



Patients and Methods 1

- 380 Patients enrolled (195 males, 185 females)
- Mean age: 56 +/- 12 years
- Moderate chronic kidney disease (eGFR EPI between 30 e 60 ml/min)
- No clinical evidence of any cardiopathy

Patients and Methods 2

- All patients underwent trans – thoracic echocardiography (M – mode, B – mode and Doppler evaluation) with microconvex probe (3.5 MHz)
- Echocardiographic evaluation was performed by three nephrologists with same proceedings.
- All images were obtained on three successive systolic and diastolic cycles and stored on optical media.

Patients and Methods 3

- Left ventricular end – diastolic and end – systolic volumes were evaluated according to Simpson's method
- Right ventricular end – diastolic volume was evaluated with M- mode echocardiography on long axis parasternal view and with B – mode four chambers apical view.
- TAPSE index survey was obtained by M – mode echocardiography apical view on tricuspid valve annulus. TAPSE value is calculated as distance (mm) between higher and lower level of tricuspid annulus excursion.
- Trans – mitralic doppler evaluation was performed on four chambers apical view placing sample volume at bottom level of mitral leaves.

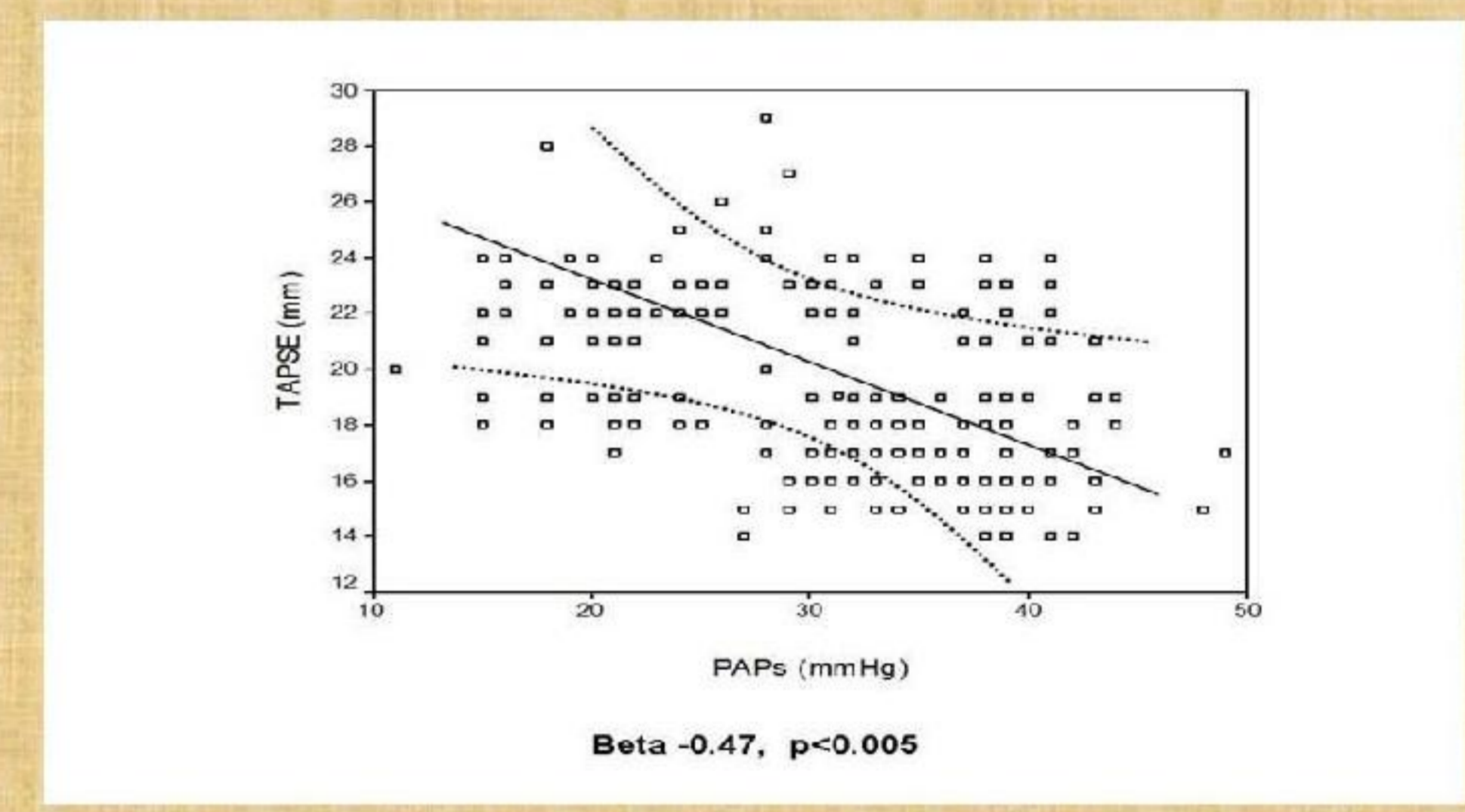
Results 1

- TAPSE index was slightly reduced (<18 mm) in 44.5% (90 patients) enrolled patients, while it has been strongly reduced (<15 mm) only in 10.3% of patients enrolled (21 patients)
- Right ventricular end – diastolic size higher than 22 mm was reported on 88 patients (43% of whole population), while higher values (> 26 mm) were reported in 107 of patients (52.9%). RVEDV higher than 30 mm was reported only in 6 of 202 enrolled patients (14.8%)
- PAPs (pulmonary systolic arterial pressure) values higher than 30 mmHg were reported in 58/202 patients (28.7%), while PAPs values higher than 40 mmHg were reported in 10/202 patients (5%)
- Ejection fraction was normal (57±5% and mean value of 56%) in all enrolled patients.

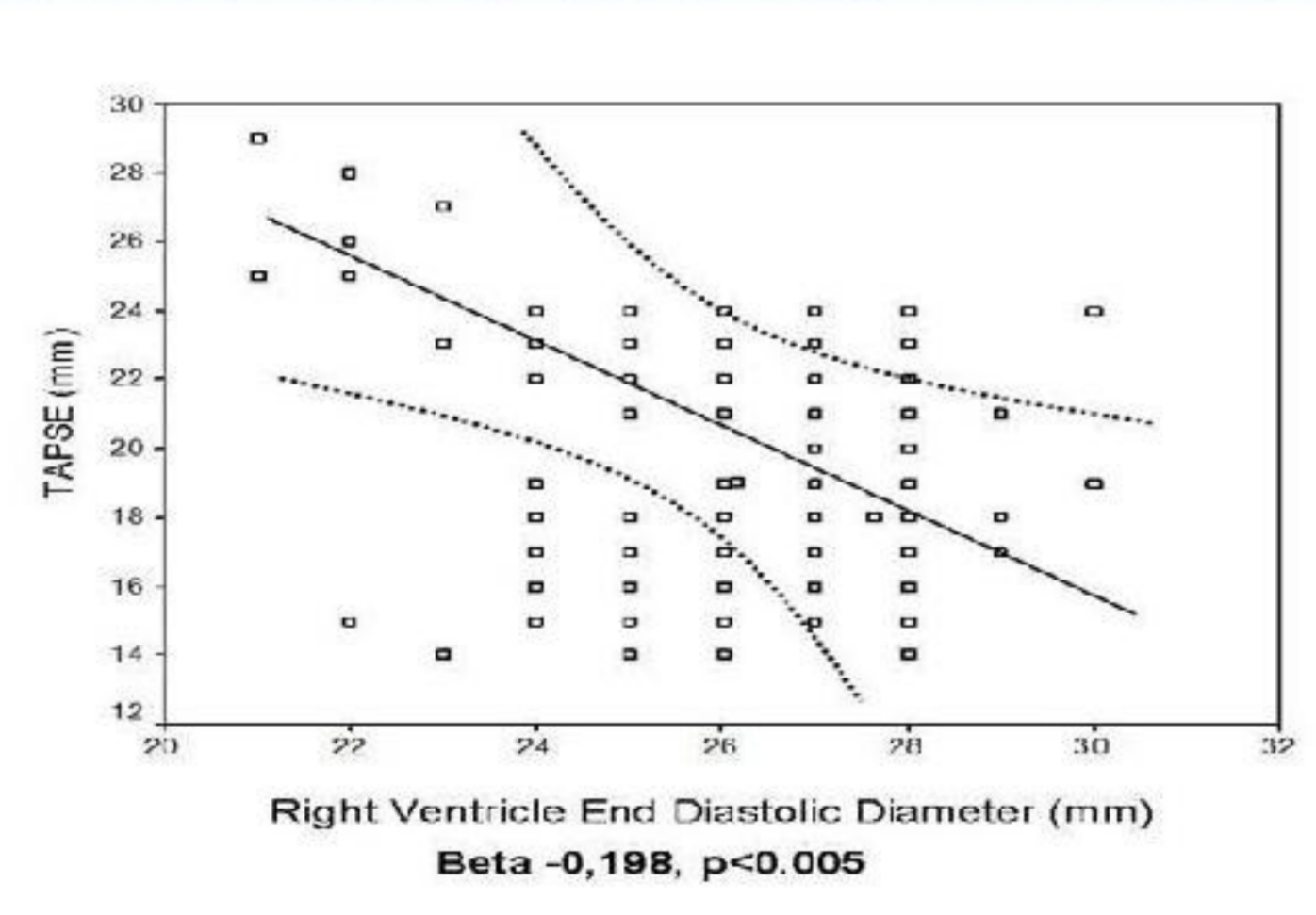
Results 2

- Significant reverse connections were observed between TAPSE and PAPs ($\beta=-0.47$, $p<0.005$), right ventricular end – diastolic volume ($\beta=-0.197$, $p<0.005$), Framingham score ($\beta=-0.17$, $p<0.005$) and age ($\beta=-0.17$, $p<0.005$).
- TAPSE values were significantly lower in smokers patients in respect of non smokers ones. No statistical significant distinctions between diabetic and non – diabetic patients were reported.
- There was no connection between eGFR, PTH, systemic blood pressure and TAPSE and/or PAPs.
- Right cardiac function parameters were distributed according to bimodal one with some patients (41/202) showing high PAPs values and low TAPSE values and other ones (161/202) with normal values of both parameters.

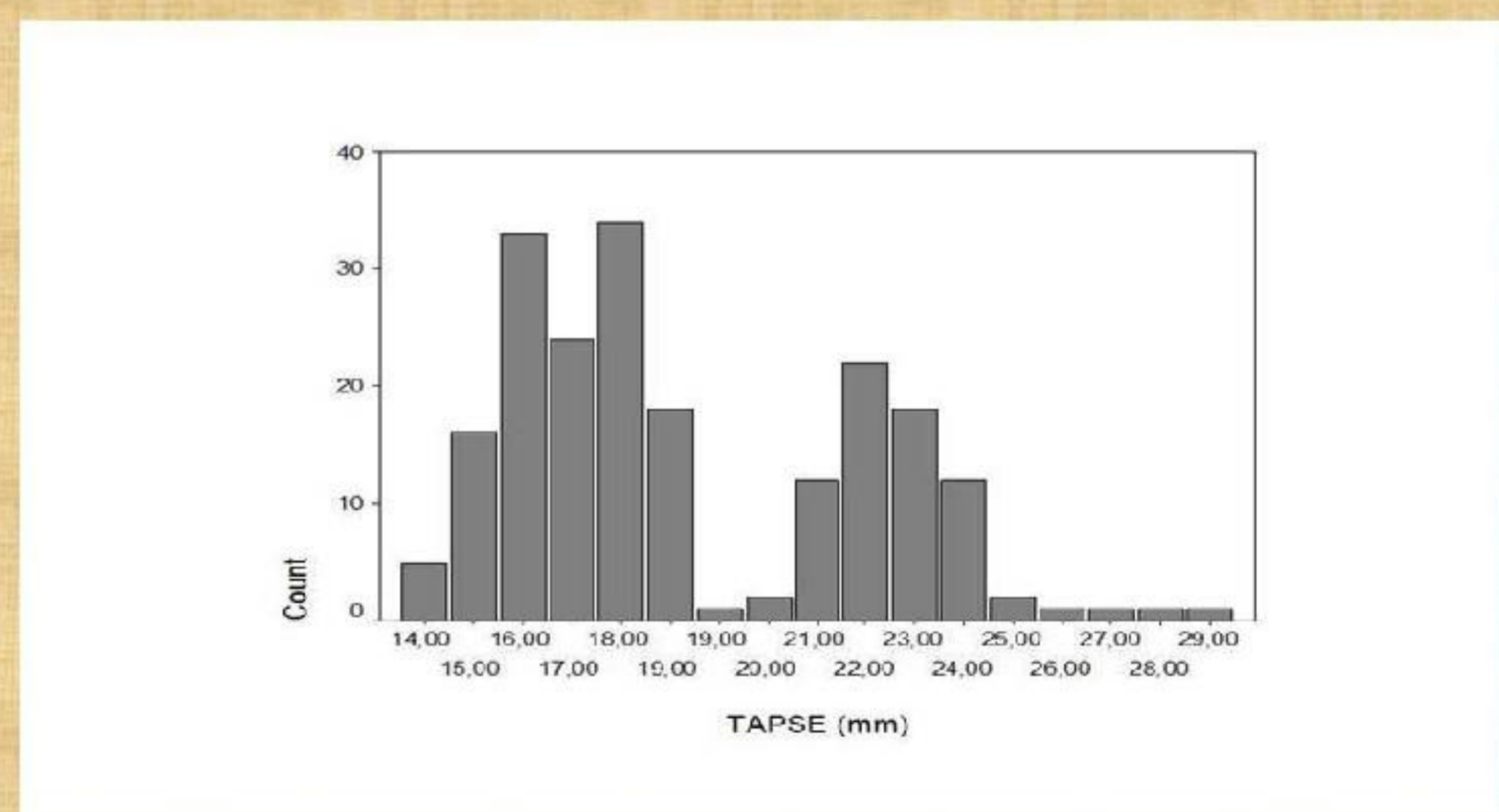
TAPSE – PAPs statistical correlations



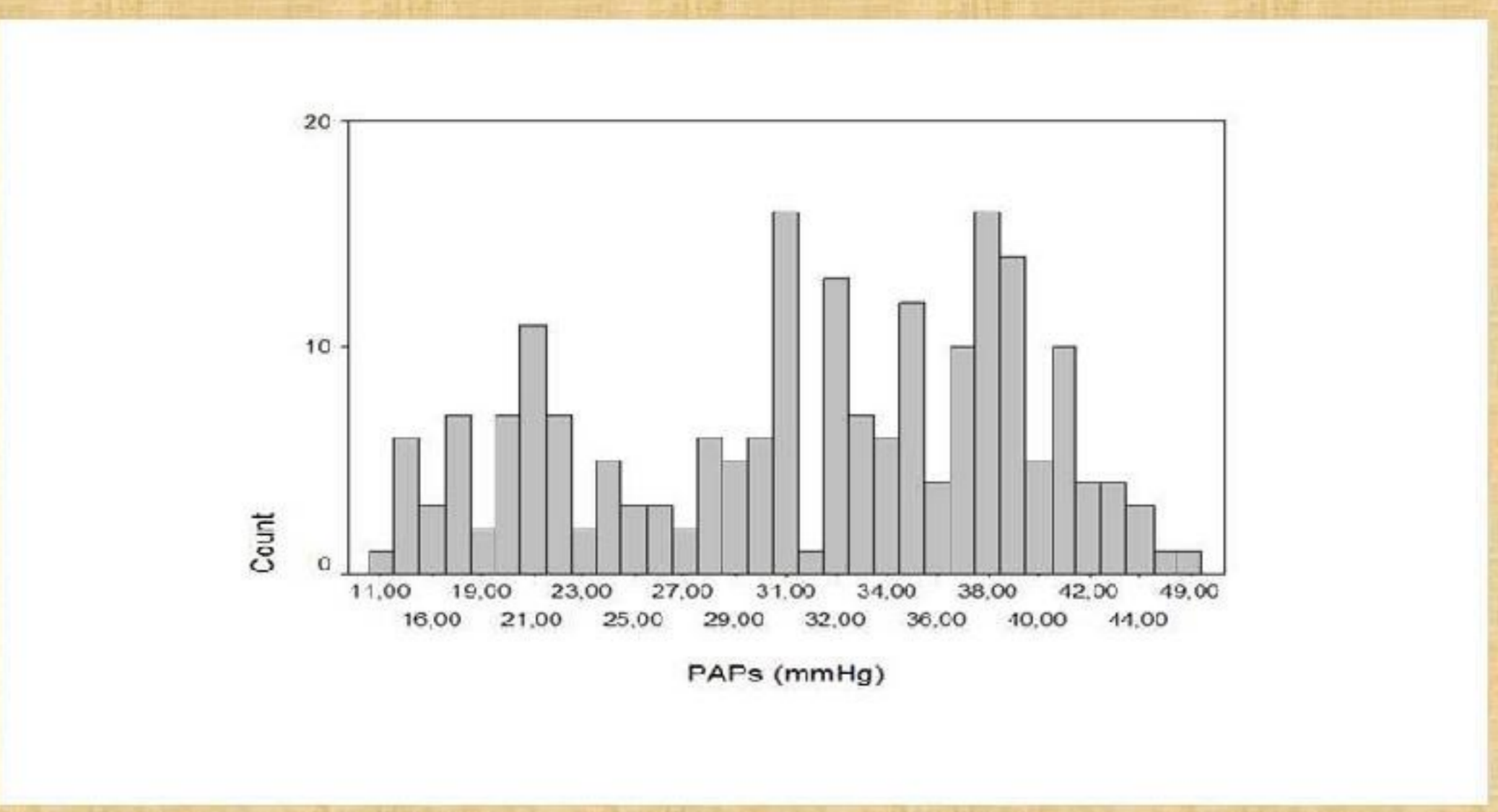
TAPSE – RVEDV correlations



TAPSE values distribution on study population



PAPs values distribution on study population



Conclusions

- Our study underlines early right ventricular dysfunction (lower TAPSE and higher PAPs values) in patients affected by mild to moderate chronic kidney disease without any primary cardiac involvement.
- TAPSE evaluation is quite easy and quick to perform. It doesn't need of contrast media and it is also evaluable in patients with bad echocardiography acoustic views.
- Our data suggest the importance of right ventricular dysfunction early diagnosis, especially in end – stage CKD patients in which we have to provide vascular access for hemodialysis. Patients with pulmonary hypertension should be evaluated for CVC or distal AVF set up rather than proximal AVF (preload increase).

