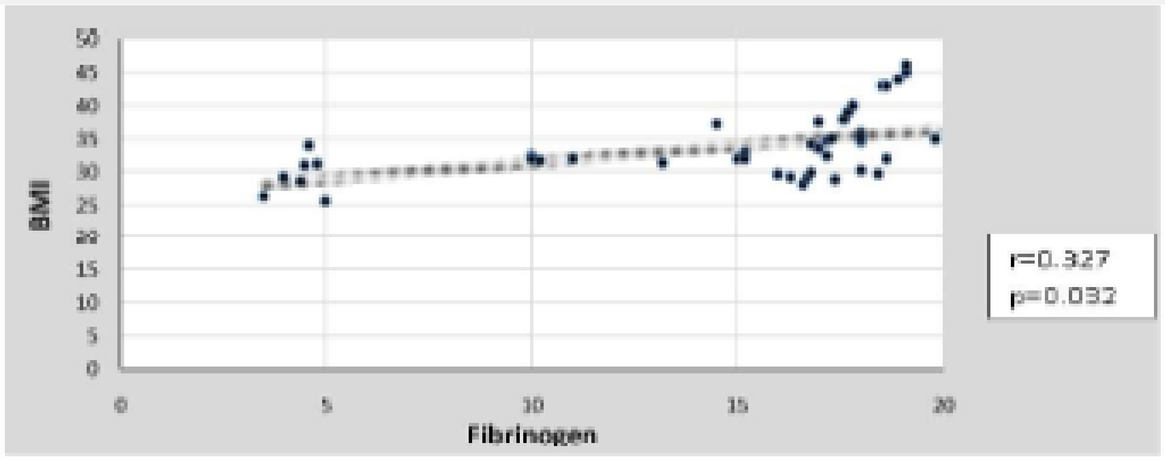


**Figure 1:** Positive correlation between Fibrinogen and BMI in obese

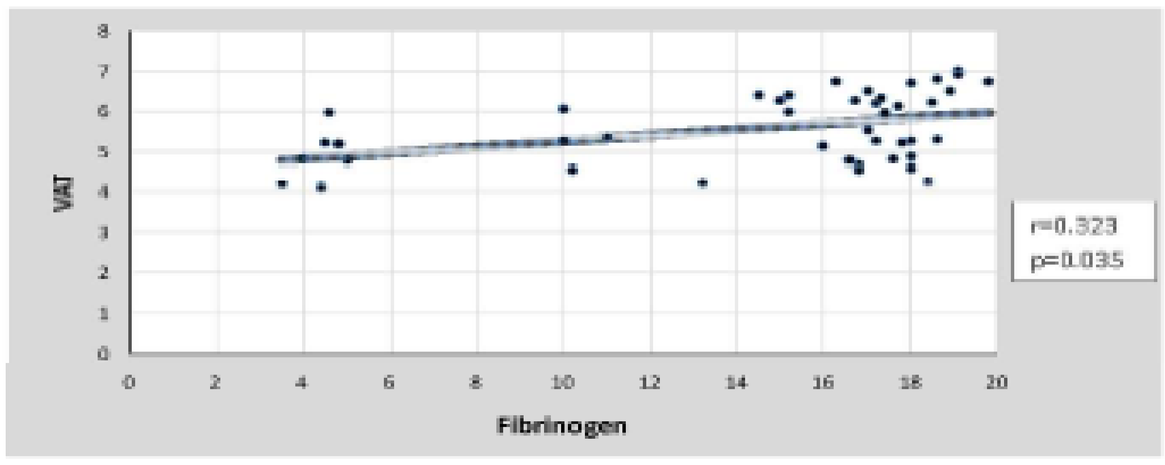


**Figure 2:** Positive correlation between Fibrinogen and VAT in obese

## CONCLUSION

There is highly significant increase in the fibrinogen level, visceral and subcutaneous abdominal fat (measured by US) in the obese group than controls. Fibrinogen had significant positive correlation with the different adiposity markers and blood pressure. VAT is a stronger predictor for cardiovascular risk compared to SCF.

## REFERENCES

**1- Bastien M et al (2014).** Overview of epidemiology and contribution of obesity to cardiovascular disease. Prog Cardiovasc Dis.; 56(4):369-81

**2- Franks PW et al (2010).** Childhood obesity, other cardiovascular risk factors, and premature death. N Engl J Med; 362:485–493

**3- Balagopal PB et al (2011).** Nontraditional risk factors and biomarkers for cardiovascular disease: mechanistic, research, and clinical considerations for youth;123(23):2749-69.

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