RESULTS

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The results of administration of glimepride (0.1 mg/kg orally) and Vit. E (200 mg/kg in the dietary water) either singly or in combination on the concentration of chemical neurotransmitters namely norepinephrin, GABA, dopamine and serotonine in the different brain areas namely cerebral certex, thalamus, hypothalamus midbrain and cerebellum in streptozotocin induced diabetis in rats and on the blood glucose, liver enzymes namely aspartate aminotransferase (AST) and alanine aminotrasferase (ALT) and kidney namely blood urea and serum creatinine were shown in the form of tables (1-46), bar charts (16-36).

Result of administration of glimepiride and vit E either singly or in combination on fasting blood glucose, liver enzymes namely ALT and AST and kidney function namely blood urea and serum creatinine in the streptozotocin induced diabetic rats were shown in the tables (1- 9).

Effect streptozotocin induced diabetes on fasting blood glucose, ALT, AST, blood urea and serum creatinine of the rats:

The results of the present work showed that streptozotocin (50 mg/kg I.P) significantly ($P \geq 0.05$) elevate fasting blood glucose with a percentage change of +230% from a mean of 69.25 ± 7.72 mg/dl to a mean of 318.56 ± 44.41 mg/dl with percentage increase of + 304%, + 294% in AST and ALT from a mean of 26.63 ± 4.14, 38.56 ± 3.09 u/l to a mean of 126.58 ± 21.51, 152.25 ± 22.61 u/l respectively which is highly significant at $P<0.005$ compared with control group.

The result showed that streptozotocin indueed diabetes produced non-significant $P> 0.45$ change in blood urea from a mean of 16.23 ±

2.03 u/l in control group to a mean of 15.88 ± 2.47 u/l in the diabetic group and serum creatinine from a mean of 0.66 ± 0.96 mg/dl in the control group to a mean of 0.65 ± 0.078 mg/d in the control group kidney function (Table 1).

Effect of administration of glimepiride (0.1 mg/kg orally) on fasting blood glucose level, AST, ALT, blood urea and serum creatinine in diabetic rats:

A further study was carried out to demonstrate the influence of glimepiride (0.1 mg/kg orally) on fasting blood glucose level mg/dl AST, u/l ALT, u/l blood urea u/l and serum creatinine mg/dl. Results of the present work (Table 2) showed significant (P< 0.25) reduction of fasting blood glucose with a percentage of -109% with significant reduction (P<0.25) of AST and ALT with percentage decrease of -20%, -100% from a mean of 0.126.58 ± 21.51, 152.25 ± 22.61 u/l in the diabetic non treated rats to a mean of 80.39 ± 18.35, 100.56 ± 22.02 u/l in the diabetic treated rats with glimepiride with non-significant (P> 0.05) change of blood urea and serum creatinine from a mean of 15.88 ± 2.47 u/l, 0.65 ± 0.078 mg/dl in the diabetic non treated to a mean of 18.25 ± 3.33 u/l, 0.58 ± 0.113 mg/dl in diabetic treated rats with glimepiride .

Table (3) also compare the fasting blood glucose level, AST, ALT, blood urea and serum creatinine in the diabetic rats treated with glimepiride with those in normal rats showed significant elevation of +109%, +201%, +160%, 12%, 2%, of fasting blood glucose level, AST, ALT with a percentage increase of +12% in blood urea but non-significant (P>0.10) with a non-significant reduction –12% in serum creatinine at (P>0.025)

Effect of vit E administration (200 mg/kg orally) on fasting blood glucose, AST, ALT, blood urea and serum creatinine of the rats:

Results of the present work showed non-significant P>0.50 reduction of fasting blood glucose with a percentage -5% reduction from a mean of 318.56 ± 44.41mg/dl in the diabetic non treated rats to a mean of 300.89 ± 39.02 mg/dl in the normal rat with a percentage reduction of -44%, -39% of AST and ALT from a mean of 126.58 ± 21.51, 152.25 ± 22.61 u/l in the normal rats to a mean of 70.98 ± 22.34; 92.78 ± 21.02 u/l with a non-significant (P>0.05) change of blood urea and serum creatinine from a mean of 15.88 + 2.47 u/l and 0.65 + 0.078 mg/dl in the diabetic non treated rats to a mean of 16.90 ± 1.91 u/l and 0.67 ± 0.71 mg/dl in the diabetic rats treated with vit E with a percentage change of +6% and +3% respectively compared with diabetic non treated rats Table (4).

Table (5) compare the effect of vit E administration on fasting blood glucose level, AST, ALT, blood urea and serum creatinine with those in the normal rats showed significant P < 0.005 elevation of fasting blood glucose with a percentage elevation of +212% with significant (P < 0.051) elevation of AST, ALT with a percentage change of +60% , +40% respectively of with a non-significant (P≥ 0.25) change of blood urea and serum creatinine.

Effect of combined administration of vit E (200 mg/kg orally) and glimepiride (0.1 mg/kg orally) on fasting blood glucose, AST, ALT blood urea and serum creatinine of diabetic rat:

A further study was carried out to varify the infleunce of combined administration of vit E (200 mg/kg orally) and glimepiride (0.1 mg/kg)

orally for 3 weeks the data of the present work showed that significant (P>0.0005) reduction of fasting blood glucose with a percentage reduction of -67 % from a mean of 318.56 ± 44.41 mg/dl in the diabetic rats to a mean of 104.96 ± 10.90 mg/dl with percentage reduction of -76%, -71% in AST, ALT levels from a mean of 126.58 ± 21.51, 152.25 ± 22.61 u/l in the diabetic non treated group to a mean of 29.88 ± 4.56, 43.50 ± 7.64 u/l and with percentage change of +13%, -3% of blood urea and serum creatinine which is non-significant P≥ 0.15 compared with diabetic non treated rats Table (6).

Table (7) compare the effect of combined drug regimen on fasting blood glucose, AST, ALT, blood urea and serum creatinine with those in normal rats showed that non-significant P>0.05 increase of fasting blood glucose concerning AST, ALT there is non-significant (P>0.05) elevation with a percentage of -6%, -4 % with non-significant (P>0.03) change in blood urea, serum creatinine.

Table (8) show comparison between diabetic group treated with combined drug regimen and diabetic group treated with glimepiride revealed that highly significant (P< 0.0005) reduction of fasting blood glucose with a percentage reduction of -48% from a mean 201.63 ± 41.27 in the diabetic group treated with glimepridie to a mean of 104.96 ± 10.90 mg/dl in the group treated with combined drug regimen with a percentage reduction of -62%, -56% from a mean of 80.39 ± 18.35, 100.56 ± 22.02 u/l in the diabetic glimepiride treated group to a mean of 29.88 ± 4.56, 43.50 ± 7.69 u/l in the diabetic combined drug treated group. Concerning blood urea and serum creatinine the data revealed non-significant (P>0.25) reduction from a mean of 18.25 ± 3.33 u/l, 0.58 ± 0.113 mg/dl

in the diabetic glimepiride treated rats to a mean of 17.33 ± 2.40 u/l and 0.63 ± 0.10 mg/dl with a percentage change –5% and +5% respectively in the diabetic rats treated with combined drug regimen (Chart 16-20).

Table (9) compare the effect of combined drug regimen on a F.B. glucose, serum AST, ALT, blood urea and serum creatinine with that of Vit. E alone in streptozotocin induced diabetic rats showed highly significant (P< 0.0005present) reduction of blood glucose from with a percentage reduction of -65% from a mean of 300.89 ± 39.02 to a mean of 104.96 ± 10.90 mg/dl. Regarding liver enzymes AST and ALT it revealed highly significant (P < 0.0005) reduction with a percentage reduction of -68%, -53% from a mean of 70.98 ± 22.34, 92.78 ± 21.02u/l to a mean of 29.88 ± 4.56, 43.50 ± 7.69 u/l. Kidney function the present work revealed non-significant (P> 0.20) reduction with a percentage change of -6% and -5% in blood urea and serum creatinine (Chart 16-20).

Table (10) showed the normal values (M ± SD) of brain neurotransmitters norepinephrin, serotonine, GABA and dopamine ug/gm. wet tissue in the brain areas cerebral cortex, thalamus, hypothalamus, midbrain and cerebellum.

The effect of injection of streptozotocin induced diabetes (5 mg/kg sic) on the neurotransmitter (norepinephrin, GABA Dopamin and serotonine):

Concerning GABA level in diabetes induced by strpetozotocin, the results of the present work demonstrated highly significant (P< 0.0005) elevation in the cerebral certex, from a mean of 308.17 ± 44.38 ug/gm wet tissue in normal non treated group to a mean of 453.67 ± 57.44 ug/kg

in diabetic non treated group with percentage increase +47% of and significant increase of +44%, in thalamus-hyptohalamus from a mean of 467.50 ± 59.18 ug/gm wet tissue in the normal non treated group to a mean of 666.28 ± 71.92 ug/gm wet tissue with percentage increase of +45%, and in mid brain from a mean of 418.15 ± 54.70 ug/gm wet tissue to a mean of 607.75 ± 66.77 ug/gm wet tissue with percentage elevation of +45% and in the cerebellum from a mean of 239.93 ± 40.88 ug/gm wet tissue to a mean of 380.77 ± 49.72 ug/gm wet tissue which is highly significant ($P < 0.0005$) with percentage change of +58% Table (11).

A further study was done to varify the dopamine content in the different areas in streptozotocin induced diabetes where it was demonstrated significant ($P<0.25$) reduction from a mean of 0.373 ± 0.064, 0.334 ± 0.059, 0.182 ± 0.029, 140 ± 0.022 ug/gm wet tissue in normal non treated group to a mean of 0.281 ± 0.049, 0.233 ± 0.042, 0.129 ± 0.022, 0.101 ± 0.015 ug/gm wet tissue in diabetic group with a percentage decrease of -24%, -30%, -29%, -27% in cerebral cortex, thalamus, mid brain and hind brain respectively (Table 12).

Table (13) showed that streptozotocin (5 mg/gm b.w. injected i.p) significantly ($P<0.01$) elevation of the concentration of norepinephrin content of cerebral cortex and hypothalamus from a mean of 0.261 ug/gm wet tissue ± 0.014, 0.368 ± 0.041 ug/gm wet tissue in normal non treated group to a mean of 325 ± 0.07, 0.478± 0.081 ug/gm wet tissue with a percentage increase of +24%, +29% with non-significant change ($P>0.10$) in the midbrain with percentage increase of 10% from a mean of 0.162 ± 0.029 ug/gm wet tissue in the normal non treated group to a mean of 0.179 ± 0.037 ug/gm wet tissue in the group injected with

streptozotocin and in cerebellum from a mean of 0.191 ± 0.029 ug/gm wet tissue in the normal non treated group to a mean of 0.215 ± 0.044 ug/gm wet tissue in the group injected with streptozotocin which is non-significant (P>0.10) with a percentage change of +10 and +12 respectively.

The present work also extend to study the diabetic effect on the serotonine content in diabetes induced by streptozotocin. Data of the present work showed significant P < 0.005 decrease from a mean of 0.152 ± 0.024, 0.300 ± 0.042, 0.693 ± 0.088, 0.253 ± 0.039 ug/gm wet tissue in normal non treated group to a mean of 0.107 ± 0.010, 0.196 ± 0.044, 0.512 ± 0.063, 0.176 ± 0.024 ug/gm wet tissue in diabetic group with a percentage decrease of -29%, -34%, -26%, -30% in cerebral cortex, thalamus, mid brain and hind brain respectively (Table 14).

The effect of administration of glimepiride (0.1 mg/kg/day orally) on the neurotransmitters (norepinephrin, GABA, Dopamine and 5HT in the different areas of diabetic rat brain:

Concerning the glimepiride effect on GABA level table (15) showed high significant (P < 0.01) rise of GABA level with percentage change of +29% in the cerebral cortex +19% in the hypothalamus +19% in the mid brain, and +24% in the cerebellum Table (15).

On comparing GABA level in diabetic group treated with glimepiride, with normal rats our results showed that highly significantly (P< 0.0005) rise of the transmitter level with percentage increase of +82% in cerebral cortex, +68% in thalamus, hypothalamus, +73% in mid

brain and +92 % in cerebellum compared with normal non treated group (Table 16).

Regarding the level of dopamine in diabetic rats treated with glimepiride, compared with diabetic non treated the data of the present work table (17) showed that there were significant ($P < 0.01$) reduction from a mean of 0.281 ± 0.049 ug/gm wet tissue to a mean of 0.205 ± 0.039 ug/gm wet tissue with a percentage reduction of -27% in cerebral cortex, from a mean 0.233 ± 0.042 ug/gm wet tissue to a mean of 0.172 ± 0.032 ug/gm wet tissue with a percentage reduction of -26% in thalamus hypothalamus, and from a mean of 0.129 ± 0.022 ug/gm wet tissue to a mean of 0.101 ± 0.007 in diabetic treated group with a percentage reduction of -21%, -20 % in the cerebellum, which is significant at ($P<0.01$).

Dopamine content in diabetic rats treated with glimepiride in the different brain areas compared with its level in normal non treated rats table (18) showed highly significant ($P > 0.0005$) reduction with percentage reduction of -54% reduction in the cerebral cortex, -48% in thalamus-hypothalamus, -44% and in mid brain, and -42 % reduction in the cerebellum.

A further study was carried out to demonstrate the influence of glimepiride (0.1 mg/gm B.W/day for orally) on norepinephrin concentration in diabetes induced by streptozotocin. Results of the present work table (19) showed non-significant ($P> 0.40$) elevation in norepinephrin of cerebral cortex from a mean of 0.325 ± 0.071 ug/gm wet tissue to a mean of 0.346 ± 0.076 ug/gm wet tissue with non-significant ($P > 0.05$) elevation of +6%, and in cerebellum from a mean of 0.215 ±

0.004 ug/gm wet tissue to a mean of 0.223 ± 0.049 ug/gm wet tissue with percentage elevation of +3% and in the thalamus from a mean of 0.478 ± 0.08 ug/gm wet tissue to a mean of 0.476 ± 0.088 ug/mg wet tissue with a percent change of -9% and in the mid brain from a mean of 0.179 ± 0.037 ug/gm wet tissue to a mean of 0.0171 ± 0.041 ug/gm wet tissue with percentage change of -9%.

Table (20) showed that norepinephrin content in the brain areas in diabetic rats treated with glimepiride compared to normal non treated rats, it was found significant $P < 0.025$ elevation of norepinephrin in the cerebral cortex and hypothalamus with a percentage of +21% , +29% and non-significant elevation in the mid brain and cerebellum with a percentage change of +6%, +16%.

Table (21) showed the concentration of serotonine in the different brain areas in diabetic rats treated with glimepiride compared with diabetic non treated group there were non-significant ($P > 0.025$) increase in 5HT level with percentage increase of +5% in +2%, +1%, +3% in cerebral cortex, thalamus, hypothalamus, mid brain and cerebellum respectively Table (21).

Serotonine level in diabetic rats treated with glimipride compared with its level in normal non treated rats in table (22) it was found that highly significant ($P < 0.005$) decrease with a percentage reduction of -26%, -33% -25%, -28%, in the cerebral cortex, thalamus, hypothalamus, mid brain and cerebellum respectively.

The effect of administration of Vit E (200 kg/day) in the dietary water on the neurotransmitter (norepinephrin, GABA, domapine and 5HT) in the different areas of rat brain:

Regarding GABA level in the diabetic rats treated with vit E compared with diabetic non treated rats it was found non-significant ($P>0.25$) elevation of GABA level in the cerebral cortex and thalamus hypothalamus from a mean of 453.67 ± 57.44 , 666.28 ± 71.92, ug/gm wet tissue to a mean of 472.28 ± 58.98, 691.89 ± 73.78 ug/gm wet tissue with a percentage change of +4%, +3% and non-significant ($P\geq0.05$) elevation from a mean of 607.75 ± 66.77 ug/gm wet tissue to a mean of 643.16 ± 70.1 ug/gm wet tissue in the mid brain and from a mean of 380.77 ± 49.72 to a mean of 399.98 ± 51.78 in the cerebellum with percentage change of +5% and =5% respectively table (23).

Table (24) showed very highly significant ($P<0.0005$) rise in GABA concentration from a mean of 380.17 ± 44.38, 467.50 ± 59.18, 418.15 ± 54.70, 239.93 ± 40.88 ug/gm wet tissue to a mean of 453.67 ± 57.44, 666.28± 71.92, 607.75 ± 66.77 ug/gm wet tissue with a percentage increase of +53%, +48%, +53%, +66%, in the cerebral cortex hypothalamus, mid brain and cerebellum respectively in diabetic rats treated with vit E compared with normal rats.

Regarding dopamine level in the rats treated with Vit. E compared with diabetic non treated rats it was found significant ($P<0.01$) reduction of the dopamine level from a mean of 0.281 ± 0.044, 0.233 ± 0.042, 0.129 ± 0.022, 0.101 ± 0.015 ug/gm wet tissue in the diabetic non treated group to a mean of 0.287 ± 0.054, 0.241 ± 0.046, 0.138 ± 0.0017, 0.104 ±

0.017 ug/gm wet tissue in the cerebral cortex, hypothalamus, mid brain and cerebellum respectively Table (25).

Table (26) represented comparison between diabetic group treated with vit E with normal non treated and showed significant ($P < 0.025$) reduction with a percentage change of -23% the dopamine level in the cerebral cortex from a mean of 0.373 ± 0.064 in the normal non treated to a mean of 0.287 ± 0.054 in the diabetic group treated with vit E with a highly significant reduction ($P < 0.01$) with a percentage reduction -27%, -24%, -25% of the dopamine from a mean of 0.334 ± 0.059, 0.182 ± 0.029, 0.140 ± 0.022 ug/gm wet tissue in the normal treated to a mean of 0.241 ± 0.046, 0.138, 0.017, 0.104 ± 0.017 ug/gm wet tissue in the hypothalamus, mid brain and cerebellum respectively.

Also the present work extended to study norepinephrin level in diabetic rats treated with vit E showed non-significant ($P>0.40$) change from a mean of 0.325 ± 0.071, 0.478 ± 0.081, 0.179 ± 0.037, 0.215 ± 0.044 ug/gm wet tissue in diabetic non treated group to a mean of 0.361 ± 0.0383, 0.469 ± 0.093, 0.175 ± 0.032, 0.209 ± 0.042 ug/gm wet tissue in the diabetic group treated with vit E with a percentage elevation +11%, -2%, -2%, and -6% in the cerebral cortex, hypothalamus, mid brain and cerebellum respectively Table (27).

Table (28) showed comparison between diabetic vit E treated group compared with normal non treated group a significant ($P < 0.0125$) elevation of norepinephrin In the cerebral cortex from a mean of 0.261 ± 0.034 ug/gm wet tissue in the normal non treated rats to a mean of 0.361 ± 0.083 ug/gm wet tissue in the rats treated with vit E also showed

significant ($P < 0.025$). elevation of norepinephrin from a mean of 0.368 ± 0.044 ug/gm wet tissue in the control to a mean of 0.469 ± 0.093 ug/gm wet tissue in the group treated with vit E with a percent change of +27% in the thalamus hypothalamus with percentage increase of +8% , +9%, in the midbrain and cerebellum from a mean of 0.162 ± 0.029, 0.191 ± 0.039 ug/gm wet tissue to a mean of 0.175 ± 0.032, 0.209 ± 0.042 ug/gm wet tissue but was non-significant ($P< 0.20$).

Moreover, experiments were performed to demonstrate the concentrations of serotonine in diabetic rats treated with vit E, results of the present work table (29) reported non-significant ($P>0.01$) elevation of serotonine in the cerebral cortex with a percentage change of +10% from a mean of 0.107 ± 0.010 ug/gm wet tissue in the diabetic non treated group to a mean of 0.115 ± 0.015 ug/gm wet tissue in the group treated with vit E and a percentage elevation of +4%, +2%, +5% in the hypothalamus, mid brain, and cerebellum respectively from a mean of 0.196 ± 0.044, 0.512 ± 0.063, 0.176 ± 0.024 in the diabetic group to a mean of , 0.204 ± 0.046, 0.522 ± 0.061, 186 ± 0.032 in diabetic treated group with vit E.

Table (30) showed serotonine content in the brain areas of the diabetic rats treated with vit E compared with normal non treated rats there was a highly significant reduction $P < 0.005$ with a percentage reduction of -24% of serotonine in the cerebral cortex from a mean 0.152 ± 0.024 ug/gm wet tissue in the normal rat to a mean of 0.115 ± 0.015 ug/gm wet tissue in the diabetic vit E treated group with a highly significant reduction $P < 0.0025$ of serotonine with a percentage

reduction of 32%, 24% 26% in the hypothalamus, mid brain and cerebellum respectively.

The effect of combined administration of Vit E (200 mg/kg in the dietary water) and glimepiride (0.1 mg/kg B.W orally) on the neurotransmitter (norepinephrin, GABA, dopamine and 5HT) in the rat brain area:

Concerning GABA level of diabetic rats treated with combined administration of vit E and glimepiride there is significant $P < 0.25$ reduction in the GABA level from a mean of 453.67 ± 57.44, 666.78 ± 71.92, 607.75 ± 66.77, 380.77 ± 49.72 ug/gm wet tissue in the diabetic non treated rat to a mean of a 379.49 ± 48, 566.78 ± 67.25, 512.96 ± 62.12, 307.63 ± 39 ug/gm wet tissue with a percentage reduction of -16%, -15%, -15% and -19%, in the cerebral cortex, hypothalamus, mid brain and cerebellum respectively table (31) (Chart 21-24).

Table (32) compare GABA level in diabetic rats treated with combined drug regimen with normal rats, showed that significant ($P<0.01$) elevation with a percentage change of +23% in the cerebral cortex with highly significant ($P> 0.005$) with a percentage change of +21%, +22%, and 28% in the hypothalamus, mid brain and cerebellum respectively (Chart 21-24).

Table (33) represents comparison between the effect of combined drug regimen Vit E and glimepiride with glimepiride alone in streptozotocin induced diabetes on GABA levels and revealed highly significant ($P < 0.0005$) reduction of GABA highly significant ($P< 0.005$) reduction of GABA levels with a percentage reduction of -32%, -28%,

29%, 34% from a mean of 562.88 ± 69.96, 788.39 ± 79.00, 726.54 ± 76.50 and 472.52 ug/gm wet tissue to a mean of 379.48, 566.78 ± 64.25, 512.63 ± 45.39 and 307.63 ± 45.39 ug/gm wet tissue in the cerebral cortex, hypothalamus, midbrain and cerebellum respectively (Chart 21-24).

Another comparison was done between effects of combined administration of Vit. E and glimepiride on GABA levels with effect of Vit. E alone in streptozotocin diabetic rat in table (34) that revealed significant ($P < 0.05$) reduction of GABA levels with a percentage reduction of -19%, -18%, -20%, -23% in the cerebral cortex, hypothalamus, mid brain and cerebellum respectively (Chart 21-24).

Concerning dopamine content of diabetic rats treated with combined administration of vit E and glimepiride table (35) showed a non-significant ($P > 0.25$) elevation of dopamine from a mean of 0.281 ± 0.44, 0.233 ± 0.042, 0.129 ± 0.022, 0.101 ± 0.015 ug/gm wet tissue in the diabetic non treated group to a mean of 0.296 ± 0.044, 0.252 ± 0.039, 0.142 ± 0.014, 0.109 ± 0.015 ug/gm wet tissue with a percentage in crease of +5%, +4%, +10%, +4% in the cerebral cortex, hypothalamus, mid brain and cerebellum respectively (Chart 25-28).

Table (36) compare dopamine in combined drug regimen with normal non treated rats showed significant ($P < 0.025$) reduction of dopamine level in the cerebral cortex from a mean of 0.373 ± 0.064 ug/gm in the normal non treated rat to a mean of 0.296 ± 0.044 ug/gm wet tissue with a percentage reduction of -20% and highly significant ($P<0.010$) reduction in the dopamine level in the thalamus hypothalamus,

midbrain from a mean of 0.334 ± 0.059, 0.182 ± 0.029, 0.140 ± 0.029 ug/gm wet tissue in the normal non treated rats to a mean of 0.252 ± 0.039, 0.142 ± 0.014, 0.109 ± 0.01 ug/gm wet tissue with a percentage reduction of -24%, -21%, and -22%, in the hypothalamus, midbrain and cerebellum respectively (Chart 25-28).

Table (37) represents comparison between the effects of combined drug regimen treated diabetic rats on dopamine levels with that of glimepiride treated diabetic rats and revealed significant ($P < 0.25$) elevation of dopamine levels. From a mean of 0.205 ± 0.039, 0.172 ± 0.32, 0.101 ± 0.007, 0.080 ± 0.010 ug/gm wet tissue in glimepiride treated rats to a mean of 0.296 ± 0.44, 0.252 ± 0.039, 142 ± 0.014, 0.109 ± 0.015 ug/gm wet tissue in the combined regimen treatment with a percentage elevation of +44%, +46%, +40%, +36% in the cerebral cortex, hypothalamus, mid brain and cerebellum respectively (Chart 25-28)

Another comparison was done between the effects of combined drug regimen compared with Vit. E treated diabetic rats there was non-significant ($P< 0.05$) elevation in the cerebral cortex and hypothalamus with a percentage change of +3%, +4% from a mean of 0.287 ± 0.054, 0.241 ± 0.046, 0.138 ± 0.017, 0.104 ± 0.017 ug/gm wet. tissue to a mean of 0.296 ± 0.044, 0.252 ± 0.039 ug/gm wet tissue but non-significant ($P>0.25$) and non-significant ($P>0.35$) elevation of dopamine from a mean of in the diabetic Vit. E treated to a mean of 0.142 ± 0.014, 0.109 ± 0.015 ug/gm wet tissue in the combined drug treated diabetic rat table (38) (Chart 25-28).

Combined administration of vit E (200 mg/gm) and glimepiride 0.1 mg/gm orally on the norepinephrin, showed significant ($P < 0.25$) reduction of norepinephrin from a mean of 0.325 ± 0.071, 0.478 ± 0.081 ug/gm in the diabetic non treated group to a mean of 0.272 ± 0.039, 0.375 ± 0.051 ug/gm in the cerebral cortex and hypothalamus in the group treated with combined drug regimen with a percentage reduction of -16%, -21%, and non-significant ($P > 0.35$) elevation of norepinephrin in the mid brain and cerebellum from a mean of 0.179 ± 0.037, 0.215 ± 0.044 ug/gm wet tissue in the diabetic non treated group to a mean of 0.186 ± 0.039, 0.2317 ± 0.045 ug/gm wet tissue in the group treated with vit E and glimepiride with a with a percentage elevation of +3% and +7% in the midbrain and cerebellum Table (39) (Chart 29-32).

In Table (40) norepinephrin level in diabetic rats treated with combined vit E and glimepiride compared to normal rats showed non-significant ($P>0.05$) elevation of norepinephrin from a mean of 0.261 ± 0.034, 0.368 ± 0.044, 0.162 ± 0.029, 0.191 ± 0.039 ug/gm wet tissue in the normal rats to a mean of 0.272 ± 0.039, 0.375 ± 0.051, 0.186 ± 0.039, 0.231 ± 0.045 ug/gm wet tissue with a percentage in crease of +4%, +1%, +14%, +20% in the cerebral cortex, hypothalamus, midbrain and cerebellum respectively (Chart 29-32).

Table (41) showed comparison between combined regimen treated group and glimepride treated group there was significant ($P > 0.05$) reduction with a percentage reduction of -21% in the cerebral cortex and hypothalamus from a mean of 0.346 ± 0.076, 0.476 ± 0.088 ug/gm wet tissue in the glimepiride treated group to a mean of 0.272 ± 0.039, 0.375 ± 0.051 ug/gm wet tissue in the combined drug treated group with a

percentage elevation of +8%, +3% in the midbrain and cerebellum from a mean of 0.172 ± 0.034, 0.223 ± 0.049 ug/gm wet tissue in the glimepiride treated rats to a mean of 0.186 ± 0.039, 0.231 ± 0.054 ug/gm wet tissue in the combined drug treated group but non-significant (P > 0.025) (Chart 29-32).

In table (42) comparison between effects of diabetic rats received both Vit. E and glimepiride with diabetic rats received Vit. E alone on norepinephrine levels it was revealed significant (P < 0.05) reduction in the cerebral cortex and hypothalamus with a percentage reduction of -24%, -20% from a mean of 0.361 ± 0.083, 0.469 ± 0.093 to a mean of 0.272 ± 0.039, 0.373 ± 0.051 ug/gm wet tissue with a percentage elevation of +6%, +10% from a mean of 0.175 ± 0.032, 0.209 ± 0.042 ug/gm in the diabetic Vit. E treated rat to a mean of 0.186 ± 0.039, 0.231 ± 0.054 ug/gm wet tissue in the diabetic rats received combined drug therapy (Chart 29-32).

The effect of combined administration of vit E and glimepiride also on 5HT level also was studied table (43) showed highly significant (P<0.01) elevation of 5HT from a mean of 0.107 ± 0.010, 0.196 ± 0.044, 0.512 ± 0.063, 0.176 ± 0.024 ug/gm wet tissue in the diabetic non treated rats to a mean of 0.149 ± 0.22, 0.293 ± 0.037, 0.658 ± 0.075, 0.241 ± 0.034 ug/gm wet tissue with a percentage increase of +39%, +49%, +28% and 36% in the cerebral cortex, hypothalamus, mid brain and cerebellum (Chart 33-36).

Table (44) comparing the 5HT level in the combined drug regimen and normal rats result showed non-significant P> 0.25 reduction of 5HT

level from a mean of 0.152 ± 0.024, 0.300 ± 0.042, 0.693 ± 0.088, 0.253 ± 0.039 ug/gm in the normal rats to a mean of 0.149 ± 0.022, 0.293 ± 0.037, 0.658 ± 0.076, 0.041 ± 0.034 ug/gm wet tissue with a percentage change of -1%, -2%, -5%, -5 % in the cerebral cortex, hypothalamus, mid brain and cerebellum respectively (Chart 33-36).

On comparing 5HT levels in brain areas in diabetic group received Vit. E and glimepiride with that in diabetic group received glimepiride treatment we find highly significant elevation of 5HT levels with a percentage increase of +33%, +45%, +26%, +33% from a mean of 0.112 ± 0.015, 0.201 ± 0.038, 0.519 ± 0.066, 0.181 ± 0.027 ug/gm wet tissue in glimepiride treated group to a mean of 0.149 ± 0.022, 0.293 ± 0.037, 0.658 ± 0.076, 0.241 ± 0.034 ug/gm wet tissue in the cerebral cortex, hypothalamus, mid brain and cerebellum respectively the combined drug treated group (Table 45) (Chart 33-36).

Table (46) compare 5HT levels in diabetic rats received both Vit E and glimepiride with its levels in diabetic rats received glimepiride showed significant ($P < 0.01$) elevation with a percentage elevation of +29%, +43%, +26% and +29% in the cerebral cortex, hypothalamus, mid brain and cerebellum (Chart 33-36).

Table (1): Effect of a single dose of streptozotocin (50 mg/kg I.p) induced diabetes on the average concentration (M±SD) of F.B glucose (mg/dl), AST (u/L), ALT (u/L), BUN (blood urea) (u/L) and creatinine (mg/dl) in the serum compared with normal non treated rats.

Animal Groups / Tested parameters	Control Mean ± SD	Diabetic Mean ± SD	Percentage change	P	Significant
F.B. Glucose (mg/dl)	96.25 ± 7.72	318.56 ± 44.41	+230%	<0.0005	H.S.
AST (u/L)	26.63 ± 4.14	126.58 ± 21.51	+304%	< 0.0005	H.S.
ALT (u/L)	38.56 ± 3.09	152.25 ± 22.61	+294%	< 0.0005	H.S.
B.U.N (u/L)	16.23 ± 2.03	15.88 ± 2.47	- 2%	>0.35	N.S.
Creatinine (mg/dl)	0.66 ± 0.06	0.65 ± 0.078	+1%	>0.40	N.S.

H.S: Highly Significant N.S: Non-significant

Table (2): Effects of oral administration of glimepiride (0.1 mg/kg/day) for 3 weeks on the average concentration (M±SD) of fasting blood glucose (mg/d.l), serum AST (u/L), ALT (u/L), blood (u/L) and serum creatinine gm/DL) in streptozotiocin (50 mg/kg) induced diabetic rats compares with diabetic non treated rats.

Animal Groups / Test parameters	Diabetic	Diabetic glimepiride Mean ± SD	Percentage change	P	Significant
F.B. Glucose (mg/dl)	318.56 ± 44.41	201.63± 41.27	-109%	< 0.025	S
AST (u/L)	126.58 ± 21.51	80.39 ± 18.35	-20%	< 0.025	S
ALT (u/L)	152.25 ± 22.61	100.56 ± 22.02	-100%	< 0.025	S
B.U.N (u/L)	15.88± 2.47	18.25 ± 3.33	+12%	> 0.025	N.S.
Creatinine (mg/dl)	0.65 ± 0.078	0.58 ± 0.113	-12%	> 0.025	N.S.

N.S : Non Significant S: Significant

Table (3): Effects of oral administration of glimepiride (0.1 mg/kg/day) for 3 weeks on the average concentration (M±SD) of fasting blood glucose (mg/d.l), serum AST (u/L), ALT (u/L), B.U.N (u/L) and serum creatinine gm/dl) in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with normal non treated rats.

Animal Groups / Test parameters	Normal rats Mean ± SD	Diabetic glimepiride treated Mean ± SD	Pereentage change	P	Significant
F.B. Glucose (mg/dl)	96.25 ± 7.72	201.63 ± 41.27	+109%	< 0.005	H.S.
AST (u/L)	26.63 ± 4.14	80.39 ± 18.35	+201%	< 0.001	H.S.
ALT (u/L)	38.56 ± 3.09	100.56 ± 22.02	+160%	< 0.005	H.S.
B.U.N (u/L)	16.23 ± 2.03	18.25 ± 3.33	-12%	> 0.10	N.S.
Creatinine (mg/dl)	0.66 ± 0.96	0.58 ± 0.113	12%	> 0.10	N.S.

H.S : Highly Significant

N.S : Non Significant

Table (4): Effects of Vit. E (200 mg/kg/day) for 3 weeks on the average concentration (M±SD) of F.B glucose (mg/dl), AST (u/L), ALT (u/L), B.U.N (u/dl) and serum creatinine (mg/ dl) in the serum of streptozotocin (50 mg/kg I.P) induced diabetic rats compared with diabetic non treated rats.

Animal Groups / Test parameters	Diabetic Mean ± SD	Diabetic treated with Vit. E	Percentage change	P	Significant
F.B. Glucose (mg/dl)	318.56 ± 44.41	300.89± 39.02	-5%	>0.50	N.S
AST (u/L)	126.58 ± 21.51	70.98 ± 22.34	- 44%	<0.05	S
ALT (u/L)	152.25 ± 22.61	92.78 ± 21.02	- 39%	<0.50	S
B.U.N (u/L)	15.88± 2.47	16.90 ± 1.91	+ 6%	>0.20	N.S
Creatinine (mg/dl)	0.65 ± 0.078	0.67 ± 0.71	+ 3%	>0.30	N.S.

N.S: Non-significant S. ; Significant

Table (5): Effects of oral administration of Vit. E (200 mg/kg/day) for 3 weeks on the average concentration of F.B. glucose (mg/dl),AST (u/L), ALT (u/L), B.U.N (u/L), creatinine (mg/dl) in the serum of streptozotocin (50 mg/kg I.P) induced diabeitic rats compared with normal non treated rats.

Animal Groups / Test parameters	Normal rats Mean ± SD	Diabetic treated with Vit. E Mean ± SD	Percentage change	P	Significant
F.B. Glucose (mg/dl)	96.25 ± 7.72	300.89 ± 39.02	+ 212%	< 0.005	H.S.
AST (u/L)	26.63 ± 4.14	70.98 ± 22.34	+ 60%	< 0.005	H.S.
ALT (u/L)	38.56 ± 3.09	92.78 ± 21.02	+ 40%	< 0.05	H.S.
B.U.N (u/L)	16.23 ± 2.03	16.90 ± 1.91	+ 4%	> 0.25	N.S
Creatinine (mg/dl)	0.66 ± 0.96	0.67 ± 0.071	+ 1%	> 0.40	N.S.

H.S: Highly Significant N.S: non-significant

Table (6): Effects of combined oral administration of Vit. E (200 mg/kg/day) and glimepiride (0.1 mg/kg/day) for 3 weeks on the average concentration (M±SD) of F.B. glucose (mg/dl), AST (u/L), ALT (u/L), B.U.N (u/L) and serum creatinine (mg/dl) in the serum of streptozotocin (50 mg/kg I.P) induced diabetic rats compared with diabetic non treated rats.

Animal Groups / Test parameters	Diabetic Mean ± SD	Diabetic treated with Vit. E & glimepiride Mean ± SD	Percentage change	P	Significant
F.B. Glucose (mg/dl)	318.56 ± 44.41	104.96± 10.90	- 67%	< 0.0005	H.S.
AST (u/L)	126.58 ± 21.51	29.88 ± 4.56	- 76%	< 0.0005	H.S.
ALT (u/L)	152.25 ± 22.61	43.50 ± 7.69	- 71%	< 0.0005	H.S.
B.U.N (u/L)	15.88± 2.47	17.33 ± 2.40	+13%	> 0.15	N.S.
Creatinine (mg/dl)	0.65 ± 0.078	0.63 ± 0.100	- 3%	> 0.35	N.S.

H.S: Highly significant N.S: Non-significant

Table (7): Effect combined oral adminstration of Vit. E (200 mg/kg/day) and glimepiride (0.1 mg/kg/day) for 3 weeks on the average concentrations (M±SD) of F.B glucose (mg/dl), serum AST (u/L), ALT (u/L), B.U.N (u/L) and serum creatinine (mg/dl) in the serum of streptozotocin (50 mg/kg I.P induced diabetic rats compared with normal non treated rats.

Animal Groups / Test parameters	Normal Mean ± SD	Diabetic with glimepiride treated Vit. E Mean ± SD	Percentage change	P	Significant
F.B. Glucose (mg/dl)	96.25 ± 7.72	104.89 ± 10.90	+8%	>0.05	N.S
AST (u/L)	26.63 ± 4.14	29.88 ± 4.56	+12%	>0.10	N.S
ALT (u/L)	38.56 ± 3.09	43.50 ± 7.69	+4%	>0.05	N.S
B.U.N (u/L)	16.23 ± 2.03	17.33 ± 2.40	+6%	>0.20	N.S.
Creatinine (mg/dl)	0.66 ± 0.96	0.63 ± 0.100	-4%	>0.30	N.S.

N.S: Non-significant

Table (8): Effects of combined oral administration Vit. E 200 mg/kg/day and glimepiride (0.1mg/kg/day) for 3 weeks on the average concentration (M ±**SD)**of F.B glucose mg/dl, AST (u/L) ALT (u/L) BUN (mg/dl) and creatinine (mg/dl) in the serum of streptozotocin (50 mg/ kg I.P) induced diabetic rats compared with diabetic rats treated with glimepiride.

Animal Groups / Test parameters	Diabetic treated with glimepiride Mean ± SD	Diabetic with glimepiride treated Vit. E Mean ± SD	Percentage change	P	Significant
F.B. Glucose (mg/dl)	201± 41.27	104.89 ± 10.90	- 48%	<0.0005	H.S
AST (u/L)	80.39 ± 18.35	29.88 ± 4.56	- 26%	<0.0005	H.S
ALT (u/L)	100.56 ± 22.02	43.50 ± 7.69	- 56%	<0.0005	H.S
B.U.N(u/L)	18.25 ± 3.33	17.33 ± 2.40	- 5%	>0.25	N.S
Creatinine (mg/dl)	0.58 ± 0.113	0.63 ± 0.100	+5%	>0.20	N.S

N.S : non-significant H.S: Highly significant

Table (9): Effects of combined oral administration of Vit. E 200 mg/kg/day and glimepiride (0.1mg/kg/day) for 3 weeks on the average concentration (M±SD) of F.B glucose mg/dl, AST (u/L) ALT (u/L) BUN (mg/dl) and creatinine (mg/dl) in the serum of streptozotocin (50 mg/kg I.P) induced diabetic rats compared with diabetic rats treated with Vit. E.

Animal Groups / Test parameters	Diabetic treated with Vit.E Mean ±SD	Diabetic with glimepiride treated Vit. E Mean ± SD	Percentage change	P	Significant
F.B. Glucose (mg/dl)	300.89 ± 39.02	104.89 ± 10.90	- 65%	<0.0005	H.S
AST (u/L)	70.98 ± 22.34	29.88 ± 4.56	- 58%	<0.0005	H.S
ALT (u/L)	92.78 ± 21.02	43.50 ± 7.69	-53%	<0.0005	H.S
B.U.N (u/L)	16.90 ± 1.91	17.33 ± 2.40	-6%	>0.20	N.S.
Creatinine (mg/dl)	0.67 ± 0.071	0.63 ± 0.100	-5%	>0.30	N.S.

N.S Non-significant H.S highly significant

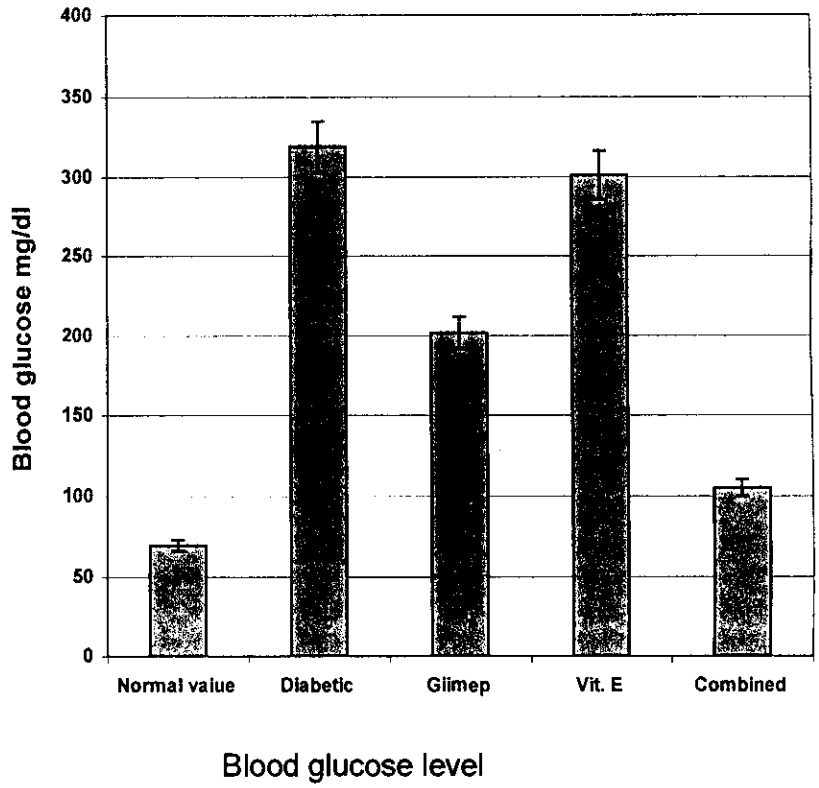

Fig. (16): A bar chart showing the effect of administration of glimepiride 0.1 mg/kg/day orally , Vit. E (200 mg/kg /day orally) and combined administration of glimpeiride and Vit. E for 3 weeks on the average concentration (M + SD) of fasting blood glucoselevels mg/dl in streptozotocin (50 mg/kg, I.P) induced diabetes in rats

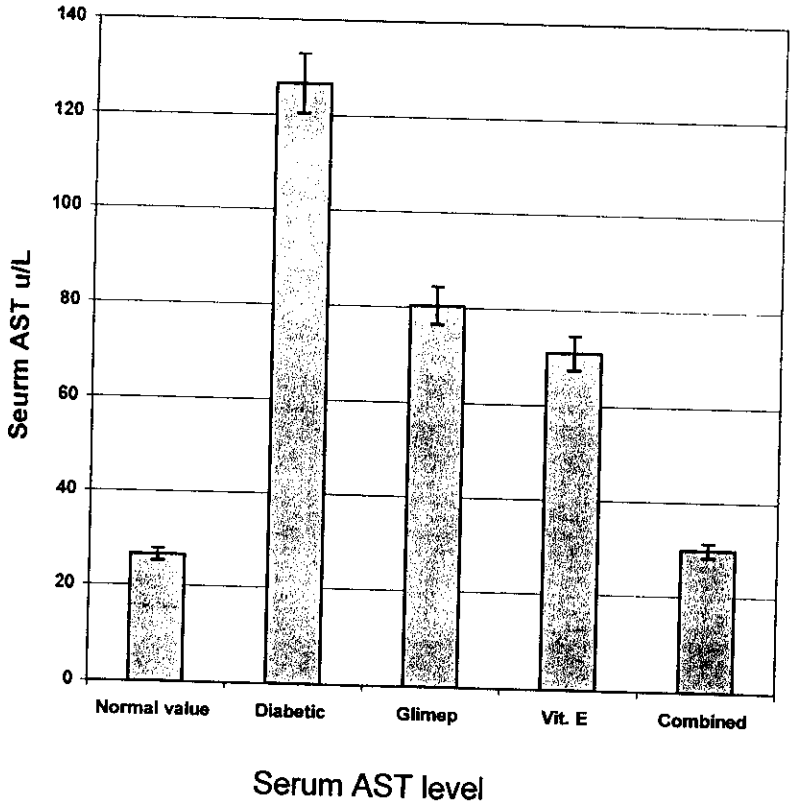

Fig. (17): A bar chart showing the effect of administration of glimepiride 0.1 mg/kg/day orally , Vit. E (200 mg/kg/day orally) and combined administration of glimpeiride and Vit. E for 3 weeks on the average concentration (M + SD) of serum AST U/L in the streptozoocin (50 mg/kg, I.P) induced diabetes in rats.

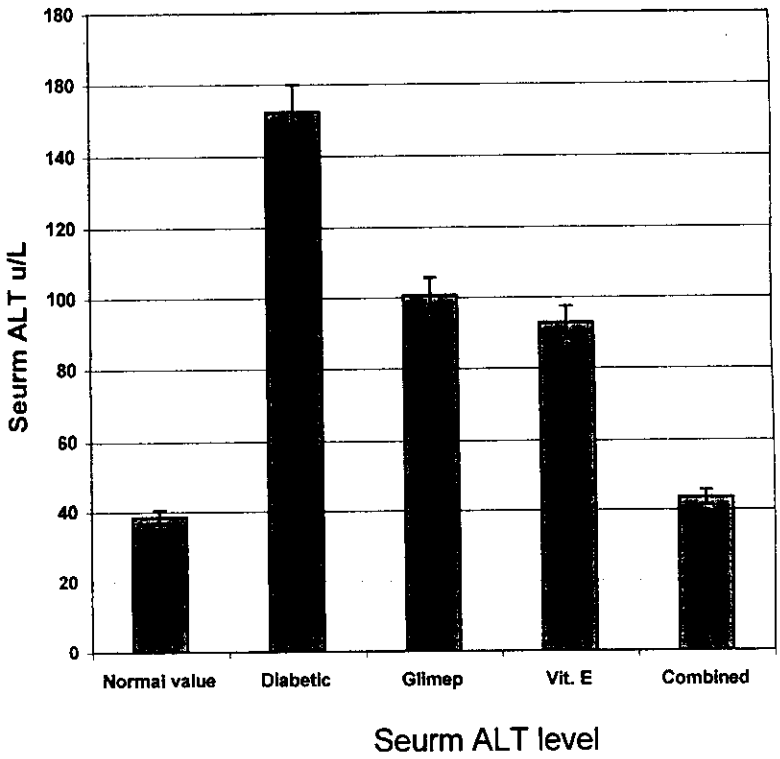

Fig. (18): A bar chart showing the effect of administration of glimepiride 0.1 mg/kg/day orally , Vit. E (200 mg/kg/day orally) and combined administration of glimpeiride and Vit. E for 3 weeks on the average concentration (M + SD). of serum ALT u/L in streptozotocin (50 mg/kg, I.P) induced diabetes in rats

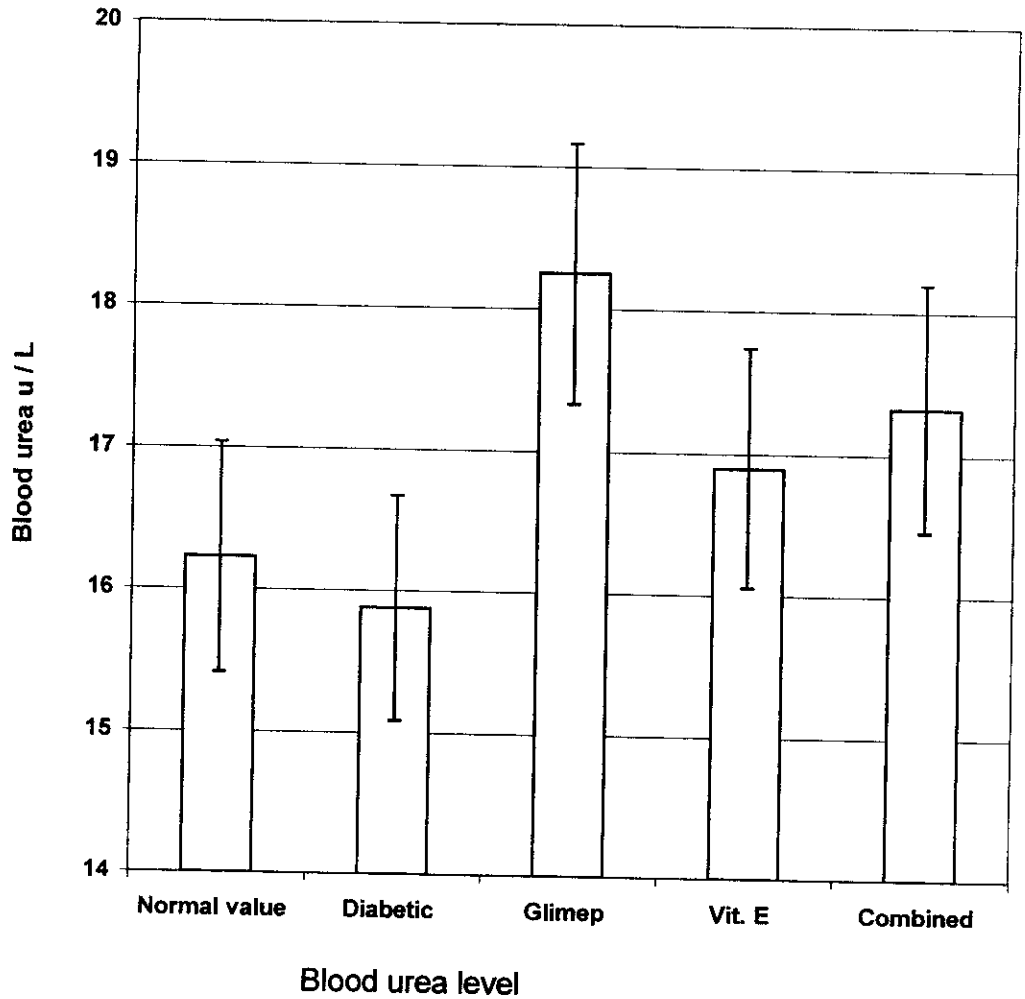

Fig. (19): A bar chart showing the effect of administration of glimepiride 0.1 mg/kg/day orally Vit. E (200 mg/kg/day orally) and combined administration of glimpeiride and Vit. E for 3 weeks on the average concentration (M + SD). of blood urea u/L in streptozotocin (50 mg/kg, I.P) induced diabetes in rats

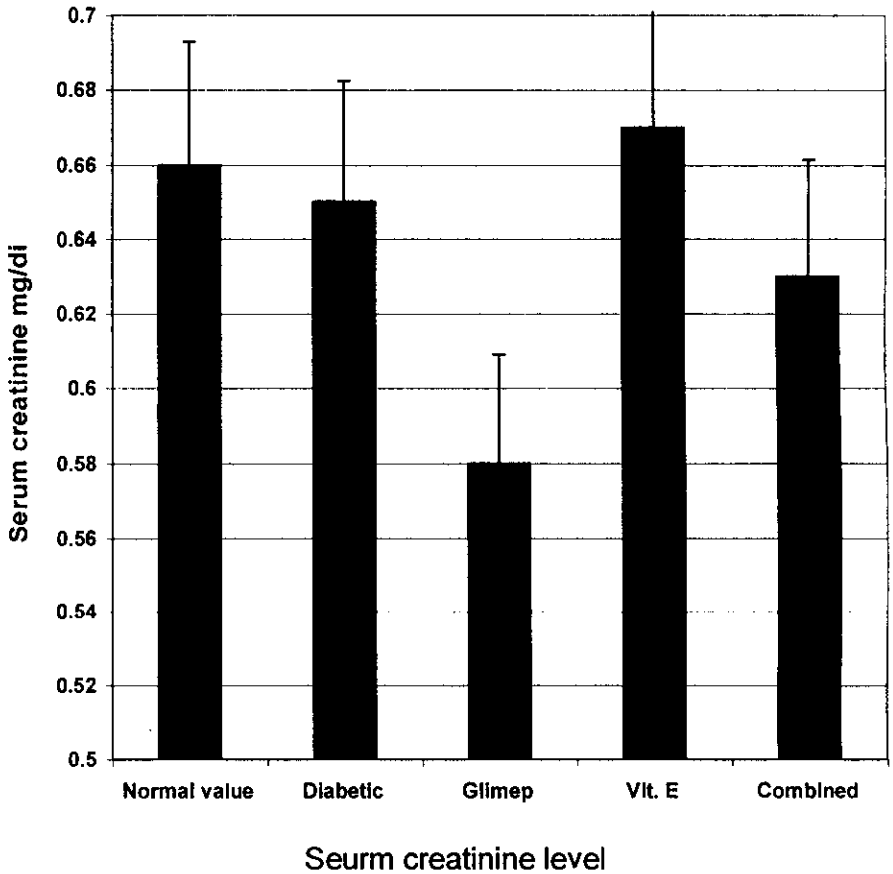

Fig (20) : A bar chart showing the effect of administration of glimepiride 0.1 mg/kg/day orelly Vit. E(200 mg/kg/day orally) and combined administration administration of glimperiride and Vit E for 3 weeks on the average concentration (M+ SD) of serum creatinine mg/dl in streptozotocin induced diabetes

Table (10): Normal values of norepinephrine, dopamine seritonine and GABA (M±SD) concentration ug/g wet tissues in different brain areas of Egyptian albino rats.

Area	Norepirephrin	Dopamine	Serotonine	GABA
Cerebral cortex	0.261 ± 0.011	0.343 ± 0.007	0.152 ± 0.015	308.17 ± 1.67
Hypothalamus	0.368 ± 0.011	0.304 ± 0.011	0.300 ± 0.014	467.50 ± 2.23
Mid brain	0.162 ± 0.013	0.122 ± 0.005	0.693 ± 0.048	418.15 ± 3.33
Cerebellum	0.191 ± 0.006	0.040 ± 0.001	0.253 ± 0.010	239.93 ± 4.5

Table (11): Effects of a single dose of sreptozotocin (50 mg/ kg I.P) induced diabetes on the average concentration (M±SD) of GABA levels (ug/gm wet. tissues) in various rat brain areas compared with normal non treated rats.

Group / Brain area	Normal rats	Diabetic	Percentage change	P	Significant
Cerebral cortex	308.17 ± 44.38	453.67 ± 57.44	+47%	< 0.0005	H.S
Hypothalamus	467.50 ± 59.18	666.28 ± 71.92	+44%	< 0.0005	H.S.
Midbrain	418.15 ± 54.70	607.77 ± 66.77	+45%	< 0.0005	H.S
Cerebellum	239.93 ± 40.88	380.77 ± 49.72	+58%	< 0.0005	H.S.

H.S : Highly Significant

Table (12): Effects of a single dose of streptozotocin (50 mg/kg I.P) induced diabetes on the average concentration (M±SD) of dopamine levels (ug/gm wet. tissue) in various rat brain areas compared with normal non treated rats.

Group / Brain area	Normal rats	Diabetic rats	Percentage change	P	Significant
Cerebral cortex	0.373 ± 0.064	0.281 ± 0.049	- 24%	<0.25	S
Hypothalamus	0.334 ± 0.059	0.233 ± 0.042	- 30%	<0.25	S.
Midbrain	0.182 ± 0.029	0.129 ± 0.022	- 29%	<0.25	S
Cerebellum	0.140 ± 0.022	0.101 ± 0.015	- 27%	<0.25	S

S : Significant

Table (13): Effects of a single dose of streptozotocin (50 mg/kg I.P) induced diabetes on the average concentration (M ±SD) of norepinephrin levels (ug/gm wet. tissue) in various rat brain areas compared with normal non treated rats.

Group / Brain area	Normal rats	Diabetic rats	% change	P	S
Cerebral cortex	0.261± 0.034	0.325± 0.071	+24%	<0.01	H.S
Hypothalamus	0.368± 0.044	0.478± 0.081	+ 29%	<0.01	H.S
Midbrain	0.162± 0.029	0.179± 0.037	+ 10%	>0.10	N.S
Cerebellum	0.191± 0.039	0.215± 0.044	+ 12%	>0.10	N.S

H.S. : Highly Significant N.S : non significant

Table (14) : Effects of a single dose of streptozotocin (50 mg/kg I.P) induced diabetes on the average concentration (M±SD) of 5 HT (ug/gm wet. tissue) in various rat brain areas compared with normal non treated rats.

Group / Brain area	Normal rats	Diabetic rats	Percentage Change	P	Significant
Cerebral cortex	0.152 ± 0.024	0.107 ± 0.010	-29%	< 0.0025	H.S.
Hypothalamus	0.300 ± 0.042	0.196 ± 0.044	-34%	< 0.0025	H.S.
Midbrain	0.693 ± 0.088	0.512 ± 0.063	-26%	< 0.0025	H.S.
Cerebellum	0.253 ± 0.039	0.176 ± 0.024	-30%	< 0.0025	H.S.

H.S : Highly Significant

Table (15): Effects oral administration of glimepiride (0.1 mg/kg/day) for 3 weeks on the average concentration (M±SD) of GABA levels (ug/gm wet. tissues) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with diabetic non treated rats.

Group / Brain area	Diabetic	Diabetic glimepiride treated	Percentage change	P	Significant
Cerebral cortex	433.67 ± 57.44	562.88 ± 69.96	+29%	< 0.01	S
Hypothalamus	666.28 ± 71.92	789.39 ± 79.00	+19%	< 0.01	S
Midbrain	607.75 ± 66.77	726.54 ± 76.50	+19%	<0.01	S
Cerebellum	380.77 ± 49.72	472.52 ± 57.95	+24%	< 0.01	S

S : significant

Table (16): Effects of oral adminstration of glimepiride (0.1mg/kg/day) for 3 week on the average concentration (M±SD) of GABA levels (ug/gm wet. tissues) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with normal non treated rats.

Group / Brain area	Normal rats	Diabetic treated with glimepiride	Percentage change	P	Significant
Cerebral cortex	308.17 ± 44.38	562.88 ± 69.96	+82%	< 0.0005	H.S
Hypothalamus	467.50 ± 59.18	789.39 ± 79.00	+68%	< 0.0005	H.S
Mid brain	418.15 ± 54.70	726.54 ± 76.50	+73%	< 0.0005	H.S
Cerebellum	239.93 ± 40.88	472.52 ± 57.95	+97%	< 0.0005	H.S

H.S : Highly Significant

Table (17): Effects of oral administration of glimepiride (0.1/mg/kg/ day) for 3 weeks on the average concentration (M±SD) of dopamine levels (ug/gm) wet. tissues in various brain areas in streptozotocin (50mg/kg I.P) induced diabetic rats compared with diabetic non l treated rats.

Group / Brain area	Diabetic	Treated with glimepiride	Percentage Change	P	Significant
Cerebral cortex	0.281 ± 0.049	0.205 ± 0.039	-27%	< 0.01	H.S.
Hypothalamus	0.233 ± 0.042	0.172 ± 0.032	-26%	< 0.01	H.S.
Midbrain	0.129 ± 0.022	0.101 ± 0.007	-21%	< 0.01	H.S.
Cerebellum	0.101 ± 0.015	0.80 ± 0.10	-20%	< 0.01	H.S.

H.S: Highly Significant

Table (18): Effects of oral administration of glimepiride (0.1 mg/kg/ day) for 3 weeks on the average concentrations (M±SD) of dopamine levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with normal non treated rats.

Group / Brain area	Normal rats	Diabetic treated with glimep.	Percentage Change	P	Significant
Cerebral cortex	0.373 ± 0.064	0.205 ± 0.039	- 54%	< 0.0005	H.S.
Hypothalamus	0.334 ± 0.059	0.172 ± 0.032	- 48%	< 0.0005	H.S.
Midbrain	0.182± 0.029	0.101 ± 0.007	- 44%	< 0.0005	H.S.
Cerebellum	0.140 ± 0.022	0.080 ± 0.012	- 42%	< 0.0005	H.S.

H.S : Highly Significant

Table (19): Effects of oral administration of glimepiride 0.1 mg/kg/ day for 3 weeks on the average concentration (M±SD) of norepinephrin levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/ kg) induced diabetic rats treated with diabetic non treated rats.

Group / Brain area	Diabetic	Diabetic treated with Glimepiride	% change	P	S
Cerebral cortex	0.325± 0.071	0.346± 0.076	+6%	>0.40	N.S.
Hypothalamus	0.478± 0.081	0.476± 0.088	+9%	>0.47	N.S
Midbrain	0.179± 0.037	0.172± 0.041	+ 9%	>0.35	N.S
Cerebellum	0.215± 0.044	0.223± 0.049	+ 3%	> 0.35	N.S.

N.S : non-significant

Table (20): Effects of oral and administration of glimepiride (0.1 mg / kg / day) for 3 weeks on the average concentration (M±SD) of norepinephrin levels (ug/gm wet. tissue) in various brain areas in sterptozotocin (50mg/kg I.P) induced diabetic rats compared with normal non treated rats.

Group / Brain area	Normal rats	Diabetic treated with glimepiride	Percentage change	P	significant
Cerebral cortex	0.261 ± 0.034	0.346 ± 0.076	+21%	< 0.025	H.S
Hypothalamus	0.368 ± 0.044	0.476 ± 0.088	+29%	< 0.025	H.S.
Midbrain	0.162 ± 0.029	0.172 ± 0.034	+6%	>0.25	N.S.
Cerebellum	0.191 ± 0.039	0.223 ± 0.049	+16%	>0.010	N.S.

H.S : highly significant

N.S : non significant

Table (21): Effects of oral administration of glimepiride (0.1 mg/kg/day) for 3 weeks on the average concentration (M±SD) of 5 HT levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with diabetic non treated rats.

Group / Brain area	Diabetic	Diabetic treated with glimepiride	Percentage change	P	Significan
Cerebral cortex	0.107 ± 0.010	0.112 ± 0.015	+5%	>0.25	N.S
Hypothalamus	0.196 ± 0.044	0.201 ± 0.038	+2%	>0.20	N.S
Midbrain	0.512 ± 0.063	0.519 ± 0.066	+1%	>0.20	N.S
Cerebellum	0.176 ± 0.024	0.181 ± 0.027	+3%	>0.25	N.S

N.S: Non-significant

Table (22): Effects of oral administration of glimepiride (0.1 mg/kg/day) for 3 weeks on the average concentration (M±SD) of 5 HT levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with normal non treated rats.

Group / Brain area	Normal rats	Diabetic rats Treated with glimepiride	Percentage Change	P	Significant
Cerebral cortex	0.152 ± 0.024	0.112 ± 0.015	-26%	< 0.005	H.S.
Hypothalamus	0.300 ± 0.042	0.201 ± 0.038	-33%	< 0.0025	H.S.
Midbrain	0.693 ± 0.088	0.519 ± 0.066	-25%	< 0.0025	H.S.
Cerebellum	0.253 ± 0.039	0.181 ± 0.027	-28%	< 0.0025	H.S.

H.S : Highly Significant

Table (23): Effects of oral administration of Vit. E (200 mg/kg/day) for one week) on the average concentration (M±SD) of GABA level (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with diabetic non treated rats.

Group / Brain area	Diabetic	Diabetic treated with Vit. E	Percentage change	P	Significant
Cerebral cortex	453.67 ± 57.44	472.28 ± 58.98	+4%	>0.25	N.S
Hypothalamus	666.28 ± 71.92	691.89 ± 73.78	+3%	>0.25	N.S
Midbrain	607.75 ± 66.77	643.16 ± 70.01	+5%	>0.15	N.S
Cerebellum	380.77 ± 49.72	399.98 ± 51.78	+5%	>0.25	N.S.

N.S: Non-significant

Table (24): Effects of oral administration of Vit. E (200 mg/kg/day) for 3weeks on the average concentration (M±SD) of GABA levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with normal non treated rats.

Group / Brain area	Normal rats	Diabetic treated with Vit. E	Percentage change	P	Significant
Cerebral cortex	308.17 ± 44.38	472.28 ± 58.98	+ 53%	< 0.0005	H.S
Hypothalamus	467.50 ± 59.18	691.89 ± 73.78	+ 48%	< 0.0005	H.S.
Midbrain	418.15 ± 54.70	643.16 ± 70.01	+ 53%	< 0.0005	H.S.
Cerebellum	239.93 ± 40.88	399.98 ± 51.78	+ 66%	< 0.0005	H.S.

H.S : Highly Significant

Table (25): Effects of oral administration of Vit. E (200 gm/kg/ day) for 3 weeks on the average concentration (M±SD) of dopamine levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with diabetic non treated rats.

Group / Brain area	Diabetic	Diabetic with Vit. E	Percentage change	P	significant
Cerebral cortex	0.281 ± 0.044	0.287 ± 0.054	+2%	> 0.25	N.S
Hypothalamus	0.233 ± 0.042	0.241 ± 0.046	+3%	> 0.25	N.S.
Midbrain	0.129 ± 0.022	0.138 ± 0.017	+6%	> 0.25	N.S
Cerebellum	0.101 ± 0.015	0.104 ± 0.017	+3%	> 0.25	N.S

N.S : Non significant

Table (26): Effects of oral administration of Vit. E (200 mg/kg/day) for 3 weeks on the average concentration of dopamine levels (M±SD) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with normal non treated rats.

Group / Brain area	Normal rats	Diabetic treated with vit E.	Percentage change	P	Significant
Cerebral cortex	0.373 ± 0.064	0.287 ± 0.054	-23%	≤ 0.025	H.S.
Hypothalamus	0.334 ± 0.059	0.241 ± 0.046	-27%	≤ 0.025	H.S.
Midbrain	0.182± 0.029	0.138 ± 0.017	-24%	≤ 0.025	H.S.
Cerebellum	0.140 ± 0.022	0.104 ± 0.017	-25%	≤ 0.025	H.S.

H.S : Highly Significant

Table (27): Effects of oral administration of Vit. E (200 mg /kg/ day) for 3 weeks on the average concentration (M±SD) of norepinephrin levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with diabetic non treated rats.

Group / Brain area	Diabetic rats	Diabetic with Vit E	% change	P	S
Cerebral cortex	0.325± 0.071	0.361± 0.083	+11%	>0.40	N.S
Hypothalamus	0.478± 0.081	0.469± 0.093	-2 %	>0.40	N.S
Midbrain	0.179± 0.037	0.175± 0.032	-2 %	>0.40	N.S
Cerebellum	0.215± 0.044	0.209± 0.042	-6 %	>0.40	N.S

N.S : non Significant

Table (28): Effects of oral administration of Vit. E (200 mg/kg/ day) for 3 weeks on the average concentration (M±SD) of norepinephrin levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with normal non treated rats.

Group / Brain area	Normal rats	Diabetic with Vit. E	Percentage change	P	significant
Cerebral cortex	0.261 ± 0.034	0.361 ± 0.083	+38%	<0.0125	H
Hypothalamus	0.368 ± 0.044	0.469 ± 0.093	+27%	<0.025	H
Midbrain	0.162 ± 0.029	0.175 ± 0.032	+8%	> 0.20	N.S
Cerebellum	0.191 ± 0.039	0.209 ± 0.042	+9%	> 0.20	N.S

H.S : highly significant N.S : non significant

Table (29): Effects of oral administration of Vit. E (200 mg/kg/day) for 3 weeks on the average concentration (M±SD) of 5HT levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/ kg I.P) induced diabetic rats compared with diabetic non treated rats.

Group / Brain area	Diabetic	Diabetic treated with Vit. E	Percentage Change	P	Significant
Cerebral cortex	0.107 ± 0.010	0.115 ± 0.015	+10%	>0.10	N.S
Hypothalamus	0.196 ± 0.044	0.204 ± 0.046	+4%	>0.35	N.S
Midbrain	0.512 ± 0.063	0.522 ± 0.061	+2%	>0.35	N.S
Cerebellum	0.176 ± 0.024	0.186 ± 0.013	+5%	>0.25	N.S

N.S : Non-significant

Table (30): Effects of oral administration of Vit. E (200 mg/ kg/day) for 3 weeks on the average concentration (M±SD) of 5 HT levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with normal non treated rats.

Group / Brain area	Normal rats	Diabetic treated Vit. E	Percentage change	P	Significant
Cerebral cortex	0.152 ± 0.024	0.115 ± 0.015	-24%	< 0.005	H.S.
Hypothalamus	0.300 ± 0.042	0.204 ± 0.046	-32%	< 0.0025	H.S.
Midbrain	0.693 ± 0.088	0.522 ± 0.061	-24%	< 0.0025	H.S.
Cerebellum	0.253 ± 0.039	0.186 ± 0.032	-26%	< 0.01	H.S.

H.S : Highly Significant.

Table (31): Effects of combined oral administration of Vit. E (200 mg/kg/day) and glimepiride (0.1mg/kg/day) for 3 weeks on the average concentration (M±SD) of GABA levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with diabetic non treated group.

Group / Brain area	Diabetic	Diabetic treated with Vit. E and glimepiride	Percentage change	P	Significant
Cerebral cortex	453.67 ± 57.44	379.48 ± 48	-16%	< 0.025	S
Hypothalamus	666.28 ± 71.92	566.78 ± 64.25	-15%	< 0.025	S
Midbrain	607.75 ± 66.77	512.96 ± 62.12	-15%	< 0.025	S
Cerebellum	380.77 ± 49.72	307.63 ± 45.39	-19%	< 0.025	S

S : Significant

Table (32): Effects of combined oral administration of Vit. E (200 mg/kg/day) and glimepiride (0.1mg/kg/day) for 3 weeks on the average concentration (M±SD) of GABA levels (ug/gm wet. tissue) in various brain areas in sterptozotocin (50 mg/kg I.P) induced diabetic rats compared with normal non treated rats.

Group / Brain area	Normal rats	Diabetic treated with vit E+ glimepiride	Percentage change	P	Significant
Cerebral cortex	308.17 ± 44.38	379.48 ± 49.33	+23%	< 0.01	S
Hypothalamus	467.50 ± 59.18	566.78 ± 64.25	+21%	< 0.01	S
Midbrain	418.15 ± 54.70	512.96 ± 62.12	+22%	< 0.01	S
Cerebellum	239.93 ± 40.88	307.63 ± 45.39	+28%	< 0.01	S

S: Significant

Table (33): Effects of combined oral administration of Vit. E 200mg/kg/day and glimepiride (0.1mg/kg/day) for 3weeks on the average concentrations (M±SD) of GABA levels ug/gm wet. tissue in various rat brain areas in streptozotocin (50 mg kg I.P) induced diabetic rats compared with diabetic rats treated with glimepiride.

Group / Brain area	Diabetic treated with glimepiride	Diabetic treated with glimepiride and Vit. E	Percentage change	P	Significant
Cerebral cortex	562.88 ± 69.96	379.48 ± 49.33	-32%	< 0.0005	S
Hypothalamus	789.39 ± 79.00	566.78 ± 64.25	-28%	< 0. 0005	S
Midbrain	726.54 ± 76.50	512.96 ± 62.12	-29%	< 0. 0005	S
Cerebellum	472.52 ± 57.95	307.63 ± 45.39	-34%	< 0.0005	S

S: Significant

Table (34): Effects of combined oral administration of Vit. E (200mg/kg/day) and glimepiride (0.1mg/kg/day) for 3 weeks on the average concentration (M±SD) of GABA levels ug/gm wet. tissue in various rat brain areas in streptozotocin (50 mg / kg I.P) induced diabetic rats compared with diabetic rats treated with Vit E.

Group / Brain area	Diabetic treated with Vit. E	Diabetic treated with glimepiride and Vit. E	Percentage change	P	Significant
Cerebral cortex	472.28 ± 58.98	379.48 ± 49.33	-19%	< 0.05	S
Hypothalamus	691.89 ± 73.78	566.78 ± 64.25	- 18%	< 0. 05	S
Midbrain	643.16 ± 70.01	512.96 ± 62.12	-20%	< 0. 05	S
Cerebellum	399.98 ± 51.78	307.63 ± 45.39	-23%	< 0.05	S

S: Significant

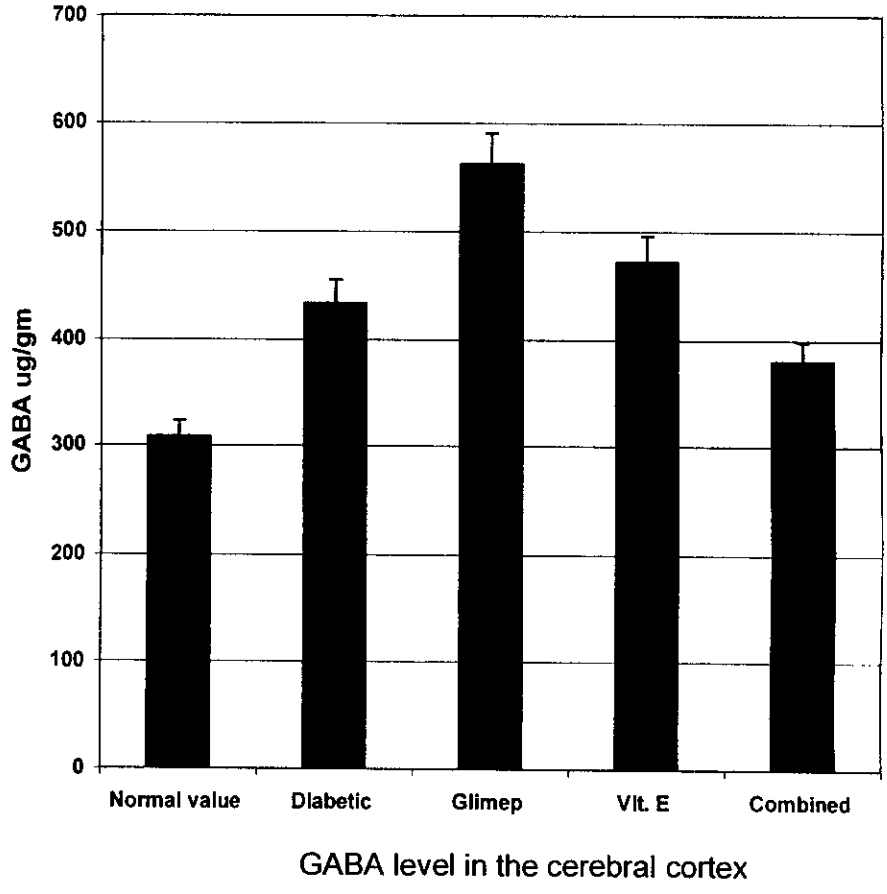

Fig. (21): A bar chart showing the effect of administration of glimepiride (0.1 mg/kg orally/day) Vit. E (200 mg/kg/day orally) and combined administration of glimepiride and Vit. E for 3weeks on the average concentration (M+SD) of GABA levels ug/gm wet. tsssue in the cerebral cortex in streptozotocin(50 mg/kg I.P.) induced diabetes in rats.

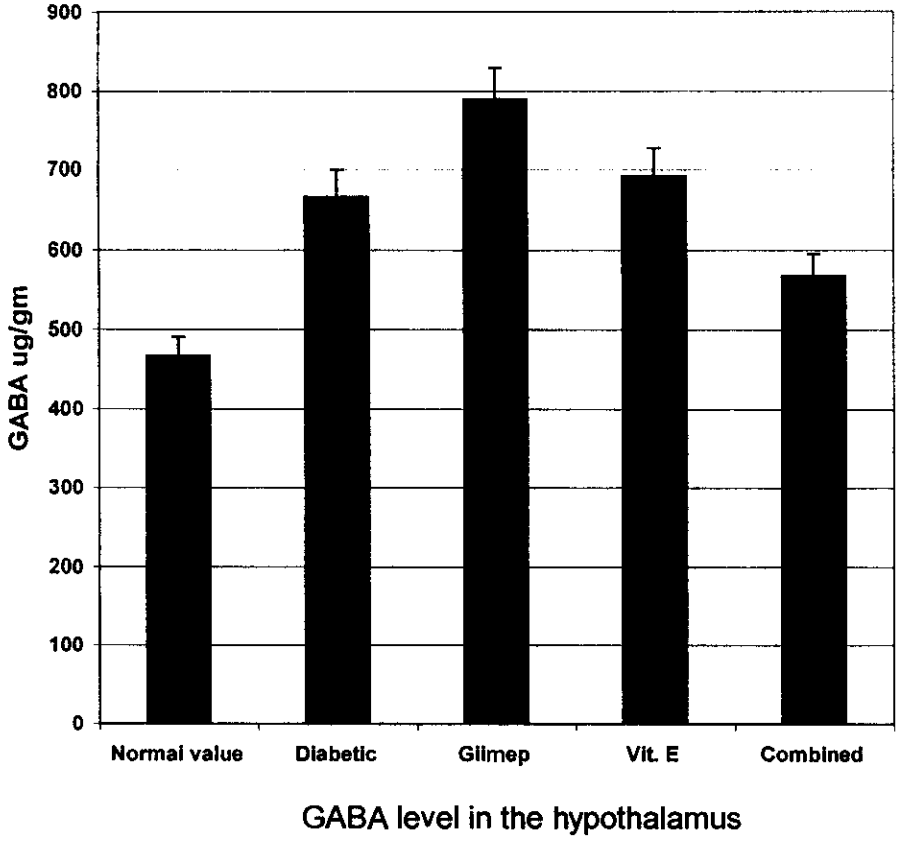

Fig. (22): A bar chart showing the effect of administration of glimepiride (0.1 mg/kg/day orally) , Vit. E (200 mg/kg /day orally) and combined administration of glimepiride and Vit. E for 3 weeks on the average concentration(M+SD) of GABA levels ug/gm wet. tissue in the hypothalamus in streptozotocin(50 mg/kg I.P.) induced diabetes in rats.

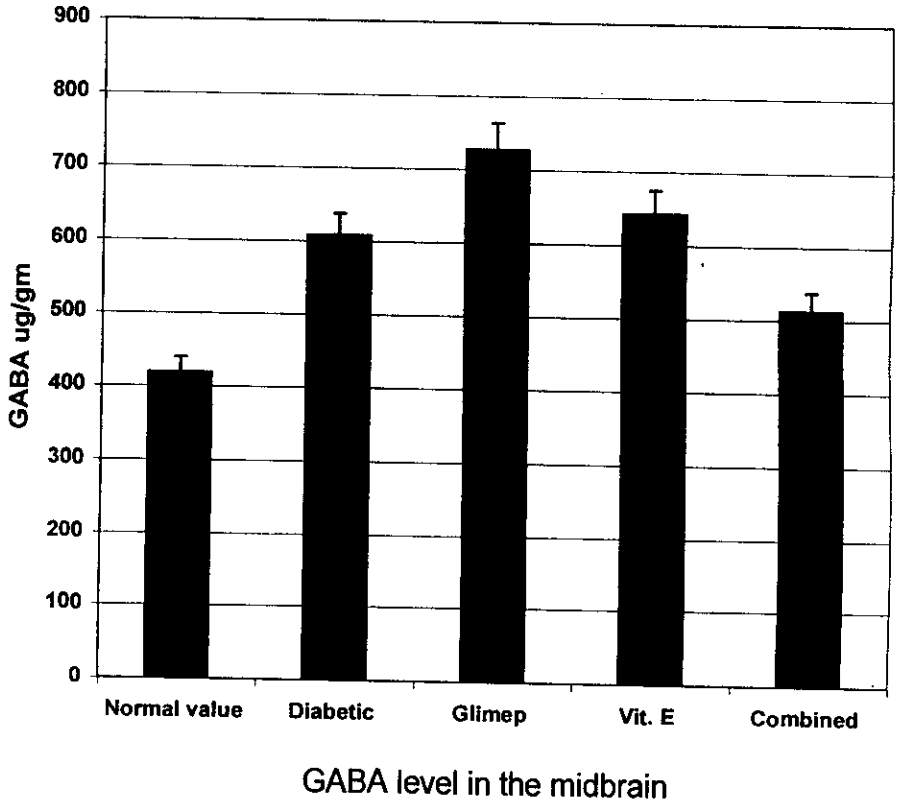

Fig. (23): A bar chart showing the effect of administration of glimepiride (0.1 mg/kg/day orally), Vit. E (200 mg/kg /day orally) and combined administration of glimepiride and Vit. E for 3 weeks on the average concentration (M+SD) of GABA levels ug/gm wet. tissue in the midbrain in streptozotocin (50 mg/kg I.P) induced diabetes in rats.

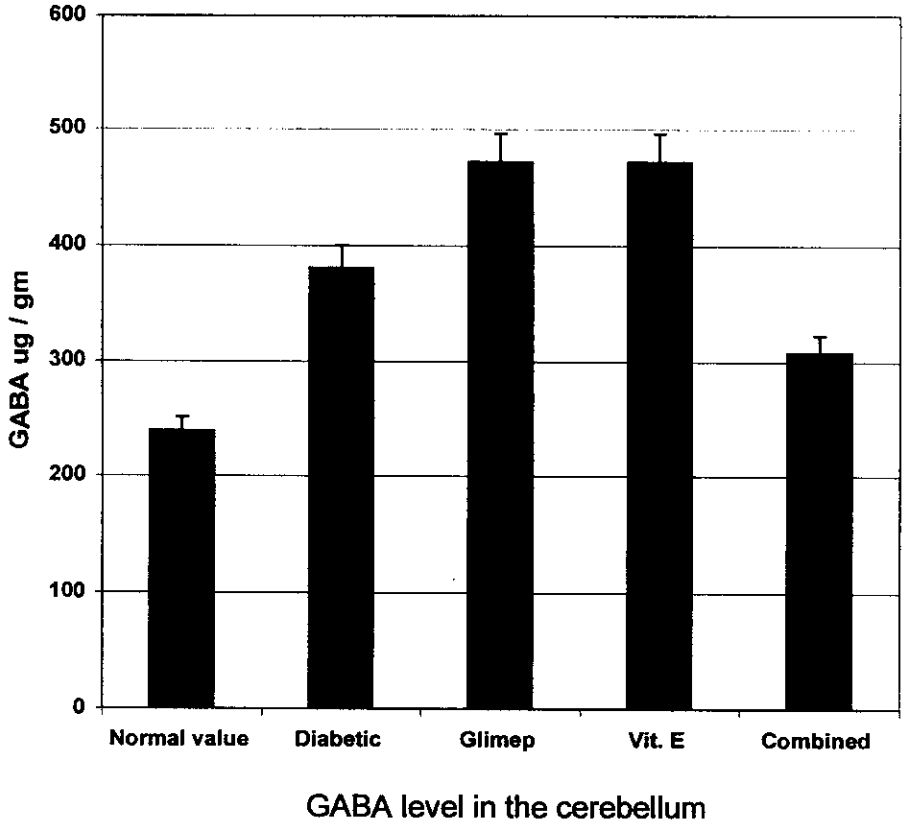

Fig. (24): A bar chart showing the effect of administration of glimepiride (0.1 mg/kg/day orally) Vit. E (200 mg/kg/day orally) and combined administration of glimepiride and Vit. E for 3 weeks on the average concentration (M+SD) of GABA levels ug/gm wet. tissue in the cerebellum in streptozotocin (50 mg/kg I.P) induced diabetes in rats.

Table (35): Effects of combined oral administration of Vit. E (200mg/kg/day) and glimepiride 0.1mg/kg/day for 3 week on the average concentration (M±SD) of dopamine levels (ug/gm wet. tissue) in various brain area in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with diabetic non treated rats.

Group / Brain area	Diabetic	Diabetic with Vit. E and glimepiride	Pereentage change	P	Significa
Cerebral cortex	0.281 ± 0.044	0.296 ± 0.044	+5%	>0.25	N.S
Hypothalamus	0.233 ± 0.042	0.252 ± 0.039	+4%	>0.25	N.S.
Midbrain	0.129 ± 0.022	0.142 ± 0.014	+10%	>0.25	N.S
Cerebellum	0.101 ± 0.015	0.109 ± 0.015	+4%	>0.25	N.S

N.S : non Significant

Table (36): Effects of combined oral administration of Vit. E (200mg/ kg/ day) for one week and glimepiride 0.1 mg/kg/day for 3 weeks on the average concentration (M±SD) of dopamine levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with normal non treated rats.

Group / Brain area	Normal	Treated with glimepiride +Vit	Percentage Change	P	Significant
Cerebral cortex	0.373 ± 0.064	0.296 ± 0.044	-20%	≤ 0.025	H.S.
Hypothalamus	0.334 ± 0.059	0.252 ± 0.039	-24%	≤ 0.025	H.S.
Midbrain	0.182 ± 0.029	0.142 ± 0.014	-21%	≤ 0.025	H.S.
Cerebellum	0.140 ± 0.022	0.109 ± 0.015	-22%	≤ 0.025	H.S.

H.S : Highly Significant

Table (37): Effects of combined oral administration of Vit. E 200mg/kg/day and glimepiride (0.1mg/kg/day) for 3weeks on the average concentration (M±SD) of dopamine levels ug/gm wet. tissue in various brain areas in streptozotcoin (50 mg / kg I.P) induced diabetic rats compared with diabetic rats treated with glimepiride.

Group / Brain area	Diabetic treated with glimepiride	Diabetic treated with glimepiride and Vit. E	Percentage change	P	Significant
Cerebral cortex	0.205± 0.039	0.296 ± 0.044	+44%	< 0.25	S
Hypothalamus	0.172 ± 0.32	0.252 ± 0.039	+46%	< 0. 25	S
Midbrain	0.107 ± 0.007	0.142 ± 0.014	+40%	< 0. 25	S
Cerebellum	0.080 ± 0.010	0.109 ± 0.015	+36%	< 0.25	S

S: Significant

Table (38): Effects of combined oral administration of Vit. E 200mg/kg/day and glimepiride (0.1mg/kg/day) for 3weeks on the average concentration (M±SD) of dopamine levels ug/gm wet. tissue in various brain areas in streptozotcoin (50 mg kg I.P) induced diabetic rats compared with diabetic rats treated with Vit. E.

Group / Brain area	Diabetic trented with Vit.E	Diabetic treated with glimepiride and Vit. E	Percentage change	P	Signi fican t
Cerebral cortex	0.287± 0.054	0.296 ± 0.044	+ 3%	< 0.35	N.S
Hypothalamus	0.241 ± 0.046	0.252 ± 0.039	+ 4%	< 0. 35	N.S
Midbrain	0.138 ± 0.017	0.142 ± 0.014	+ 2%	< 0. 25	N.S
Cerebellum	0.104 ± 0.017	0.109 ± 0.015	+4%	< 0.25	N.S

N.S: Non Significant

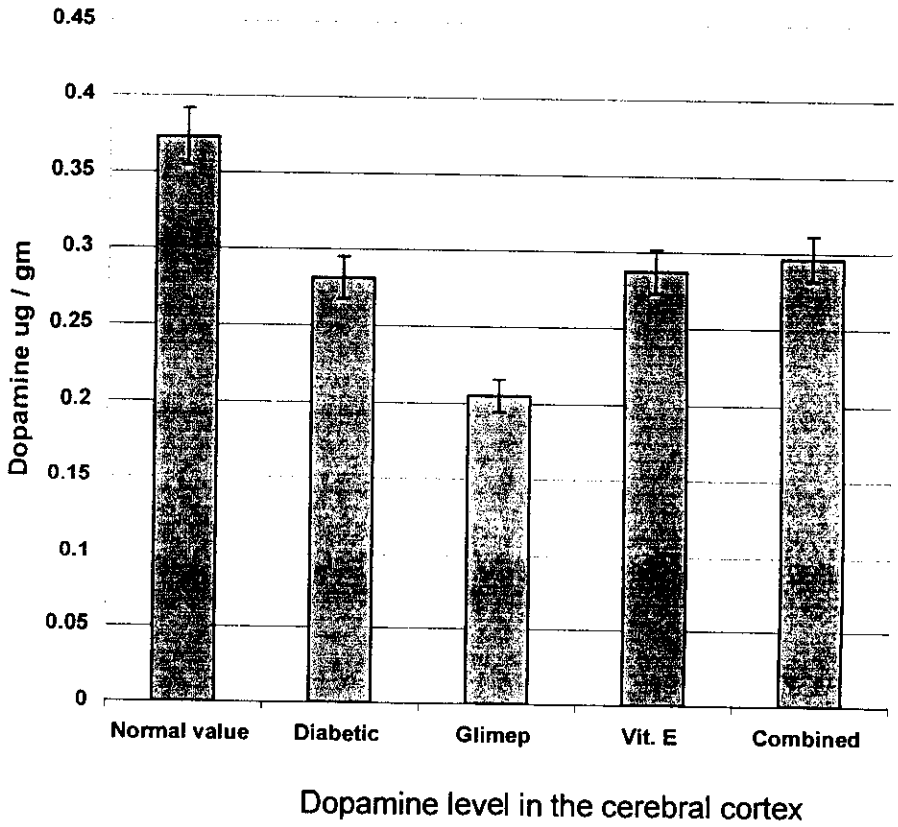

Fig. (25): A bar chart showing the effect of administration of glimepiride (0.1 mg/kg/day orally), Vit. E (200 mg/kg/day orally) and combined administration of glimepiride and Vit. E for 3 weeks on the average concentration (M+SD) of dopamine levels ug/gm wet. tissuein the cerebral cortex in streptozotocin(50 mg/kg I- p) induced diabetes

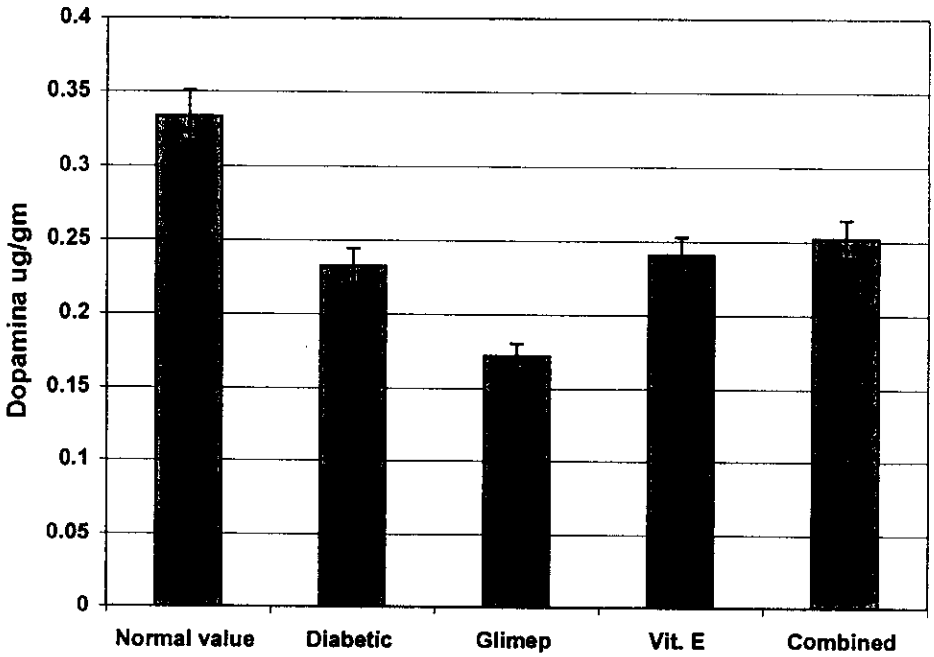

Fig. (26): A bar chart showing the effect of administration of glimepiride (0.1 mg/kg/day orally) , Vit. E (200 mg/kg/day orally)and combined administration of glimepiride and Vit. E for 3 weeks on the average concentration(M+SD) of dopamine levels ug/gm wet. tissue in the hypothalamus in streptozotocin (50 mg/kgI.P) induced diabetes in rats.

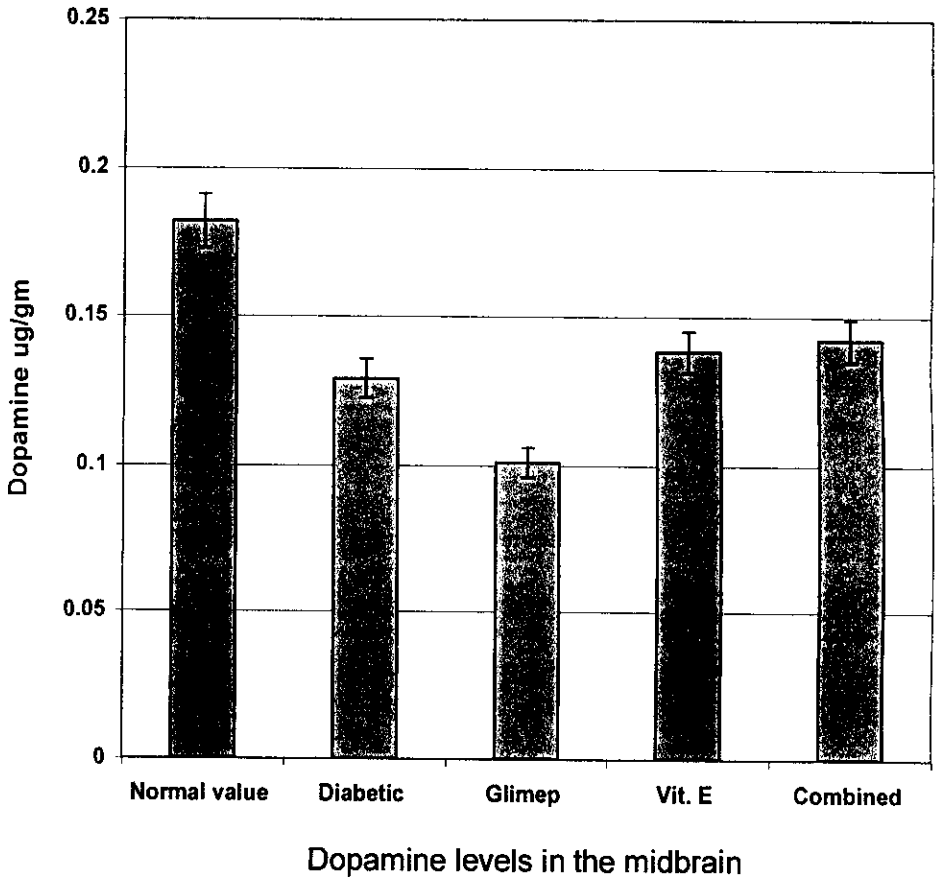

Fig. (27): A bar chart showing the effect of administration of glimepiride (0.1 mg/kg/day orally), Vit. E (200 mg/kg/day orally) and combined administration of glimepiride and Vit. E for 3 weeks on the average concentration(M+SD) of dopamine ug/gm wet. tissue in the midbrain in streptozotocin(50 mg/kg I.P) induced diabetes in rats.

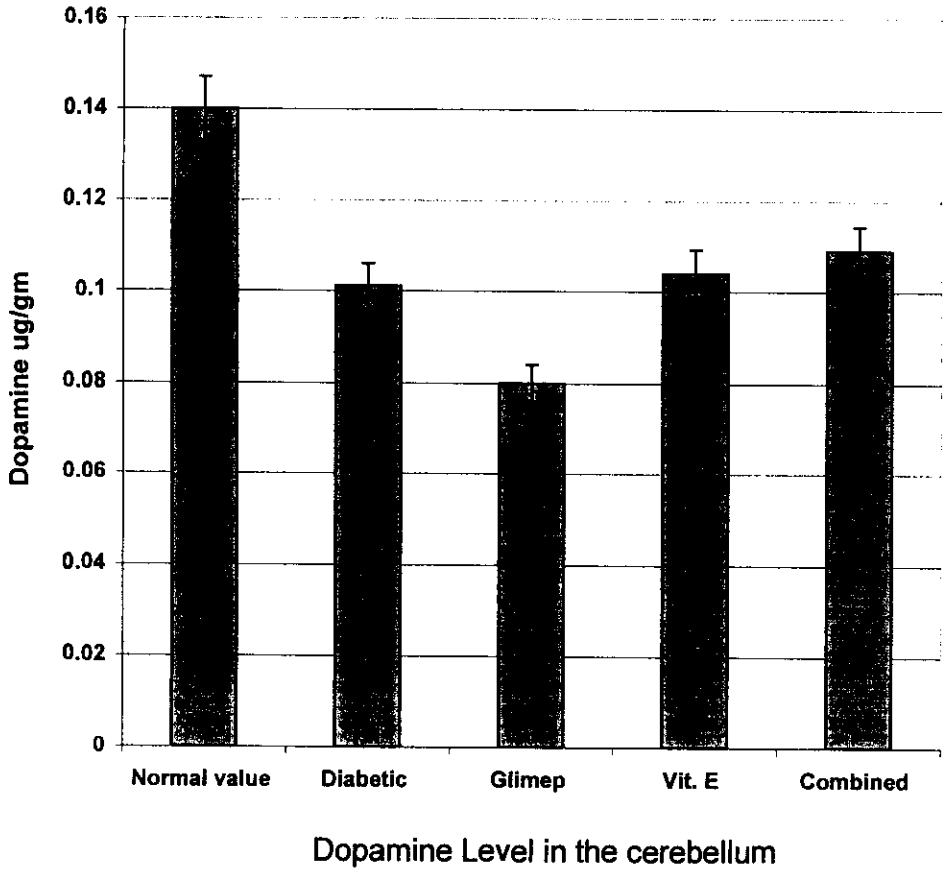

Fig. (28): A bar chart showing the effect of administration of glimepiride (0.1 mg/kg / day orally) , Vit. E (200 mg/kg orally) and combined administration of glimepiride and Vit. E for 3 week on the average concentration of dopamine levels ug/gm in the cerebellum in streptozotocin 50 mg/kg I.P. induced diabetes in rats.

Table (39): Effects of combined oral administration of Vit. E (200 mg/ kg/ day) and glimepiride (0.1/mg /kg / day) for 3 weeks on the average concentration (M±SD) of norepinephrin levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rat compared with diabetic not treated group.

Group / Brain area	Diabetic group	Diabetic with Vit. E + glimepiride	Percentage change	P	significam
Cerebral cortex	0.325 ± 0.071	0.272 ± 0.039	-16%	< 0.025	S
Hypothalamus	0.478 ± 0.081	0.375 ± 0.051	-21%	< 0.025	S.
Midbrain	0.179 ± 0.037	0.186 ± 0.039	+3%	> 0.035	N.S
Cerebellum	0.215 ± 0.044	0.231 ± 0.054	+7 %	> 0.035	N.S

S : Significant

N.S : non significant

Table (40): Effects of combined oral administration of Vit. E (200 mg/kg/ day) and glimepiride (0.1gm/kg/day) for 3 week on the average concentration (M±SD) of norepinephrin levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50mg/kg I.P) induced diabetic rats compared with normal non treated rats.

Group / Brain area	Normal rats	Diabetic and treated with glimepiride Vit. E	Percentage change	P	significant
Cerebral cortex	0.261 ± 0.034	0.272 ± 0.039	+4%	> 0.30	N.S
Hypothalamus	0.368 ± 0.044	0.375 ± 0.051	+1%	>0.40	N.S
Midbrain	0.162 ± 0.029	0.186 ± 0.039	+14%	>0.10	N.S
Cerebellum	0.191 ± 0.039	0.231 ± 0.045	+20%	>0.05	N.S

N.S : non significant

Table (41): Effects of combined oral administration of Vit. E 200mg/kg/day and glimepiride (0.1mg/kg/day) for 3weeks on the average concentration (M±SD) of norepinephrin ug/gm wet. tissue in various rat brain areas in streptozoctoin (50 mg / kg I.P) induced diabetic rats compared with diabetic rats treated with glimepiride.

Group / Brain area	Diabetic treated with glimepiride	Diabetic treated with glimepiride and Vit. E	Percentage change	P	Significant
Cerebral cortex	0.346± 0.076	0.272 ± 0.039	-21%	< 0.05	S
Hypothalamus	0.476 ± 0.088	0.375 ± 0.051	-21%	< 0. 05	S
Midbrain	0.172 ± 0.034	0.186 ± 0.039	+8%	> 0. 25	N.S
Cerebellum	0.223 ± 0.049	0.231 ± 0.054	+3%	> 0.25	N.S

S: Significant N.S: Non Significant

Table (42): Effects of combined oral administration of Vit E 200mg/kg/day and glimepiride (0.1mg/kg/day) for 3weeks on the average concentration (M±SD) of norepinephrin ug/gm wet. tissue in various rat brain areas in streptozoctoin (50 mg / kg I.P) induced diabetic rats compared with diabetic rats treated with Vit.E.

Group / Brain area	Diabetic treated with Vit.E	Diabetic treated with glimepiride and Vit. E	Percentage change	P	Significant
Cerebral cortex	0.361± 0.083	0.272 ± 0.039	-24%	< 0.025	S
Hypothalamus	0.469 ± 0.093	0.375 ± 0.051	-20%	< 0. 05	S
Midbrain	0.175 ± 0.032	0.186 ± 0.039	+6%	> 0. 30	N.S
Cerebellum	0.209 ± 0.042	0.231 ± 0.054	+10%	> 0.20	N.S

S: Significant N.S: Non Significant

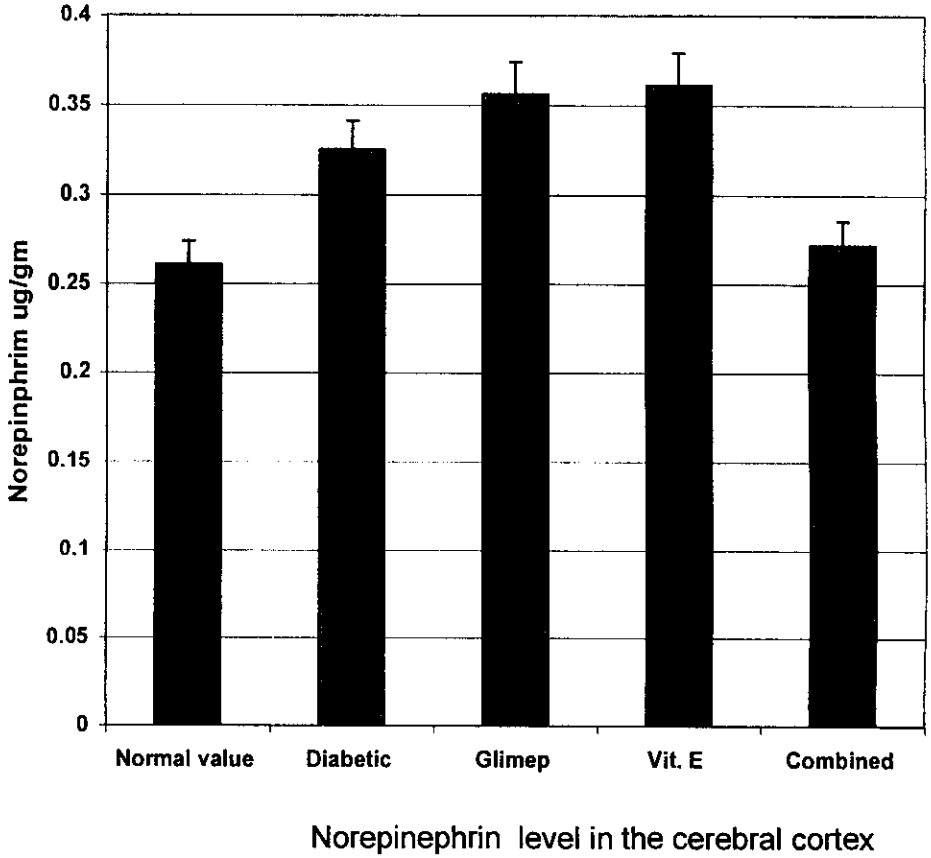

Fig. (29): A bar chart showing the effect of administration of glimepiride (0.1 mg/kg/day orally) , Vit. E (200 mg/kg/day orally) and combined administration of glimepiride and Vit. E for 3 weeks on the average concentration(M+SD) of norepinephrin levels ug/gm wet. tissue in the cerebral cortex in streptozotocin(50 mg/kg I.P.) induced diabetes in rats.

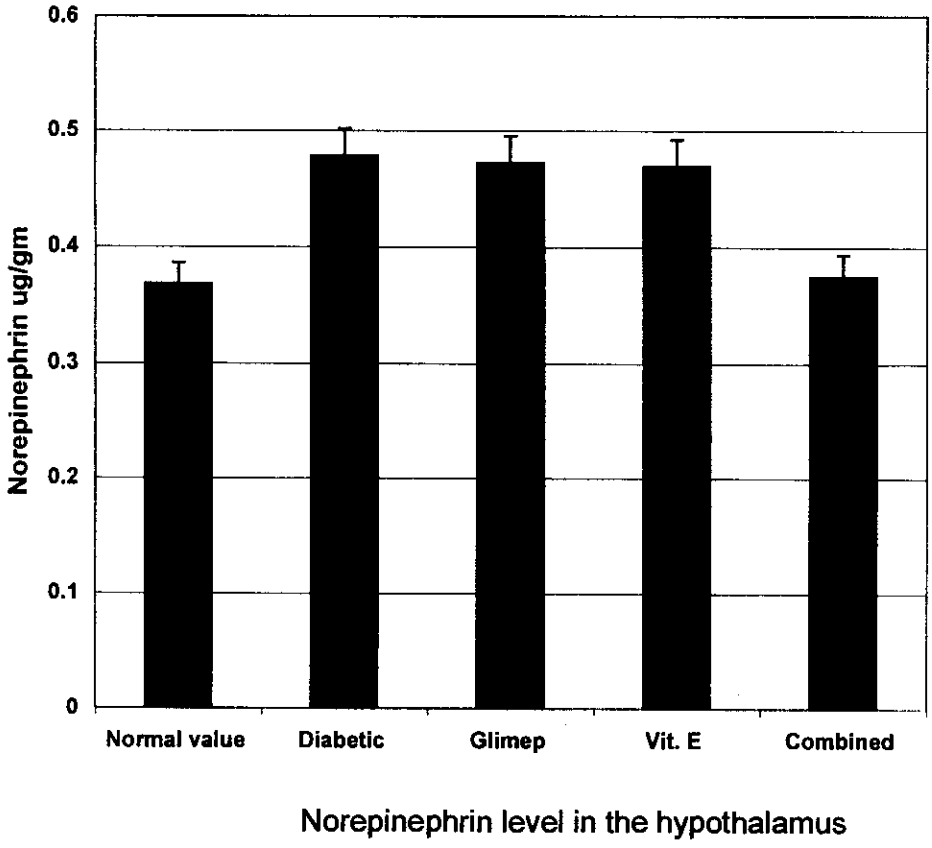

Fig. (30): A bar chart showing the effect of administration of glimepiride (0.1 mg/kg/day orally) , Vit. E (200 mg/kg/day orally) and combined administration of glimepiride and Vit. E for 3 weeks on the average concentration of norepinephrin levels ug/gm wet tissue in the hypothalamus in streptozotocin (50 mg/kg I.P) induced diabetes in rats.

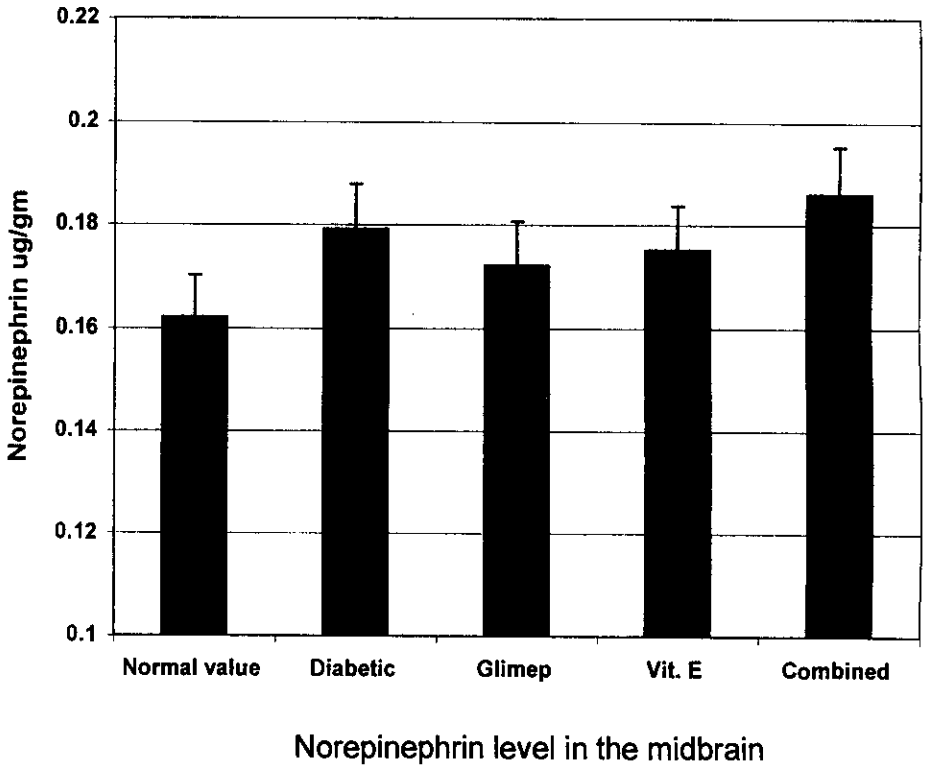

Fig. (31): A bar chart showing the effect of administration of glimepiride (0.1 mg/kg/day orally) Vit. E (200 mg/kg /day orally) and combined administration of glimepiride and Vit. E for 3 week on the average concentration (M + SD) of norepinephrin levels ug/gm wet tissue in the midbrain in streptozotocin (50 mg/kg I.P.) induced diabetes in rats.

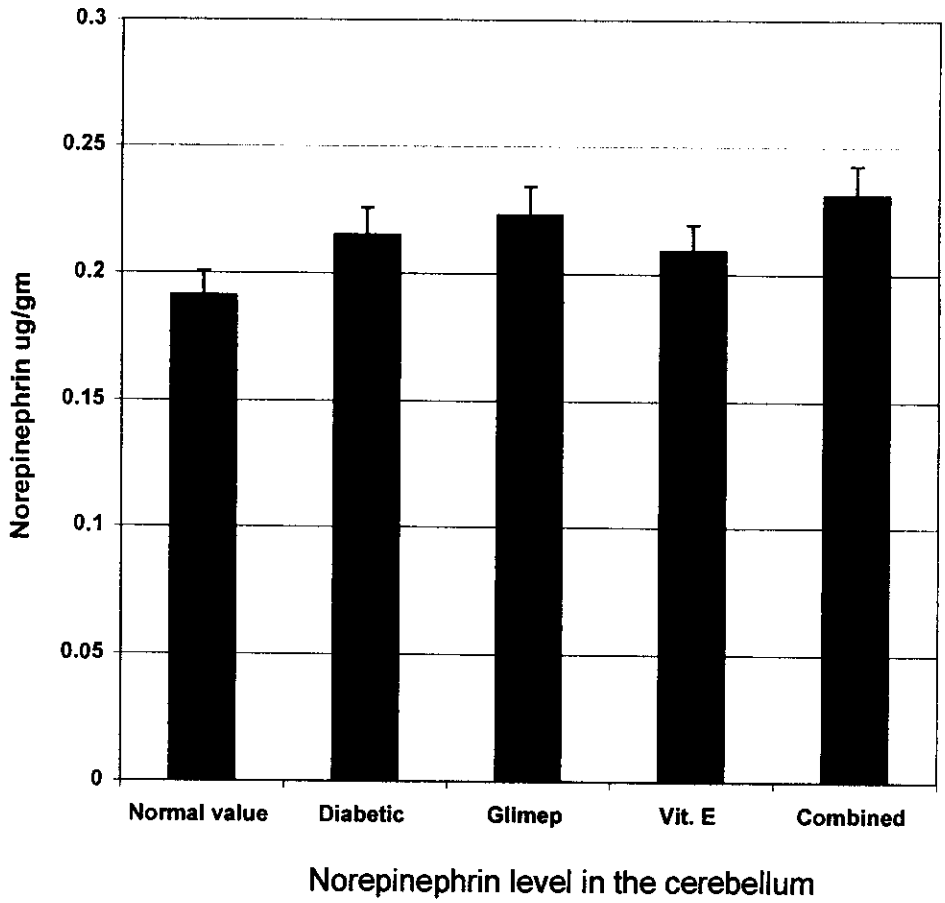

Fig. (32): A bar chart showing the effect of administration of glimepiride (0.1 mg/kg /day orally), Vit. E (200 mg/kg/day orally) and combined administration of glimepiride and Vit. E for 3 weeks on the average concentration (M+SD) of norepinephrin levels ug/gm wet tissue in the cereblium in streptozotocin (50 mg/kgI.P) induced diabetes in rats.

Table (43): Effects of combined oral administration of Vit. E (200 mg/kg/day) and glimepiride (0.1mg/kg/day) for 3 weeks on the average concentration (M±SD) of 5 HT levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with diabetic non treated rats.

Group / Brain area	Diabetic rats	Treated diabetic with Vit. E + glimepride	Percentage Change	P	Significan
Cerebral cortex	0.107 ± 0.010	0.149 ± 0.022	+39%	< 0.01	H.S.
Hypothalamus	0.196 ± 0.044	0.293 ± 0.037	+49%	< 0.01	H.S.
Midbrain	0.512 ± 0.063	0.658 ± 0.076	+28%	< 0.01	H.S.
Cerebellum	0.176 ± 0.024	0.241 ± 0.034	+36%	< 0.01	H.S.

H.S : Highly Significant

Table (44): Effects of combined oral administration of Vit. E (200 mg/kg/day) and glimepiride (0.1mg/kg/day) for 3 weeks on the average concentration (M±SD) of 5 HT levels (ug/gm wet. tissue) in various brain areas in streptozotocin (50 mg/kg I.P) induced diabetic rats compared with normal rats.

Group / Brain area	Normal rats	Diabetic treated with glimepiride and Vit. E	Percentage change	P	Significant
Cerebral cortex	0.152 ± 0.024	0.149 ± 0.022	-1%	< 0.20	N.S
Hypothalamus	0.300 ± 0.042	0.293 ± 0.037	-2%	< 0.25	N.S
Midbrain	0.693 ± 0.088	0.658 ± 0.076	-5%	< 0.20	N.S.
Cerebellum	0.253 ± 0.039	0.241 ± 0.034	-5%	< 0.25	N.S.

N.S : Non-significant

Table (45): Effects of combined oral administration of Vit. E (200mg/kg/day) and glimepiride (0.1mg/kg/day) for 3weeks on the average concentrations. (M±SD) of 5HT levels ug/gm wet. tissue in various brain areas in streptozoctoin (50 mg kg) induced diabetic rats compared with diabetic rats treated with glimepiride.

Group / Brain area	Diabetic treated with glimepiride	Diabetic treated with glimepiride and Vit. E	Percentage change	P	Significant
Cerebral cortex	0.112 ± 0.015	0.149 ± 0.022	+33%	< 0.005	H.S
Hypothalamus	0.201 ± 0.038	0.293 ± 0.037	+ 45%	< 0. 005	H.S
Midbrain	0.519 ± 0.066	0.658 ± 0.076	+ 26%	< 0. 005	H.S
Cerebellum	0.181 ± 0.027	0.241 ± 0.034	+ 33%	< 0.005	H.S

H.S: Highly significant

Table (46): Effects of combined oral administration of Vit. E 200mg/kg/day and glimepiride (0.1mg/kg/day) for 3weeks on the average concentrations. (M±SD) of 5HT ug/gm wet. tissue in various brain areas in streptozoctoin (50 mg / kg I.P) induced diabetic rats compared with diabetic rats treated with Vit. E

Group / Brain area	Diabetic treated with Vit. E	Diabetic treated with glimepiride and Vit. E	Percentage change	P	Significant
Cerebral cortex	0.115 ± 0.015	0.149 ± 0.022	+29%	< 0.01	S
Hypothalamus	0.204 ± 0.046	0.293 ± 0.037	+43%	< 0. 025	S
Midbrain	0.522 ± 0.061	0.658 ± 0.076	+26%	< 0. 05	S
Cerebellum	0.186 ± 0.032	0.241 ± 0.034	+29%	< 0.01	S

S: significant

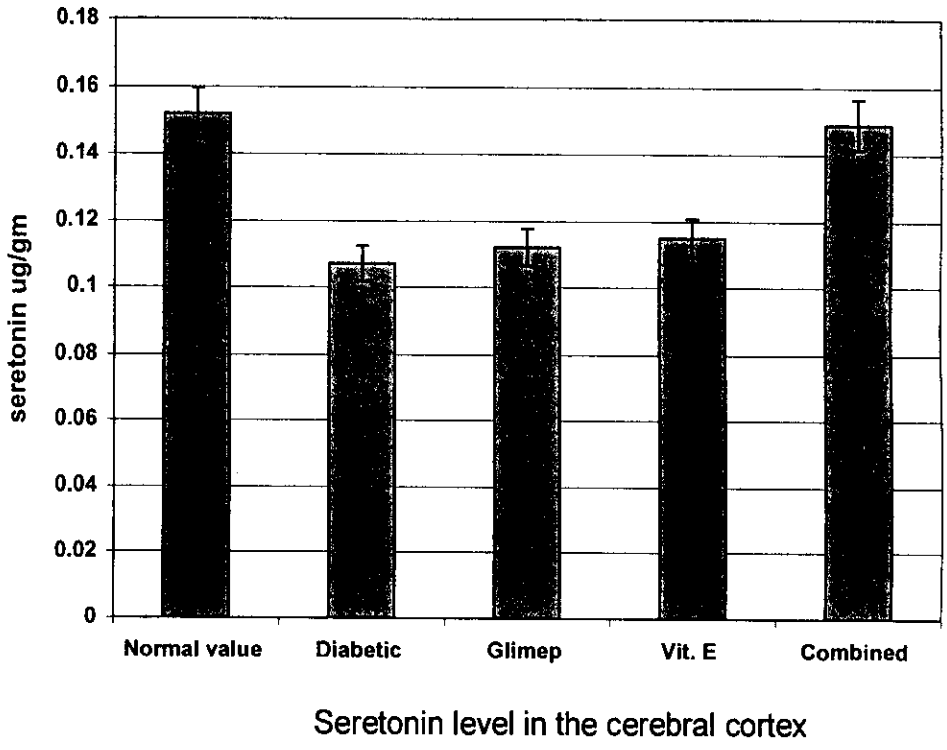

Fig. (33): A bar chart showing the effect of administration of glimepiride (0.1 mg/kg/ day orally) Vit. E (200 mg/kg/day orally) and combined administration of glimepiride and Vit. E for 3 weeks on the average concentration (M + SD) of serotoninelevels ug/gm wet tissue in the cerebral cortex in streptozotocin (50 mg/kg I.P.) induced diabetes in rats.

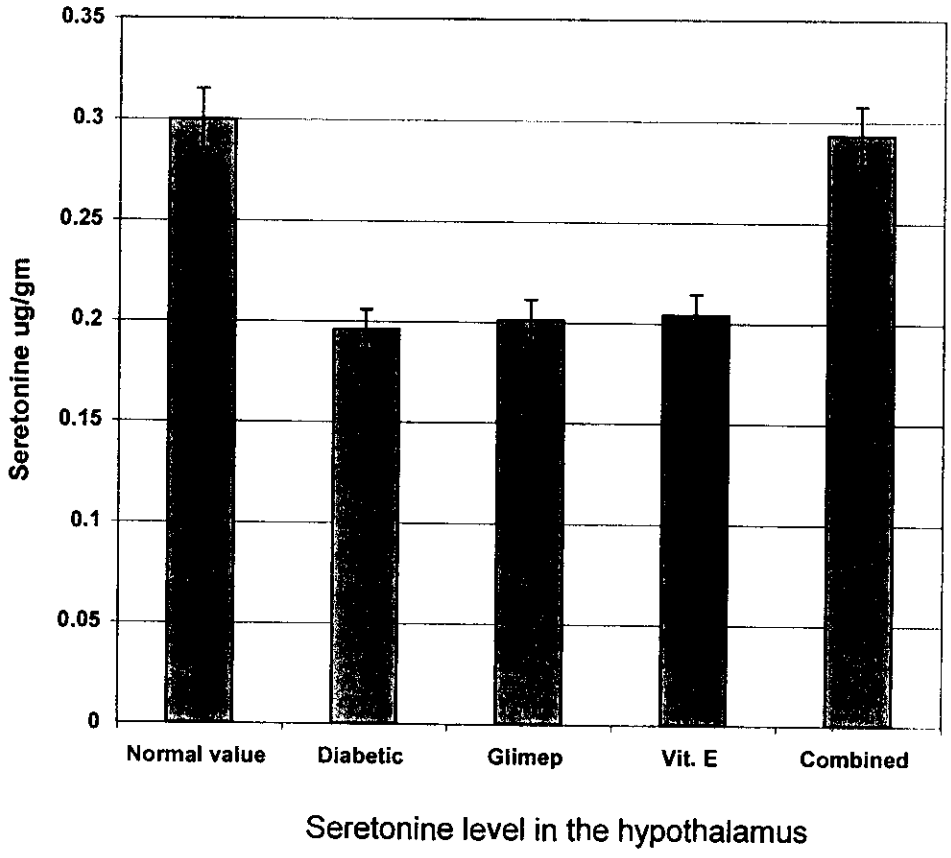

Fig. (34): Abar chart showing the effect of administration of glimepiride (0.1 mg/kg/day orally) Vit. E (200 mg/kg/day orally)and combined administration of glimepiride and Vit. E for 3 weeks on the average concentration (M + SD) of serotonine levels ug/gm wet tissue in the hypothalamus in streptozotocin 50 mg/kg induced diabetes in rats.

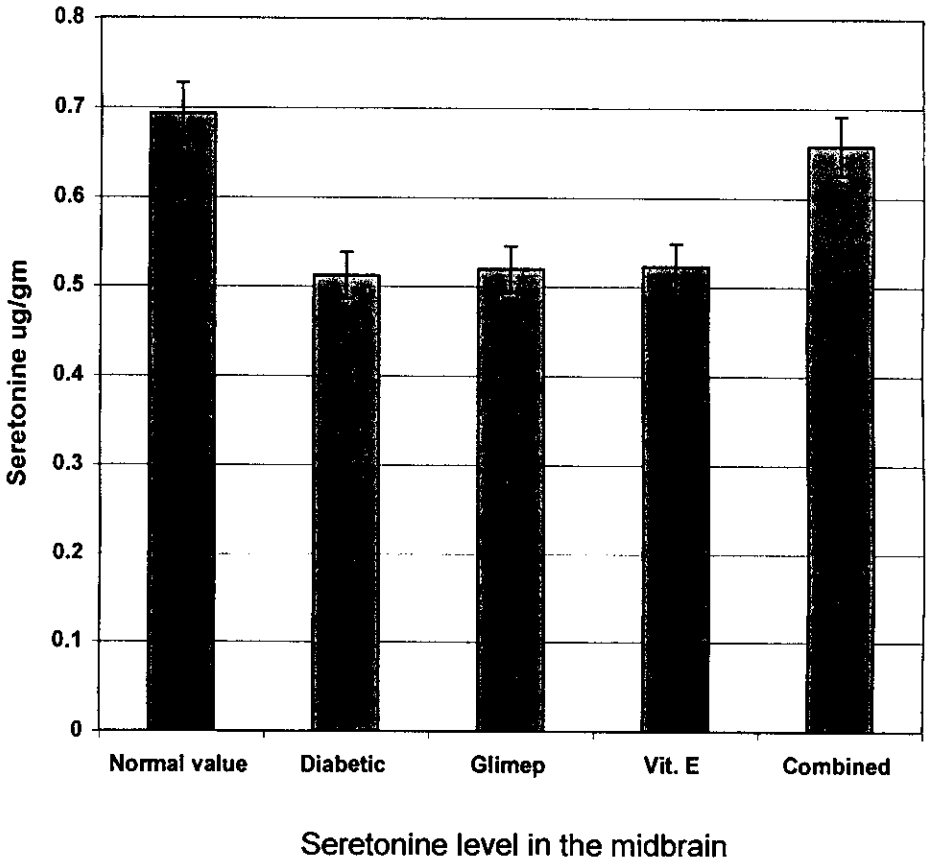

Fig. (35): A bar chart showing the effect of administration of glimepiride (0.1 mg/kg/day orally) Vit. E (200 mg/kg /day orally) and combined administration of glimepiride and Vit. E for 3 weeks on the average concentration (M + SD) of serotonine levels ug/gm wet tissue in the midbrain in streptozotocin (50 mg/kg I.P.) induced diabetes in rats.

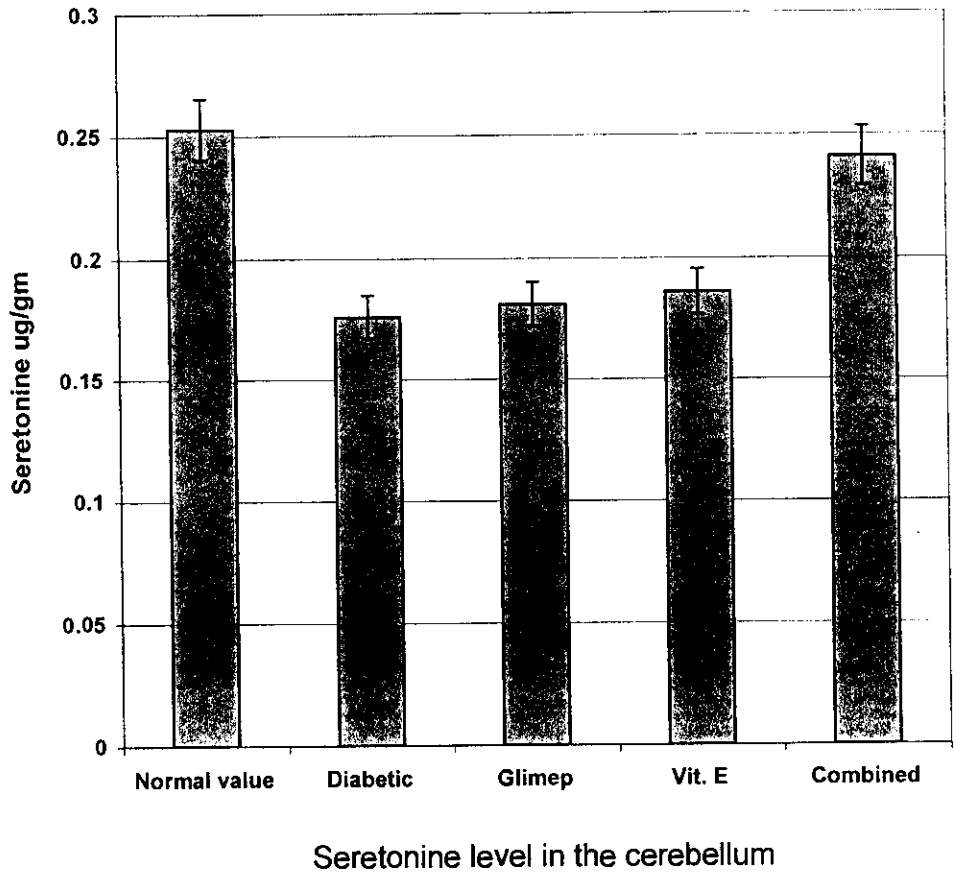

Fig. (36): A bar chart showing the effect of administration of glimepiride (0.1 mg/kg/day orally) Vit. E (200 mg/kg/day orally) and combined administration of glimepiride and Vit. E for 3 weeks on the average concentration (M + SD) of serotonine levels ug/gm wet tissue in the cerebellum in streptozotocin (50 mg/kg I.P.) induced diabetes in rats.