# Results

## I-In Vivo Studies

### 1- Effect of terazosin on blood pressure changes in insulin resistant rats:

10% solution fructose feeding for 4 weeks resulted in induction of insulin resistance manifested by significant increase in systolic blood pressure ranging from 120±4.2mmHg to 175±4.8mmHg (45.8%)($P<0.001$) and significant increase in mean blood pressure ranging from 76.5± 2.12 mmHg to121.7 ± 5.5 mmHg (59.5%) ($P<0.001$). (table 3) (fig 1 , 2,3 &4)

***Table (3): Changes of Blood pressure (BP) in insulin resistant versus control rats: ( n=6)***

| Animal group | Systolic Blood Pressure (mmHg) mean ±SEM | Mean Blood Pressure (mmHg) mean ±SEM |
|---|---|---|
| **control** | 120±4.2 | 76.5 ± 2.12 |
| **insulin resistant** | 175 ± 4.8mmhg | 121.7 ± 5.5 |
| **% Change** | (45.8%) ** | 59.5%** |

SEM = standard error of the mean

n = number of animals.

** = Significant at $P < 0.001$.

It was observed that treatment of fructose induced insulin resistant (FIIR) rats with terazosin for 10 days resulted in a significant decrease in systolic blood pressure from 175±4.8mmHg to 125±3.2mmHg(28.6%)(P<0.001) and decrease in mean blood pressure from 121.7 ± 5.49 mmHg to 100.8 ± 1.45 mmHg (17.2%) (P<0.01).Tab(4) fig(1 , 2 ,4 &5 ).

***Table (4): Effect of 10 days treatment with terazosin on blood pressure in insulin resistant rats (n=6)***

| Animal Group | Systolic Blood pressure (mm Hg) mean ±SEM | Mean Blood Pressure (mm Hg) mean ±SEM |
|---|---|---|
| **Insulin resistant** | 175±4.8mmHg | 121.7± 5.49 |
| **Insulin resistant treated with terazosin** | 125±3.2mmHg | 100.8±1.45 |
| **% change** | (28.6%)** | ↓ 17.2% * |

n= number of animals

SEM = standard error of the mean

** = significant at P < 0.001

* = Significant at P < 0.01.

## Table (5): Collective table showing changes in blood pressure in all tested groups

| Animal Group | Systolic blood pressure mean ±SEM | Mean Blood Pressure (mm Hg) mean ±SEM |
|---|---|---|
| **Control** | 120±4.2 | 76.5 ± 2.12 |
| **Insulin resistant** | 175±4.8mmHg | 121.7± 5.49 |
| **Insulin resistant treated with terazosin** | 125±3.2mmHg | 100.8±1.54 |

It is clear from the results that pretreatment of insulin resistant male albino rats for 10 days with terazosin in adose ( 100mcg/kg) was associated with an improvement in both systolic and mean blood pressure.

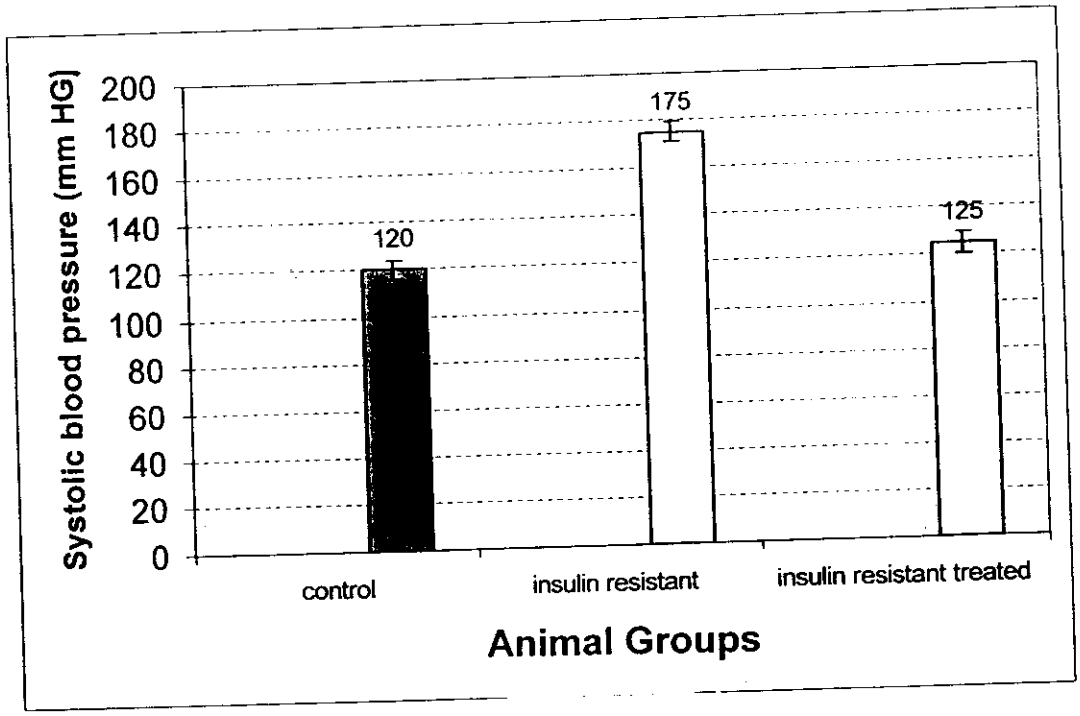


*Fig (1) : Histogram of systolic blood pressure in control, insulin resistant and terazosin treated insulin resistant models*

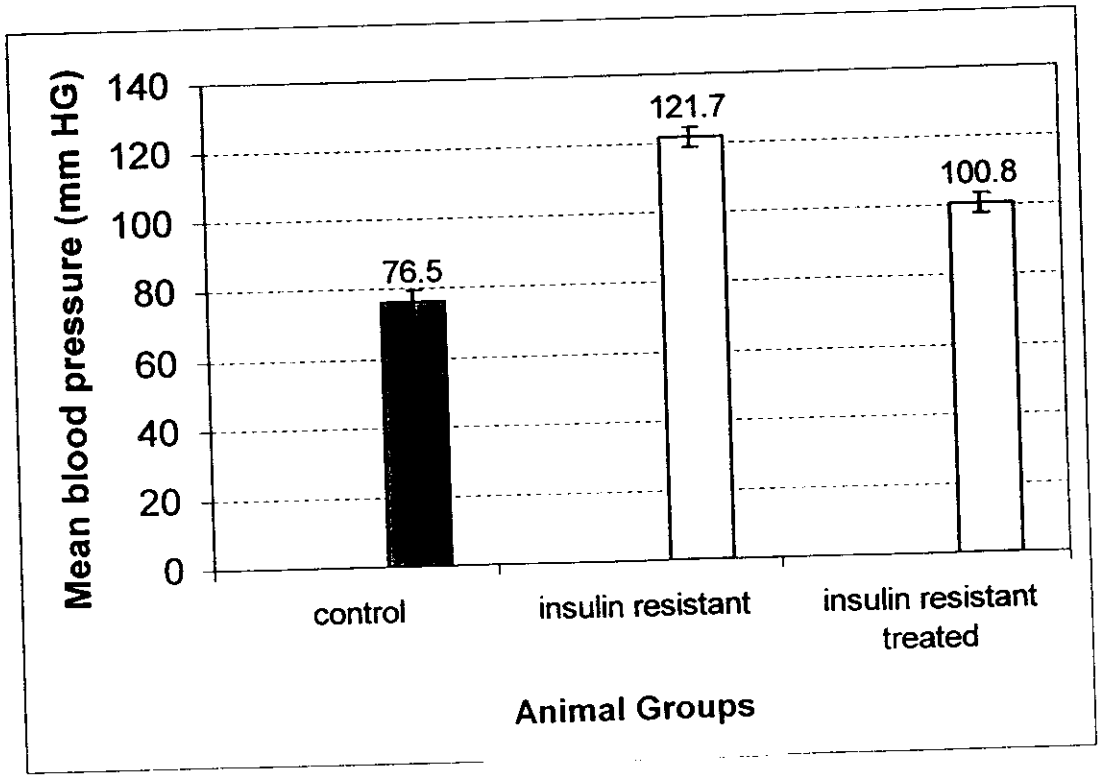


*Fig (2): Histogram of mean blood pressure levels in controls, insulin resistant and terazosin treated insulin resistant models*

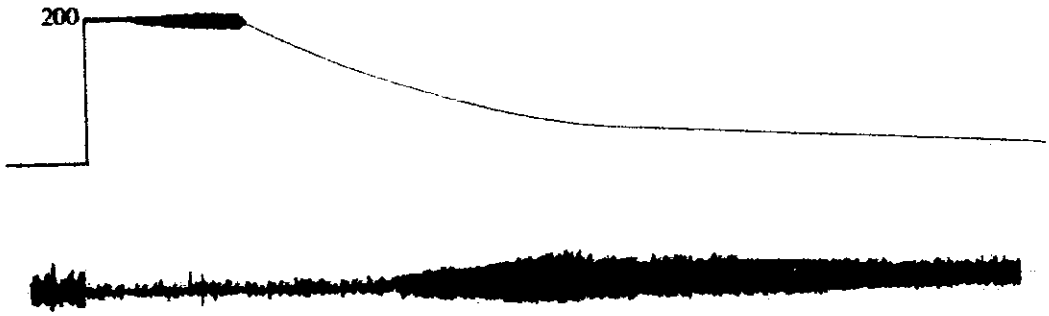


FIG.( 3 ) MEASUREMENT OF BLOOD PRESSURE BY RAT TAIL METHOD
( CONTROL GROUP )

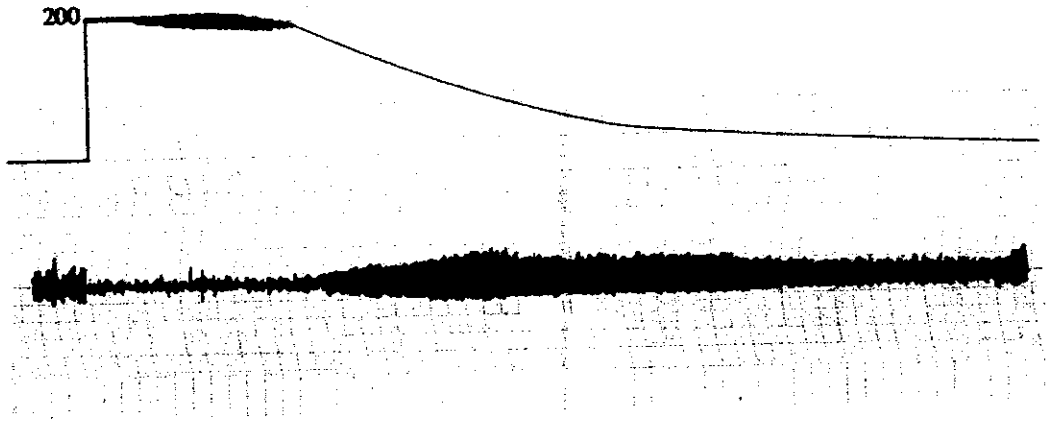


FIG.( 4 ) MEASUREMENT OF BLOOD PRESSURE BY RAT TAIL METHOD
( INSULIN RESISTANT GROUP )

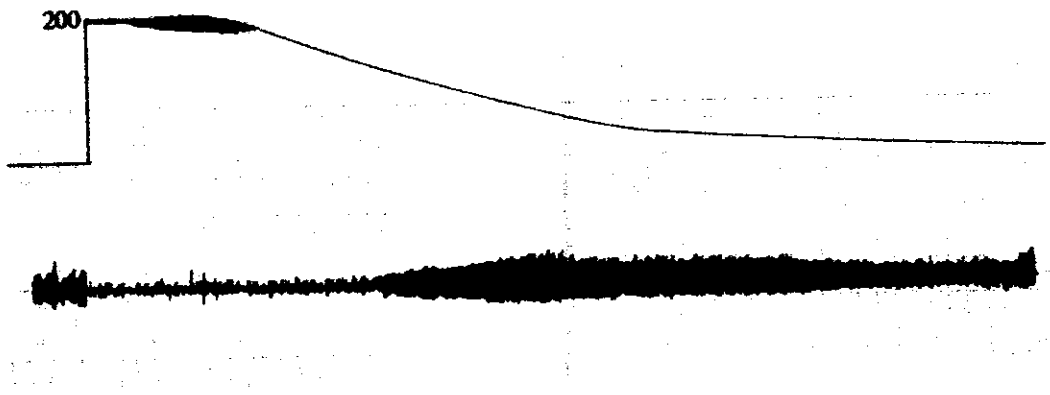


FIG.( 5 ) MEASUREMENT OF BLOOD PRESSURE BY RAT TAIL METHOD
( INSULIN RESISTANT GROUP WITH TERAZOSIN )

## 2- Effect of terazosin on renal blood flow parameters in insulin resistant rats:

Feeding rats with a 10% fructose in drinking water for 4 weeks resulted in induction of insulin resistance manifested by decrease of maximum systole in renal artery from 53.47 ± 8.91in control group to 38.60±3.78 in insulin resistant group (27.8%)($p<0.001$). significant decrease of maximum diastolic blood pressure in renal artery from 3.85±0.64 to 2.92 ±0.54(24.2%) ($p<0.001$). more ever significant decrease of minimum systolic & minimum diastolic blood pressure in renal artery from a mean of 27.48 ± 5.13 in control group to a mean of 21.42± 2.92 in insulin resistant group (22.1%) ($p<0.001$)& mean of 3.32±0.65 to a mean of 2.20±0.27(33.7%) ($p<0.001$) respectively. There is insignificant decrease of mean flow velocity ranging from 7.38±0.96 to 6.72± 0.97 (9.1%)($p>0.05$). There is insignificant increase of resistance parameter in renal artery from 0.91± 0.02 in control group to a mean of 0.92 ± 0.01 in insulin resistant group (1.1%) ($p>0.05$). Insignificant decrease of heart rate ranging from 191.17± 4.67 to a 181.50± 16.25 (5.1%)($p>0.05$) was also observed.(table 6)(fig. 6 ,7 ,8 & 9)

## *Table (6) changes of renal Blood flow parameter in insulin resistant rats (n=6)*

| Animal groups | MaxS | MaxD | Mn S | Mn D | MV | S.D | R.P | PI | HR |
|---|---|---|---|---|---|---|---|---|---|
| Control | 53.47 ± 8.91 | 3.85 ± 0.64 | 27.48 ± 5.13 | 3.32 ± 0.65 | 7.38 ± 0.96 | 17.97 ± 4.99 | 0.91 ± 0.02 | 4.11 ± 0.38 | 191.17 ± 4.67 |
| Insulin resistant | 38.60 ± 3.78 | 2.92 ± 0.54 | 21.42 ± 2.92 | 2.20 ± 0.27 | 6.72 ± 0.97 | 16.08 ± 3.37 | 0.92 ± 0.01 | 3.23 ± 0.59 | 181.50 ± 16.25 |
| % change | ↓27.81%** | **↓24.2% | **↓22.1% | **↓33.7% | +↓9.1% | +↓10.52% | +↑1.1% | **↓21.4% | +↓5.1% |

Mean ± SEM (standard error of the mean)
n = number of animals.
** = Significant.(P<0.001) += Insignificant (P>0.05)
Max S = Maximum Systole
Max D = Maximum Diastole
Mn S = Minimum Systole
Mn D = Minimum Diastole
MV = Mean Velosity of Flow = man flow velocity
S/D = Systole / Diastole Ratio
R.P = Resistance Parameter in Renal artery
P.I = Pulsitility index
H.R = Heart Rate.

Treatment of fructose induced insulin resistant (FIIR) rats with Terazosin for 10 days resulted in significant decrease of maximum systolic blood pressure in renal artery from 38.6± 3.78 in non treated group to 31.13±4.53 in treated group(19.4%)(p<0.001). in addition to significant decrease of minimum systolic blood pressure in renal artery ranging from 21.42± 2.92 in non treated group to 15.78± 2.43 in treated group (26.3%)(p,0.001).There is insignificant decrease of diastolic blood pressure in renal artery from 2.2± 0.27 to 2.00±0.45(9.1%)(p>0.05). There is significant decrease in mean flow velocity from 6.72±0.97 to 5.08± 0.41(24.4%)(p<0.001). There is insignificant increase of resistance parameter in renal artery from a mean of 0.92± 0.01in non treated group to a mean of 0.93±

0.04 in treated group (3.33%) (p> 0.05). Insignificant decrease of heart rate from a mean of 181.5 ± 16.25 to a mean of 170.5 ±10.08(6.1%) (p>0.05) was also observed. (table 7) (fig. 5 ,6,7 &8).

***Table (7) : effect of 10 days treatment with terazosin on renal blood flow parameters in insulin resistant rats (n=6)***

| | MaxS | MaxD | Mn S | Mn D | MV | S.D | R.P | PI | HR |
|---|---|---|---|---|---|---|---|---|---|
| **Insulin resistant** | 38.60 ± 3.78 | 2.92 ± 0.54 | 21.42 ± 2.92 | 2.20 ± 0.27 | 6.72 ± 0.97 | 16.08 ± 3.37 | 0.92 ± 0.01 | 3.23 ± 0.59 | 181.50 ± 16.25 |
| **Insulin resistant & treated** | 31.13 ± 4.53 | 3.07 ± 0.54 | 15.78 ± 2.43 | 2.00 ± 0.45 | 5.08 ± 0.41 | 12.80 ± 2.86 | 0.93± 0.04 | 3.31 ± 0.73 | 170.50 ± 10.08 |
| **%change** | *↓19.4% | +↑4.9% | **↓26.3% | +↓9.1% | **↓24.4% | **↓20.4% | +↑3.33% | +↓2.4% | +↓6.1% |

Mean ± SEM (standard error of the mean)

n = number of animals.

** = Significant.(P<0.001) += Insignificant (P>0.05)

Max S = Maximum Systole

Max D = Maximum Diastole

Mn S = Minimum Systole

Mn D = Minimum Diastole

MV = Mean Velocity of Flow = man flow velocity

S/D = Systole / Diastole Ratio

R.P = Resistance Parameter in Renal artery

P.I = Pulsitility index

H.R = Heart Rate

## *Table (8) collective table showing changes in renal blood flow velocity and other parameters in all tesed groups*

| Animal groups | MaxS | MaxD | Mn S | Mn D | MV | S.D | R.P | PI | HR |
|---|---|---|---|---|---|---|---|---|---|
| **Control** | 53.47 ± 8.91 | 3.85 ± 0.64 | 27.48 ± 5.13 | 3.32 ± 0.65 | 7.38 ± 0.96 | 17.96 ± 4.99 | 0.91 ± 0.02 | 4.11 ± 0.38 | 191.17 ± 4.67 |
| **Insulin resistant** | 38.60 ± 3.78 | 2.92 ± 0.54 | 21.42 ± 2.92 | 2.20 ± 0.27 | 6.72 ± 0.97 | 16.08 ± 3.37 | 0.92 ± 0.01 | 3.23 ± 0.59 | 181.50 ± 16.25 |
| **Insulin resistant & treated** | 31.13 ± 4.53 | 3.07 ± 0.54 | 15.78 ± 2.43 | 2.00 ± 0.45 | 5.08 ± 0.41 | 12.80 ± 2.86 | 0.93± 0.04 | 3.31 ± 0.73 | 170.50 ± 10.08 |

Max S = Maximum Systole

Max D = Maximum Diastole

Mn S = Minimum Systole

Mn D = Minimum Diastole

MV = Mean Velocity of Flow = man flow velocity

S/D = Systole / Diastole Ratio

R.P = Resistance Parameter in Renal artery

P.I = Pulsitility index

H.R = Heart Rate