**Background:** Body size measurements are critical in the correct assessment of cardiac adaptation to exercise in athletes. However, the impact of high body mass index (BMI) on cardiac dimensions in athletes is largely unknown. The aim of the study was to describe the normal cardiac parameters of a cohort of elite athletes characterized by BMI in the obesity range.

**Methods:** Between 2007 and 2014, 1857 elite athletes with complete anthropometric data (age 21±5 years, males 70%) free from any cardiac disease after a normal echocardiogram were studied. The analysis was focused on the echocardiograms of 50 athletes (72% rugby players) with BMI ≥ 30 (Group 1). We compared them with athletes matched for age and body surface area (BSA) with height > 1.95 m and BMI < 30 (Group 2, n=87) and age matched athletes with height < 1.90 m and BMI between 20 and 29 (Group 3, n=243).

**Results:** The number of hours per week of exercise was lower in athletes of Group 1 (17±6 vs 22±7 in Group 2 and 19±7 in Group 3, p < 0.001 between Group 1 and Group 2). Athletes belonging to Group 1 exhibited larger left ventricular end-diastolic diameter (LVEDD) compared with Group 3 (57±6 vs 53±6 mm, p < 0.001), but not with Group 2 (57±4, p=0.98). Twenty-five (50%) athletes of Group 1 vs 33 (38%) of Group 2 and 31 (13%) of Group 3 had a LV end-diastolic diameter > 57 mm (p < 0.001 between Group 1 and Group 3, p=0.23 between Group 1 and Group 2). Left ventricular (LV) wall thickness was higher in athletes of Group 1 (11±1 vs 10±2 in Group 2, p = 0.001, vs 9±1 in Group 3, p<0.001). Twelve (24%) athletes in Group 1 vs 19 (21%) in Group 2 and 16 (6%) in Group 3 exhibited a LV wall thickness > 11 mm (p < 0.001 between Group 1 and Group 3, p=0.85 between Group 1 and 2). Left atrial diameter was significantly higher in Group 1 compared to Group 3 (40±5 vs 36±1 mm, p<0.001). BMI had a lower correlation coefficient for LVEDD with respect to BSA (r=0.39, p<0.001 vs r=0.59, p < 0.001).

**Conclusions:** Athletes with BMI ≥ 30 are characterized by significantly increased LV size and left ventricular hypertrophy with wall thickness exceeding normal values in one in four cases.