

**Obesity is responsible for increased blood pressure, left ventricular thickness and tension leading to early impairment of diastolic function**

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**Introduction:**

Obesity has been shown to lead to hypertension and increased left ventricular (LV) mass. The aim of this study was to investigate the impact of obesity on diastolic function in young subjects.

**Methods:**

Prospective echocardiographic measurements were performed in 25 obese children and 25 lean controls. Two-dimensional, M-mode and color M-mode ultrasound, conventional pulse wave Doppler and tissue Doppler imaging (TDI) were used to assess cardiac function.

**Results:**

Gender distribution was not different between the two groups but obese children were older ( $14.1 \pm 1$  vs  $12.9 \pm 1.7$  yrs,  $p < 0.01$ ) at the time of study. Body mass index ( $30.4 \pm 5.5$  vs  $18.8 \pm 1.7$ , Z-score  $2.58$  vs  $0.03$ ,  $p < 0.0001$ ), systolic ( $112 \pm 13$  vs  $101 \pm 10$  mmHg,  $p < 0.01$ ) and diastolic blood pressure ( $55 \pm 6$  vs  $52 \pm 7$  mmHg,  $p < 0.05$ ) were greater whereas heart rate ( $71 \pm 9$  vs  $77 \pm 9$  bpm,  $p < 0.05$ ) was lower in the obese group. Measurements of LV mass ( $132 \pm 42$  vs  $93 \pm 25$  g,  $p < 0.0001$ ), LV wall thickness (PW  $1.28 \pm 0.2$  vs  $1.14 \pm 0.17$  cm,  $p < 0.01$ ; IVS  $1.09 \pm 0.2$  vs  $0.96 \pm 0.16$  cm,  $p < 0.01$ ), LV end-diastolic diameter ( $4.8 \pm 0.4$  vs  $4.5 \pm 0.4$  cm,  $p < 0.01$ ) and volume ( $107 \pm 22$  vs  $91 \pm 22$  ml,  $p < 0.01$ ) were significantly greater in the obese children. Nevertheless, the relative LV thickness  $[(IVS+PW)/LVEDD]$  was not different between the 2 groups. Although LV systolic function (SF and EF) was not different, obese children had a significantly increased systolic ejection volume ( $69 \pm 17$  vs  $55 \pm 16$  ml,  $p < 0.01$ ). LV systolic wall tension was significantly increased in obese children ( $231 \pm 37$  vs  $199 \pm 35$ ,  $p = 0.002$ ) whereas wall stress was not. The mitral E deceleration time ( $131 \pm 24$  vs  $116 \pm 23$  sec,  $p < 0.05$ ), Doppler E/A ratio ( $2.1 \pm 0.5$  vs  $1.8 \pm 0.4$ ,  $p < 0.05$ ), Doppler/TDI E/E' ratio ( $7.1 \pm 1.6$  vs  $6.4 \pm 1.4$ ,  $p < 0.05$ ), TDI E'/A' ratio ( $2.1 \pm 0.5$  vs  $2.4 \pm 0.6$ ,  $p < 0.05$ ) and isovolumic relaxation time ( $65 \pm 12$  vs  $60 \pm 8$  ms,  $p < 0.01$ ) were significantly different between the obese and lean patients, suggesting early LV diastolic dysfunction in obese children.

**Conclusion:**

These data confirm that obese children have increased blood pressure and LV mass and suggest an adaptation of the LV dimension to increased LV thickness in order to keep wall stress constant. This leads to increased LV tension and is responsible for early impairment of LV diastolic function. Prevention of obesity is essential in order to prevent irreversible cardiac changes in this young and growing population.