RESULTS

Evaluation of pulmonary artery systolic pressure **(PASP)** by correlating the cardiac catheterization with Doppler echocardiography were done in all patients.

The patients were classified into three groups according to the etiology of pulmonary hypertension and correlation between catheter and Doppler echocardiography were done in each group separately. Then the student T-test was done inbetween the three groups.

Table (1): Shows sex distribution among studied group, there was 58 male (57%), and 44 female (43%), there were 49 cases with congenital heart disease and 53 cases with **acquired heart disease**. There was no statistical difference between males and females in both groups($p > 0.05$).

Stuided gruops	Congenital heart disease		Acquired heart disease		Total	
	No.	%	No.	%	No.	%
Males	29	59	29	55	58	57
Females	20	41	24	45	44	43
Total	49	100	53	100	102	100

Fig. *(18)* : Bia chart shows sex distribution among the whole patients group.

Sex. Distribution Amonge All Patients groups

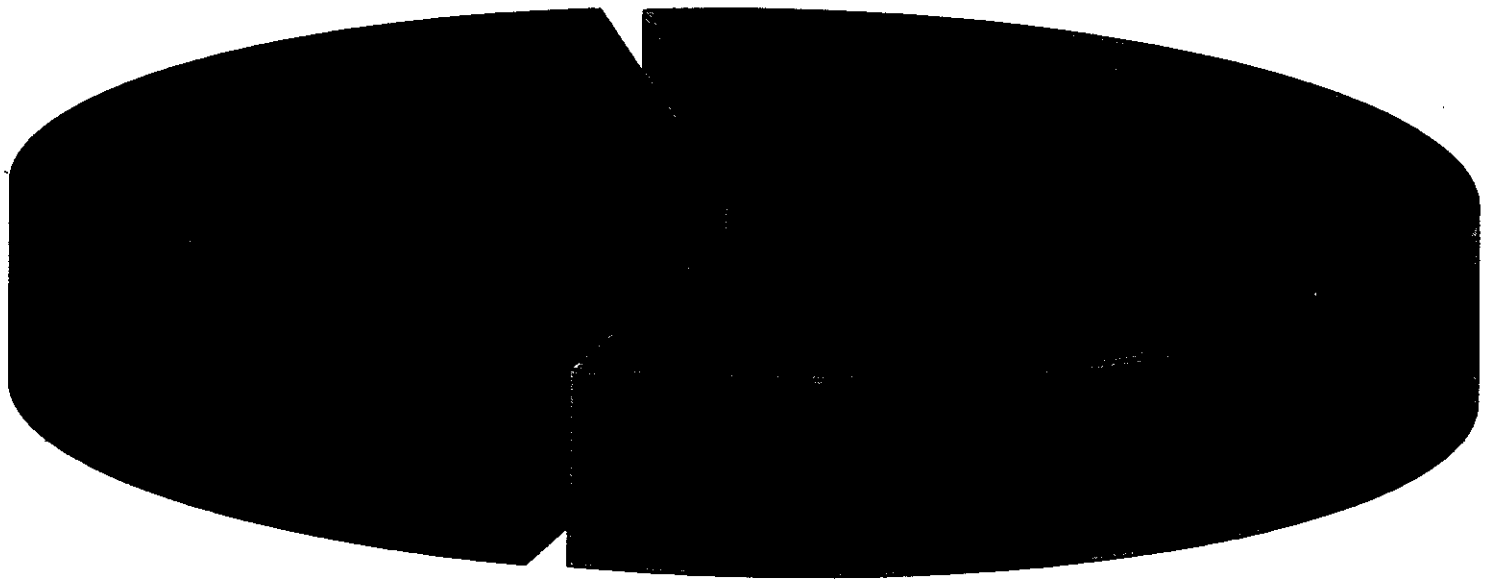


Fig (18) :

Group I

Evaluation of PASP in patients with **congenital heart disease.**

I - Catheterization findings :

Pulmonary artery systolic pressure **(PASP)** was measured in 49 patients and ranged from 32 to 80 mmHg (Mean 50.73 ± 14.6)

II -Doppler findings:

The peak systolic gradient between the right ventricle and the right atrium was calculated from the maximal velocity measured by applying a modification of the Bernoulli equation : $\mathbf{P = 4 V^2}$

Where **P** is the systolic pressure gradient across the tricuspid valve and **V** is the maximal velocity of the tricuspid gradient jet in m/s .

Fig (20); shows the estimated pulmonary artery systolic pressure by Doppler Echocardiography and cathetrization in group I (patients with congenital heart disease).

Estimated PASP ranged from 32 mmHg to 85 mmHg (Mean 49.08 ± 13.3) .

Figure (21) Shows Mean value of PASP in group I it was (49.8) in cases with Doppler echocardiography and 50.73 in cases with cardiac Catheterization .

Figure (22) graph plotting the pulmonary artery systolic pressure estimated by Doppler echocardiography against catheter shows the correlation between Doppler derived PASP using continuous wave

Doppler of tricuspid valve flow velocity in patients with tricuspid regurgitation and cardiac Catheterization .

A linear correlation was found between non - invasive estimation of **PASP** and Catheterization measurement ($P < 0.001$).

The patients of group I ,were classified into two subgroups according to the extent of Severity of estimated pulmonary artery systolic pressure by Doppler echocardiography.

Group I a :

This group included 26 patients whose estimated pulmonary artery systolic pressure by Doppler ranged between 30 to 50 mm Hg with a mean of 40.27 ± 13.47. The derived catheter pulmonary artery systolic pressure in this group ranged between 32 to 54 with a mean value 41.5

There was a highly significant correlation between pulmonary artery systolic pressure estimated by Doppler and PASP measured by catheter in this group.($P < 0.001$) . Figure (23).

Group I- b :

This group included 23 patient whose estimated pulmonary artery systolic pressure by Doppler ranged between 50 - 80 mm Hg(mean 63.53 ± 14.0.) The derived catheters pulmonary artery systolic pressure in this group ranged 54 to 85 mmHg (mean 65.98 + 13.2) there was a highly significant correlation between pulmonary artery systolic pressure estimated by Doppler echocardiography and **PASP** measured by catheter in this group $P< 0.001$ Fig. (24)

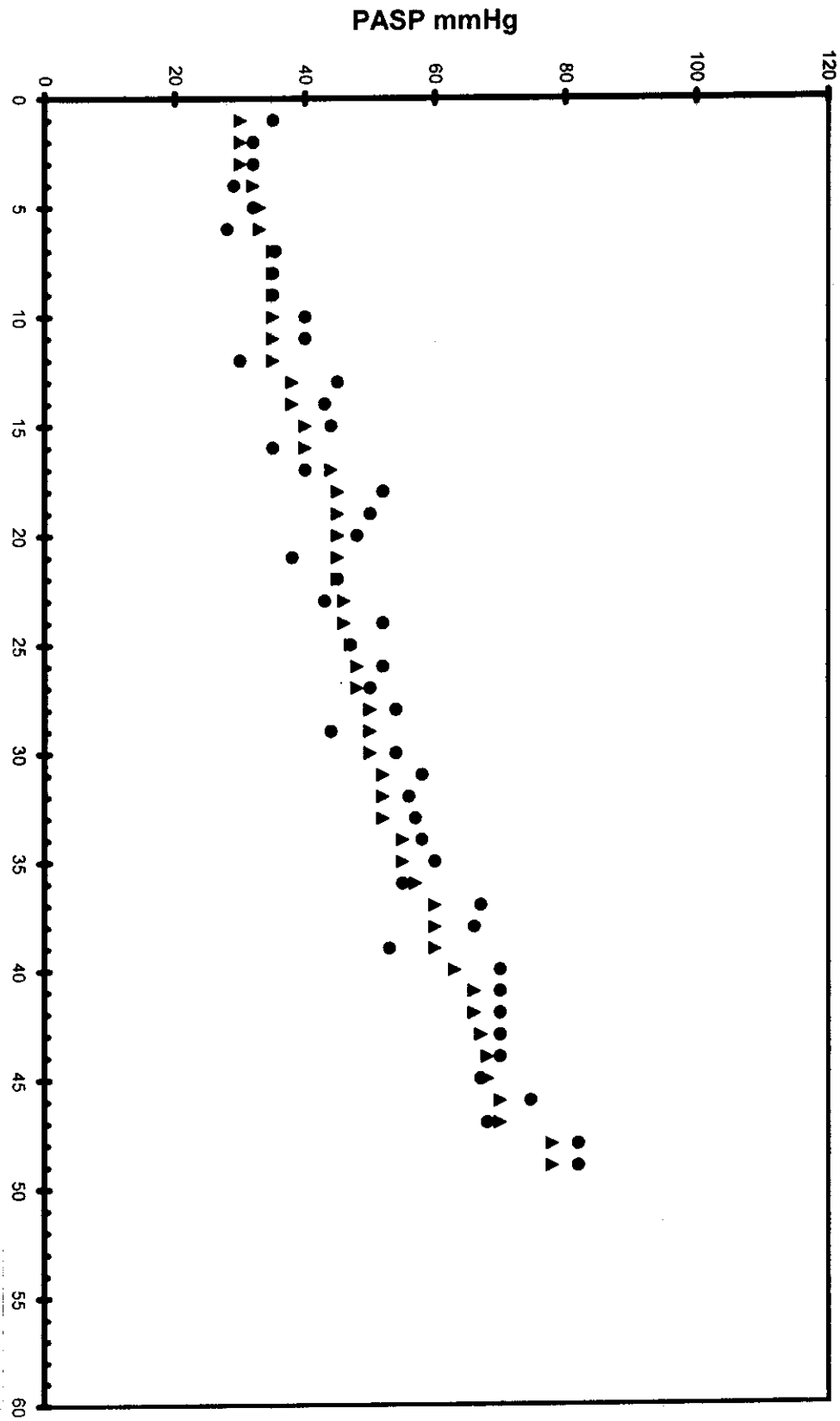

Estimation of PASP by Doppler and Catheter in group I
PASP mmHg
0
20
40
60
80
100
120
N. of patients
0
5
10
15
20
25
30
35
40
45
50
55
60
▲ Doppler
● Catheter

Fig (20) :

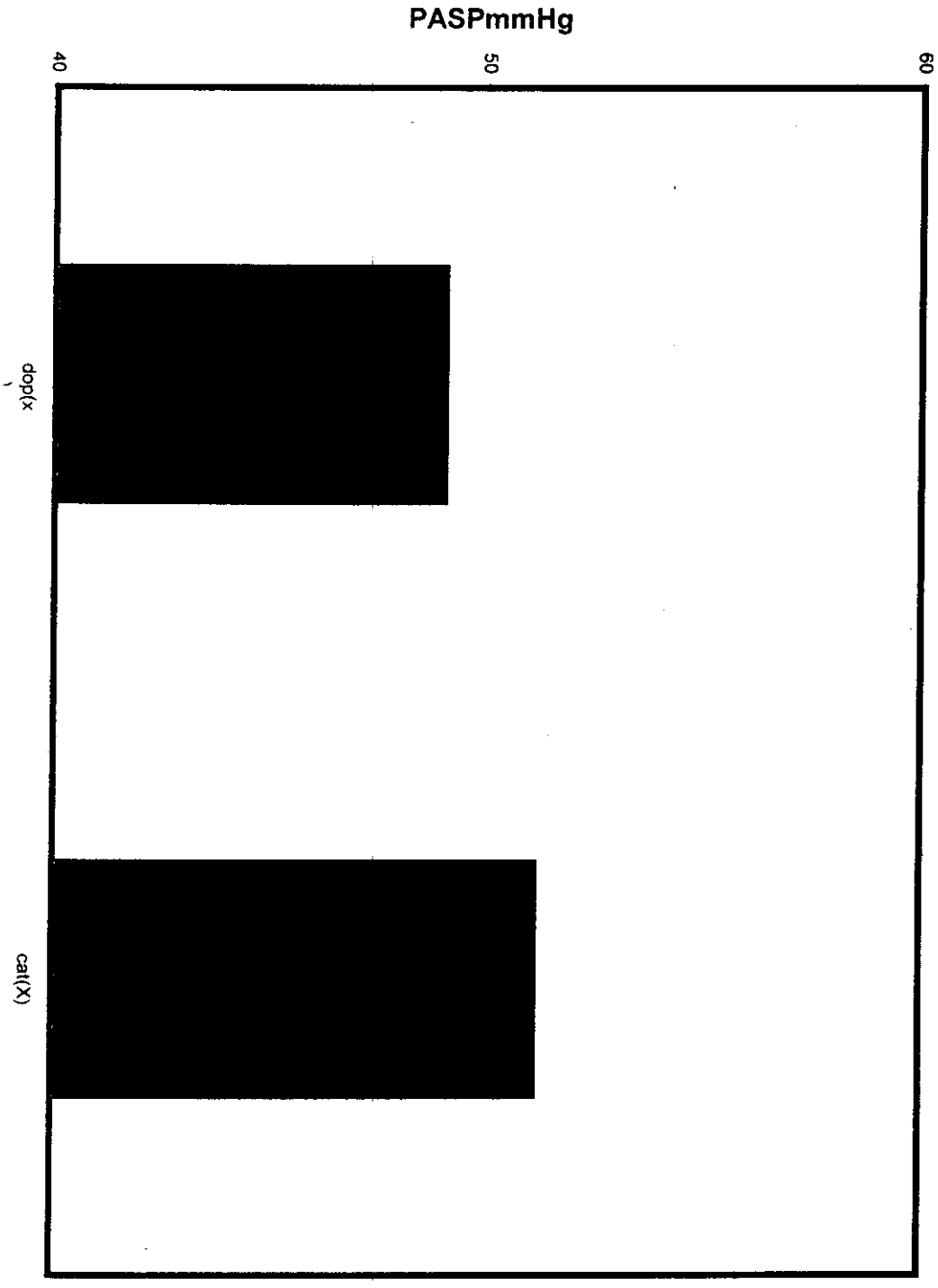


Fig (21) : ***mean PASP in group I***

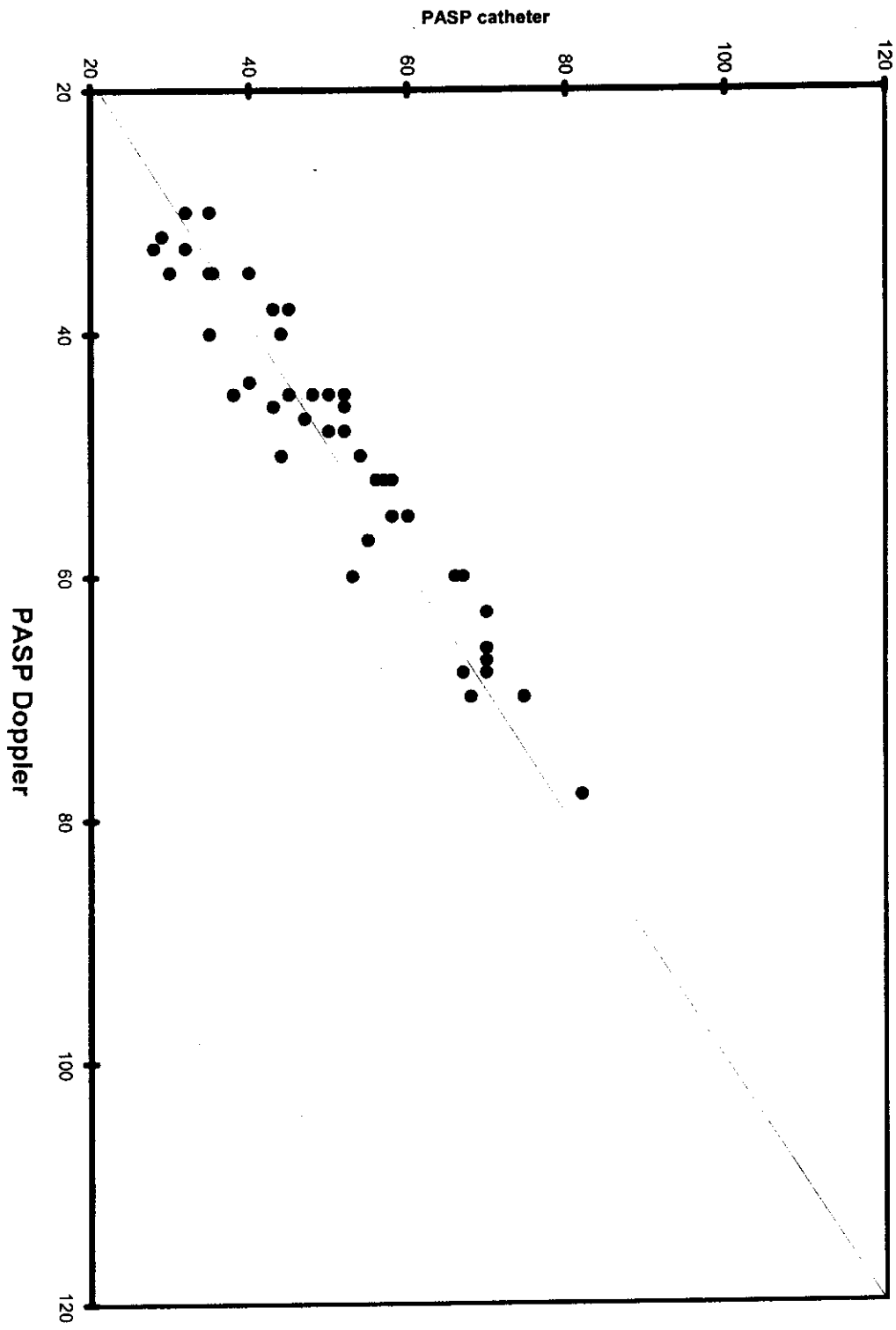


Fig (22) : **Non invasive estimation of PASP correlation between Doppler and Catheter in group I**

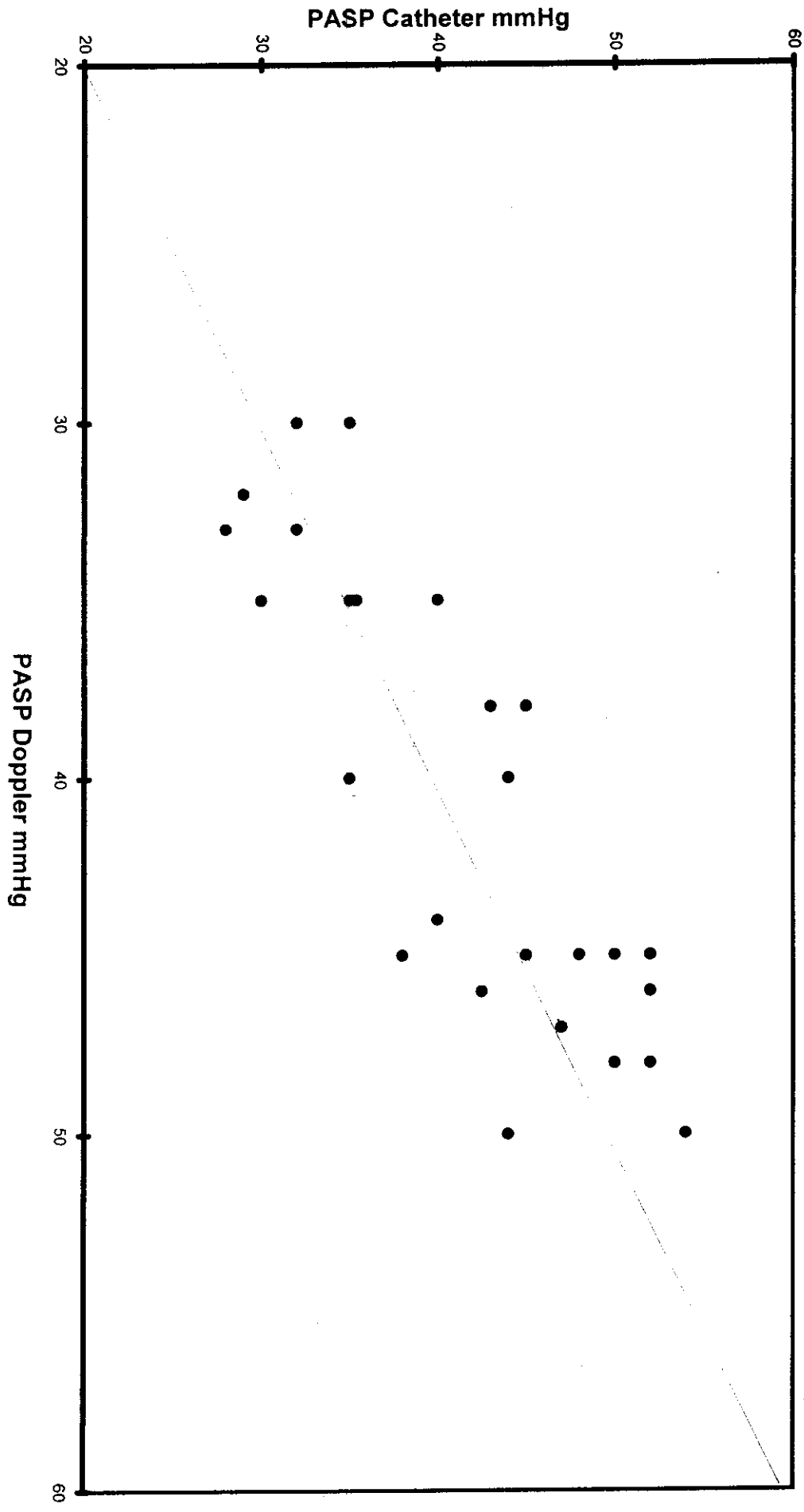


Fig (23) :

Non invasive estimation of PASP correlation between Doppler and Catheter in group I A

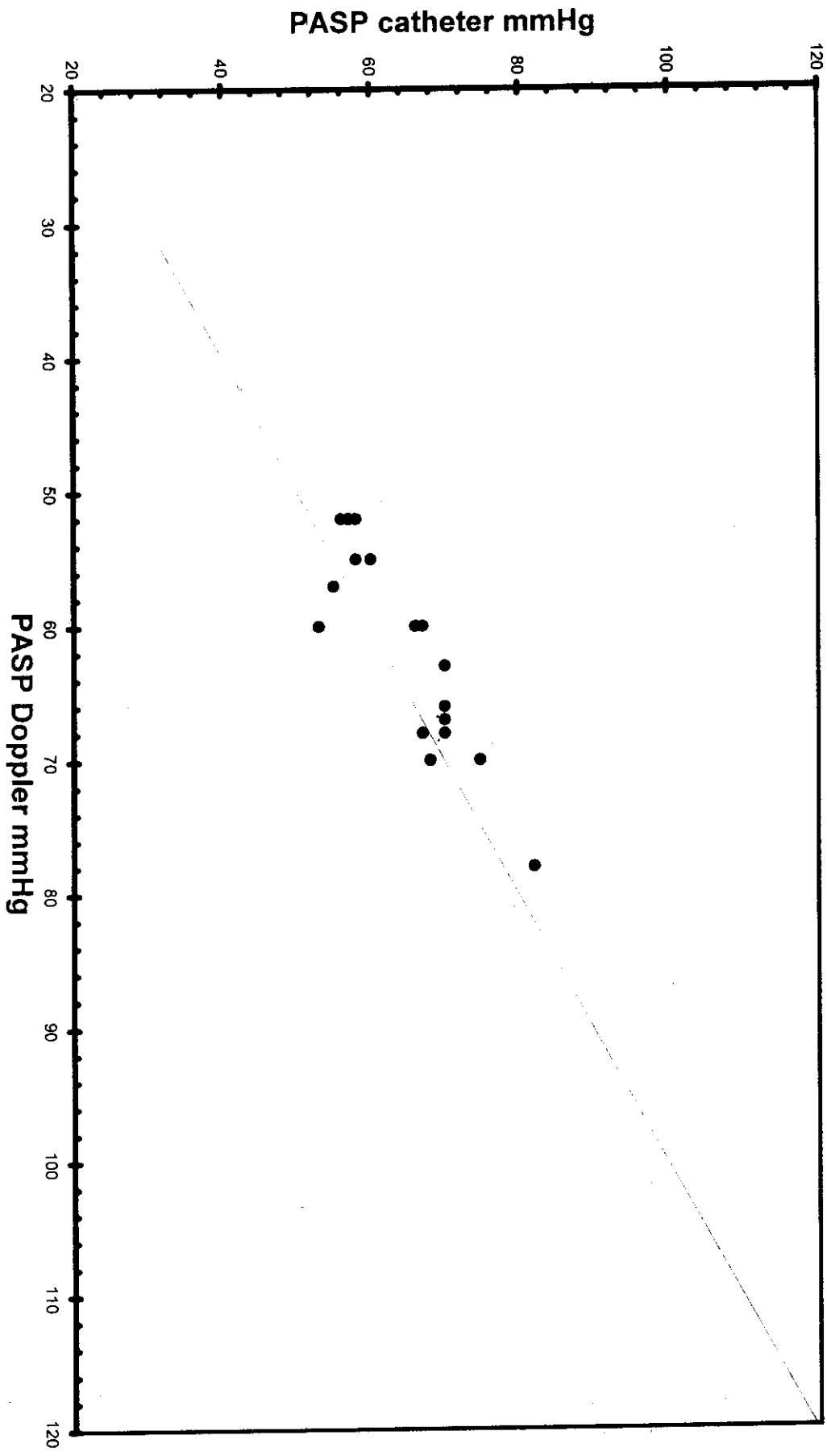


Fig (24) : **PASP Correlation between Doppler and Catheter in group I B**

Group II

Evaluation of **PASP** in patient with **valvular heart disease.**

I) Catheterization findings : Pulmonary artery systolic pressure was measured in 53 patients and ranged between 36 to 110 mm Hg. (Mean 62.21 ± 18.26)

II) Non-invasive Doppler findings : The peak systolic gradient between the right ventricle and the right atrium by Doppler echo cardiography was measured provided that, no cases with right vetricular outflow obstruction was found in selected cases. Estimated **PASP** ranged from 35 to 105 mm Hg (Mean 61.75 ± 16.49)

Fig. (25) :shows the estimated pulmonary artery systolic pressure by doppler echocardiography and cardiac catheterization in group II

Fig. (26) : Shows the mean **PASP** in group II measured by Doppler and cardiac catheterization, there was no significant statistical deference between two methods.

Fig (27): graph plotting pulmonary artery systolic pressure estimated by Doppler echocardiography against catheter in group II Shows the correlation between Doppler derived PASP using contineous wave Doppler of tricuspid valve flow velocity in patient with tricuspid regurgitation and cardiac catheterization.

A linear correlation was found between non-invasive estimation of PASP and catheterization measurments. Where ($P<0.001$).

Group II a :

Fig (28): Show graph plotting PASP estimated by Doppler against catheter in patients with **PASP** less than 50 mm Hg. There was highly significant correlation between **PASP** estimated by Doppler and catheter in this group $r = 0.81$, $P < 0.001$

Group II B :

This group included 23 patient whose estimated pulmonary artery systolic pressure by Doppler ranged between 54 to 105 mm Hg (Mean 71.4 ±12.3). The derived catheter **PASP** in this group ranged from 52 to 110 mm Hg (Mean 72.62 ±13.6)

There was a highly significant correlation between **PASP** estimated by Doppler and **PASP** measured by catheter in this group $p < 0.001$. Fig (29).

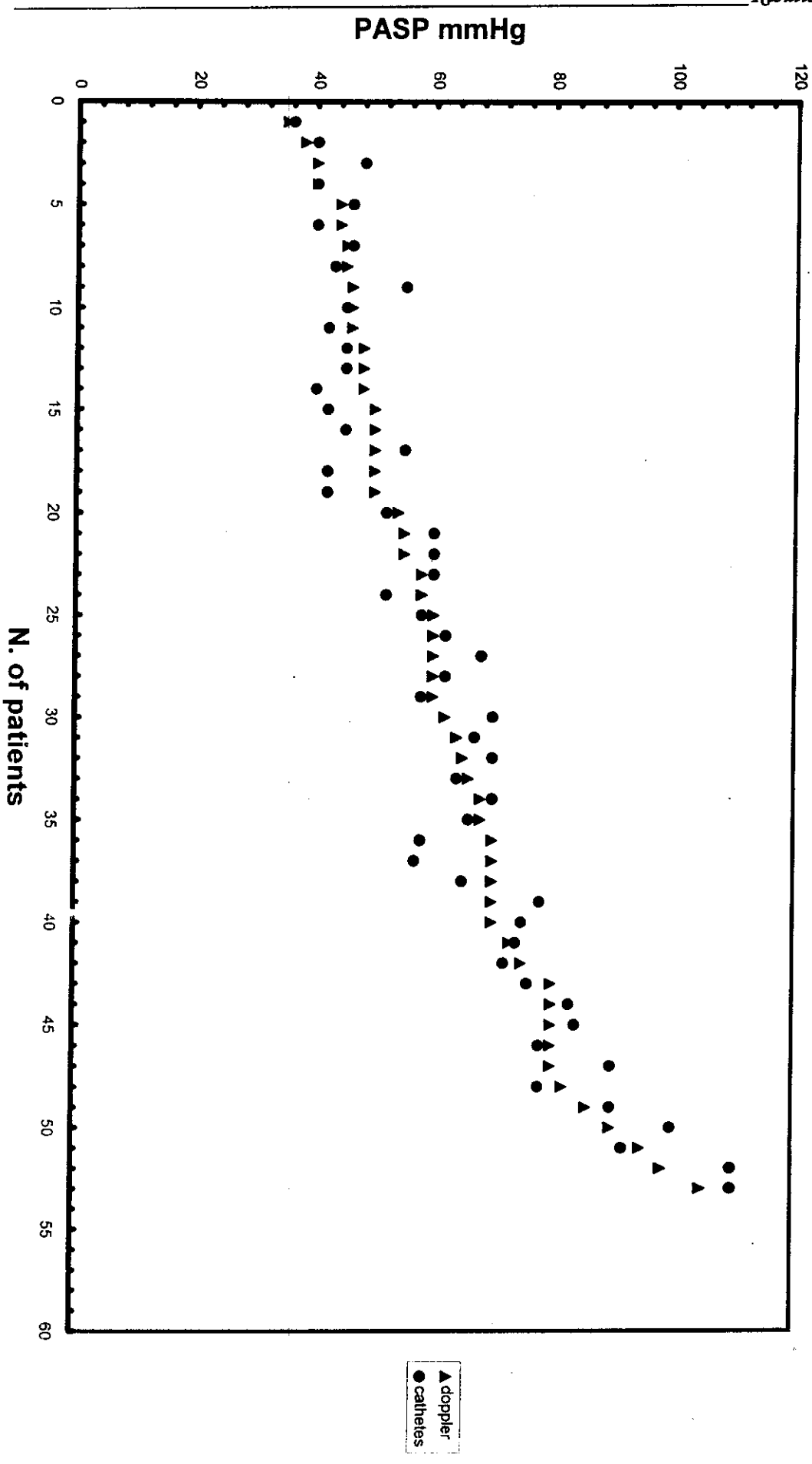


Fig (25) : **Estimation of PASP by Doppler and Catheter in group II**

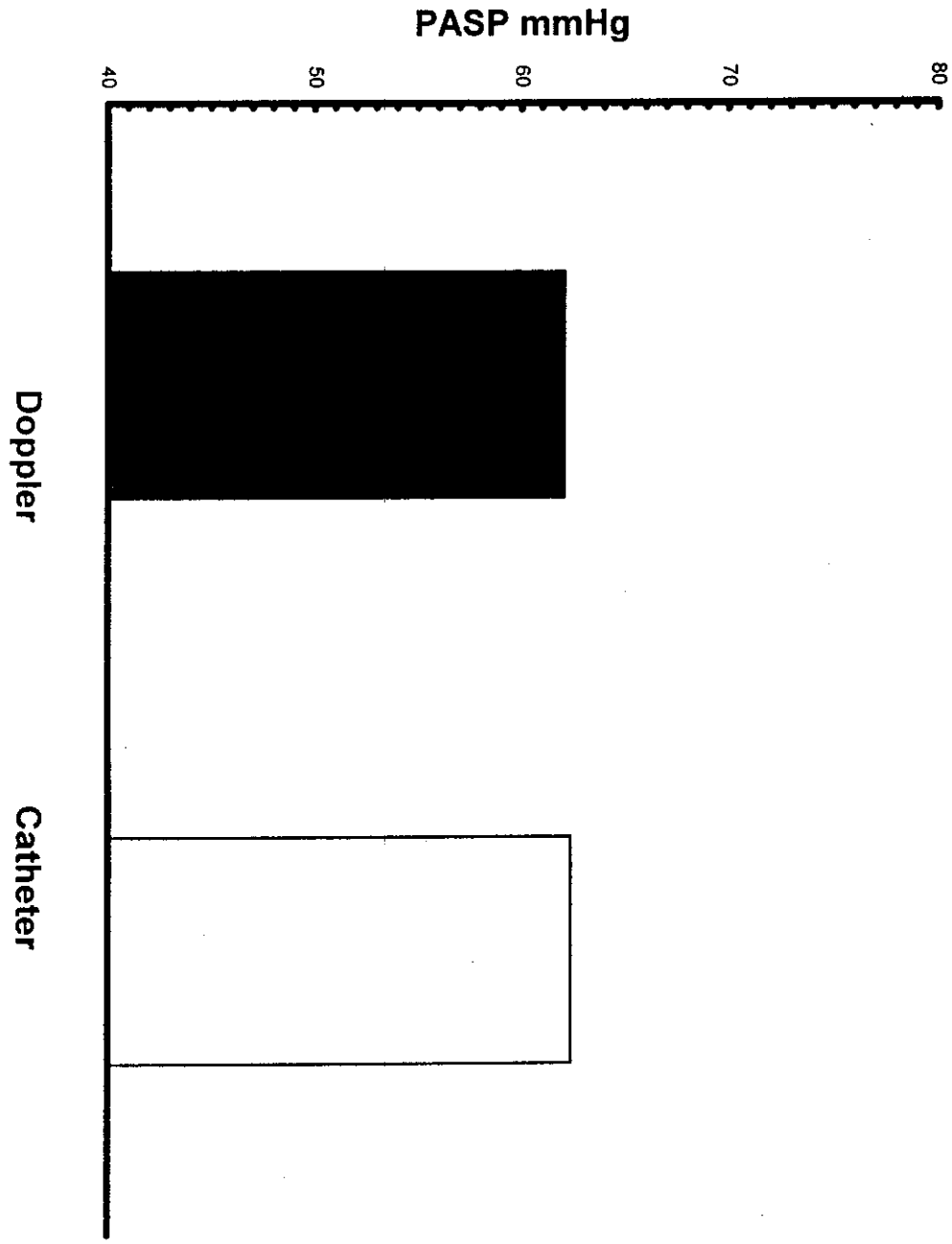


Fig (26) : Mean PASP in group II

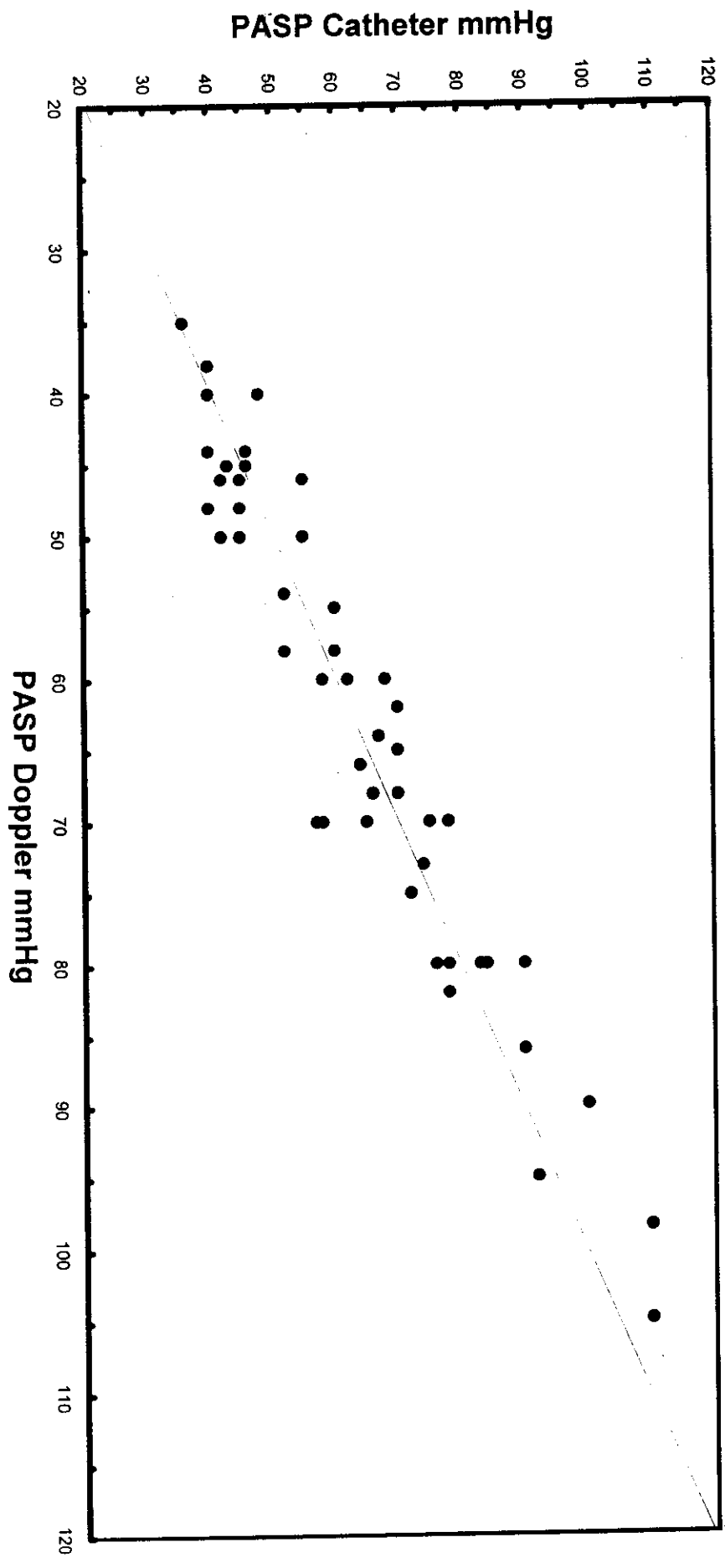
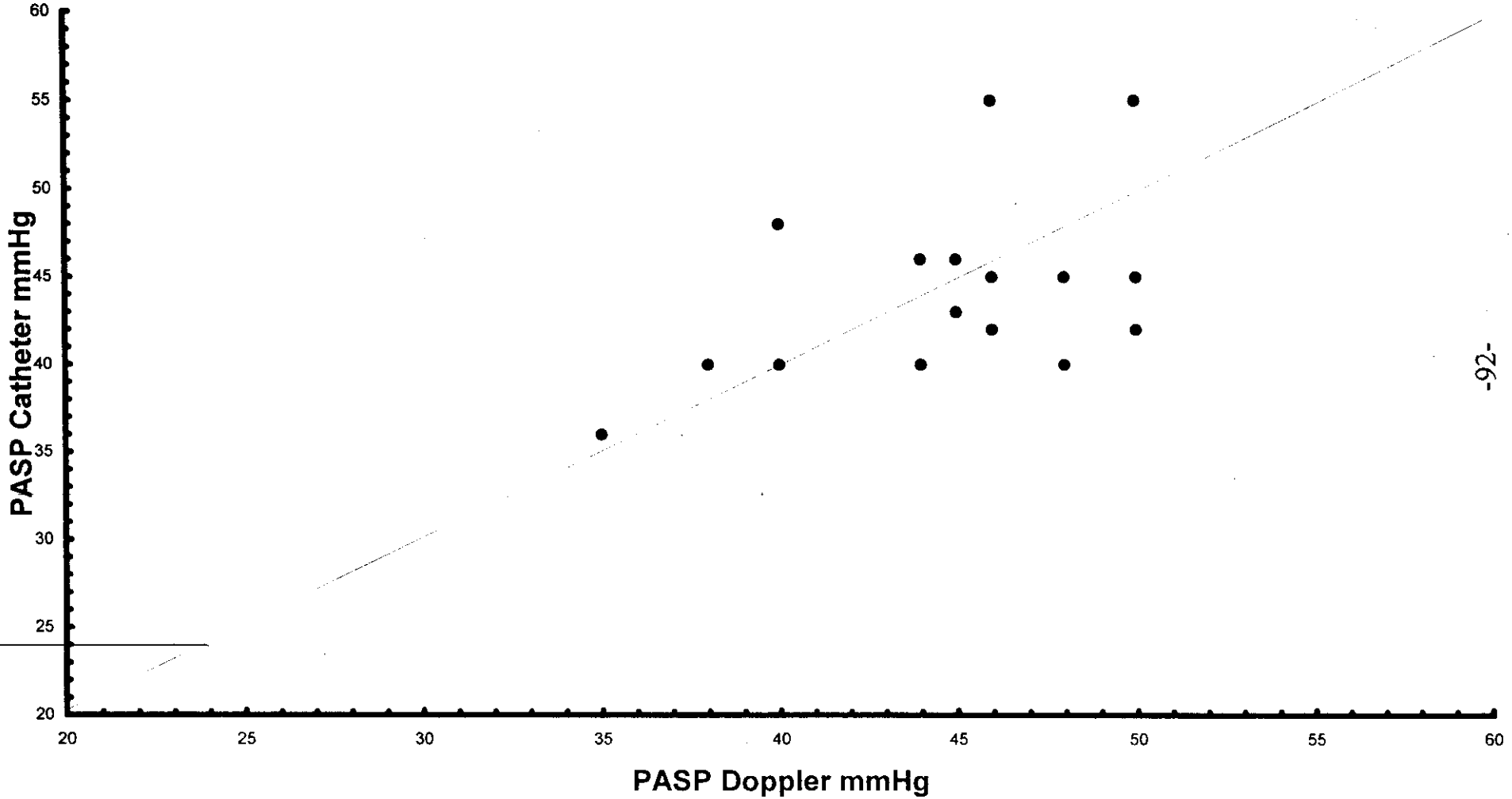


Fig (27) : **Non invasive estimation of PASP correlation between Doppler and Catheter in groupII**

Fig (28) : **Non invasive estimation of PASP correlation between Doppler and Catheter in group II A**



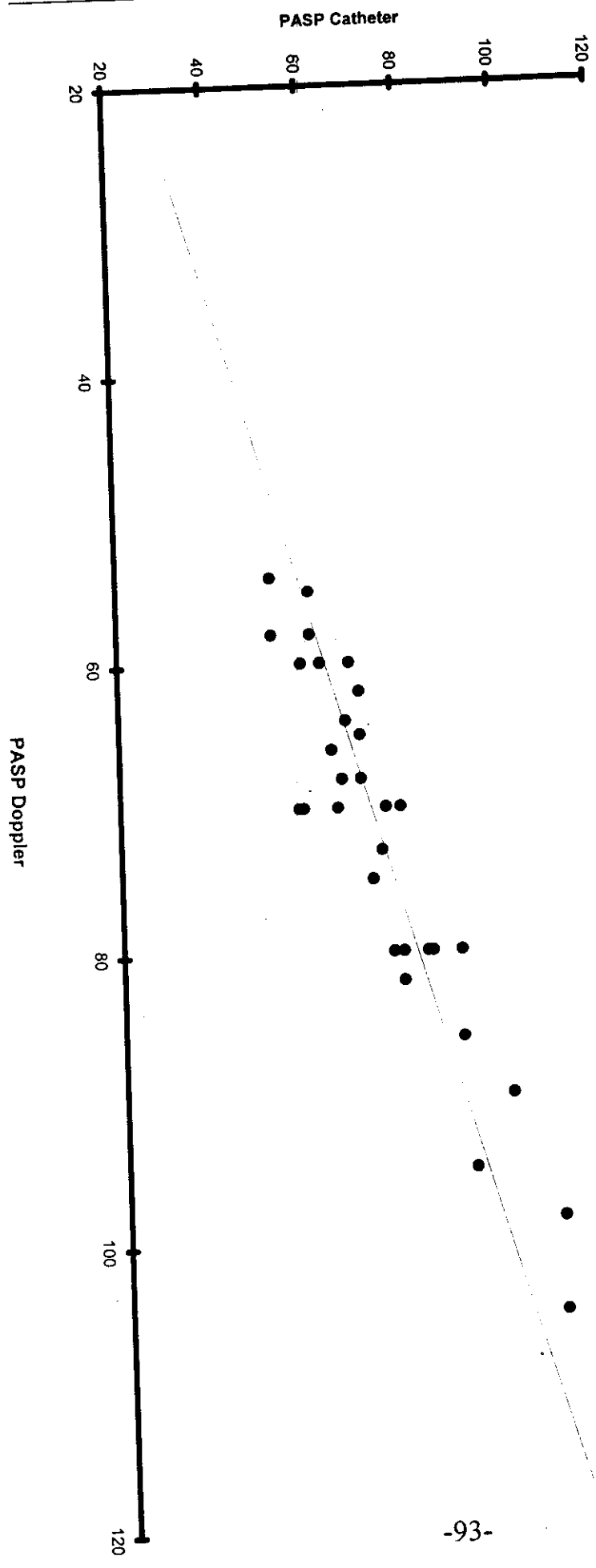


Fig (29) : Non invasive estimation of PASP correlation between Doppler and Catheter in group II b

Group III

The effect of **atrial fibrillation** on the estimation of pulmonary artery systolic pressure non-invasively :

All the patients, in our study, had a sinus rhythm except seven patients who has atrial fibrillation of variable rates. Patients with atrial fibrillation was studied separately. We found a very good correlation between Doppler estimated **PASP** using modified Bernoulli equation and direct intracardiac catheterization.

Fig (30) :shows the estimated pulmonary arterial systolic pressure in group III (patients with atrial fibrillation).

Fig (31) : Shows the mean value of **PASP** in group III measured by Doppler echocardiography and catheter it was (65.14 ± 1.2) by Doppler and (71.86 ± 2.3) by catheters

Fig (32) : Graph plotting PASP estimated by Doppler against catheter in group III ,there was a very good correlation between non-invasive Dopller findings and cardiac catheterization. Where $r = 0.98$ $P < 0.001$.

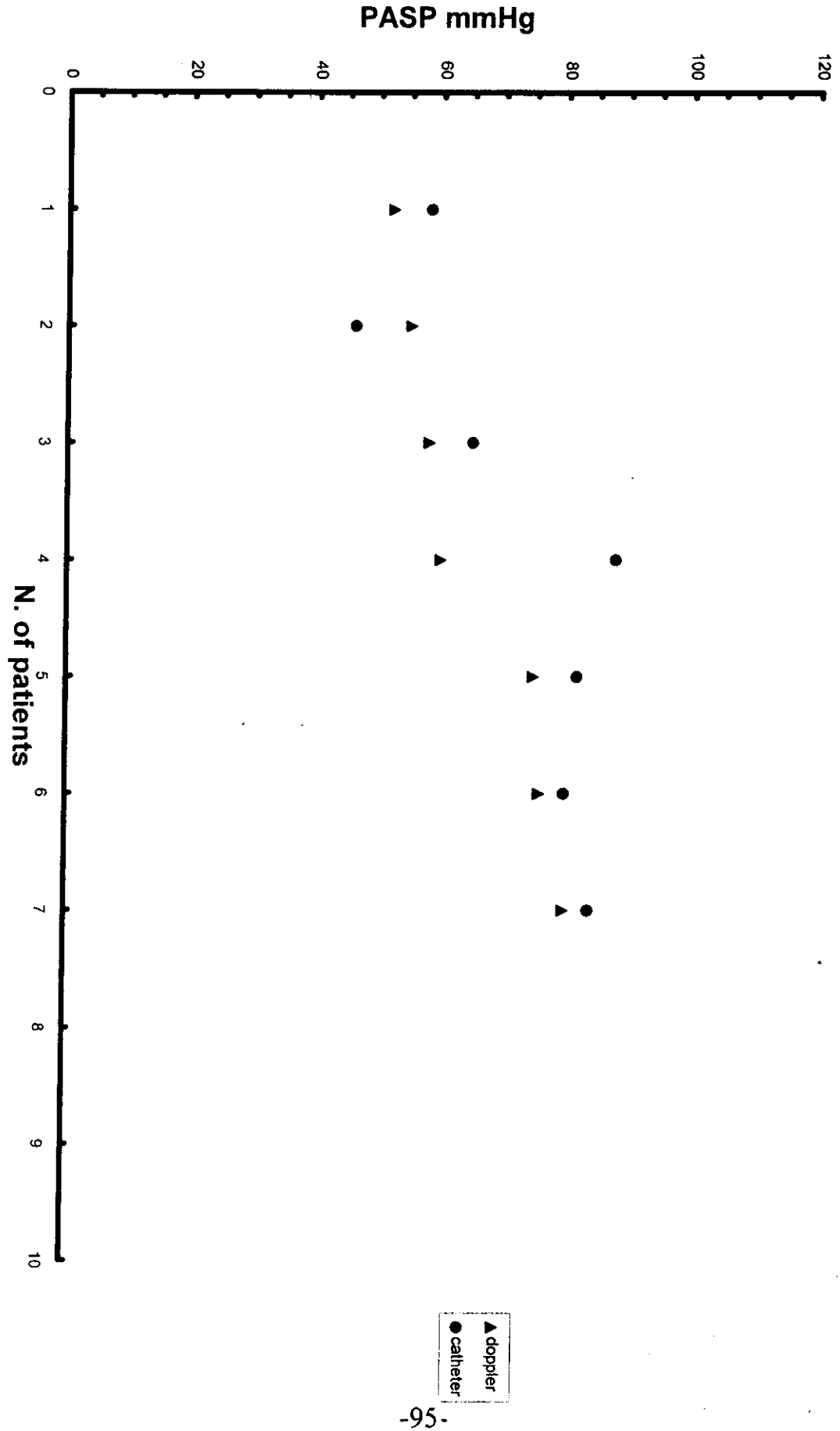


Fig (30) : **Estimation of PASP by Doppler and Catheter in group III**

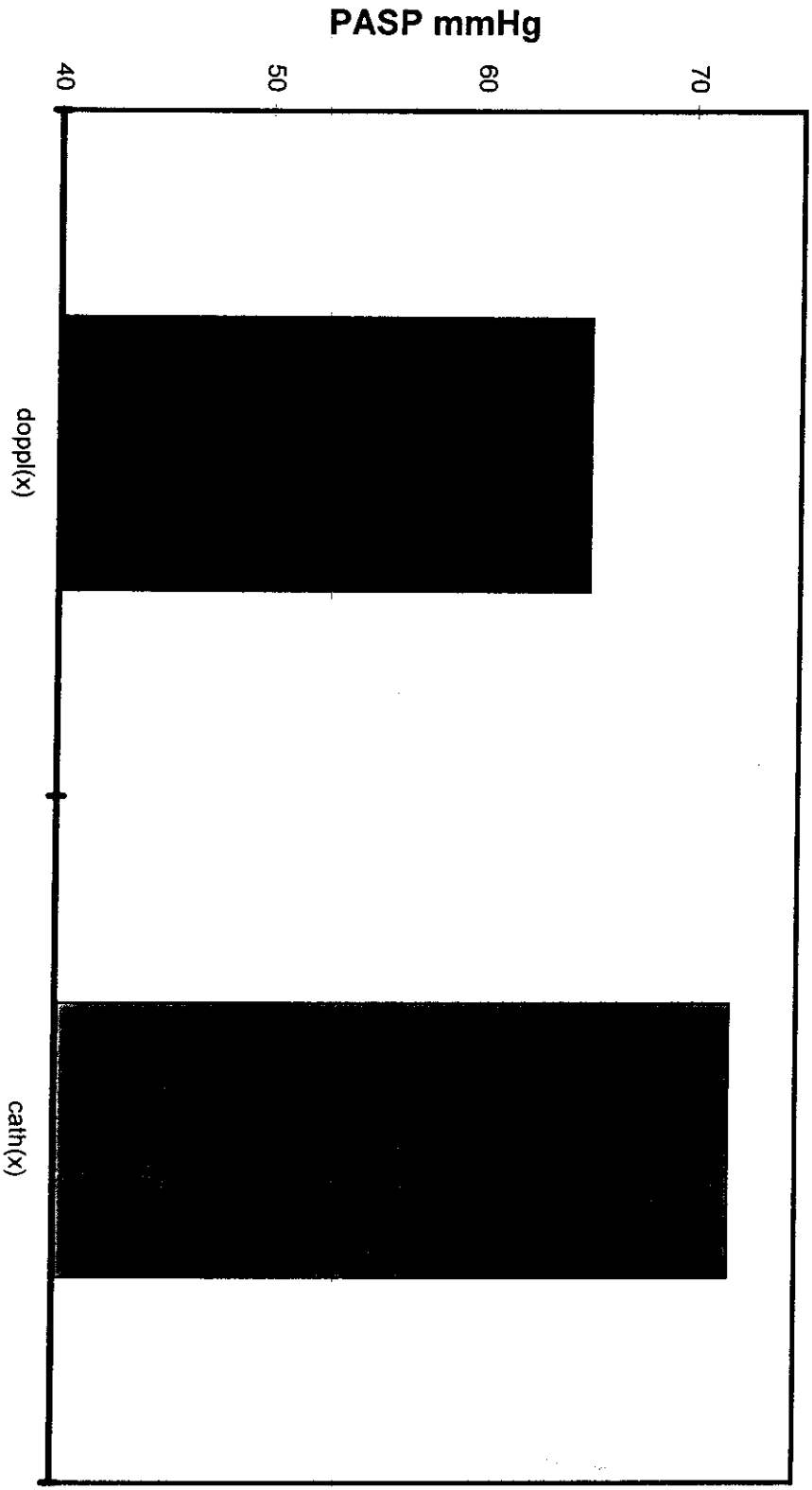


Fig (3 1): **Mean PASP in group III**

Fig (32): **Non invasive estimation of PASP correlation between Doppler and Catheter in group III**