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Effect of noise stress and /or sulpiride treatment on some physiological and histological parameters in female albino rats.

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Abstract

Background: Noise is the most stressful factor and human being. So these studies aim to clarify its effect on some physiological and histological parameters.

Material and methods: 24 Female rats were divided into four groups (6/each):1-control, 2-treated with sulpiride drug,3- noise exposure (90db/3h per day for 30days), **4**-noise + drug

Results: drug recorded a significant increase only in the percentage of body weight gain but the other parameters showed no significant changes. Noise stress recorded a significant increase in glucose, ALT, GGT, TP, globulin.
A significant decrease in percentage of body weight gain and A/G ratio were also detected . It has been detected that Sulpiride drug ameliorated most of these parameters.
Concerning the histological and histochemical studies sulpiride treatment showed no detectable changes in the liver tissues with exception of increased lymphocytes. Exposure to noise showed many dystrophic change in tissue, but drug treatment improved all the previous changes and this indicates the protective effect of sulpiride against noise exposure.

Conclusion: it is useful to use sulpiride drug in people who expose to noise stress.

Key words: Noise ,Sulpiride drug , Albino rats, Physiological parameters, Histopathalogy and histochemistery.

Introduction

Stress as noise is a part of everyone's life every day. From getting kids ready for school to fighting traffic to the demands of work, the average person goes up against the nemesis called stress multiple time daily .From waking up to sleeping our bodies are in a constant battle to maintain the balance. Noise is a kind of stresses which is defined as unwanted sound. Noise is a pervasive aspect of many modern community and work environments .Acute noise exposures activate the autonomic and hormonal systems, leading to temporary changes such as increased blood pressure, increased heart rate and vasoconstriction .After prolonged exposure, susceptible individuals in the general population may develop permanent effects, such as hypertension and ischemic heart disease that are associated with exposures to high sound pressure levels. **(Tomoyuki, 2004).**
According to **Samson *et al* .(2006)** noise exposure over 90 decibel (db) becomes a stressor and contributes to the genesis and manifestation of several multifactor diseases, chronic annoyance and permanent behavioral alterations.
Antidepressant drugs are the most successful drug in patients with clearly characteristics including psychomotor retardation, sleep disturbance, poor appetite and weight loss. However, a variety of different chemical structures have been found to have antidepressant activity. Their number is constantly growing, but as yet no group has been found to have a clear therapeutic advantage over the others (**Katzung, 2008)** .Sulpiride is the most favorite drug which used to tolerate stress symptoms **(Panzani *et al*., 2011)**.

People which expose to stress take one or some drugs to avoid the effect of stress even without a doctor prescription. So, in this study we try in to illustrate the effect of one of the antidepressant drugs (**sulpirid**e) which generally used by people to avoid the effect of stress. The present study deals with, the possible protective effect of sulpiride against noise in female albino rats from the physiological histological and histochemical point of view.

Material and Methods

1-Experimental animals:

24 Normal white female albino rats weighing (150±30) gms were taken from the farm of National organization for control and Research .They were kept under observation for one week before the beginning of the experiment to acclimatize .The chosen animals were housed in cages and exposed to artificial light for 14hrs and 10hrs complete darkness at normal atmospheric temperature .All animals were fed on standard diet contained protein ,fibers , fats ,ash, carbohydrates ,and supplied with vitamins and minerals mixture with continuous supply of water.

2-Sulpiride administration:

The drug was adiministrated orally by gastric tube at a dose of 0.028mg/g body weigh/day for one month .The dose for the rat was calculated according to the Paget's formula on the basis of the human dose **(Paget and Barns,1964)**

Methods:

(I) Animal groups:

24 female albino rats were divided into 6 main groups each group contained 6 rats.

Group1: Normal rats served as negative control (without any treatment for one month- in cage 20x3ox20

Group 2: Rats treated with the sulpiride drug at dose of (0.028mg/g body weigh/day for one month)**.**

Group 3: Rats exposed to noise only for one month over 90dB,3h/day.

Group 4 : Rats exposed to noise and treated with the drug for one month.

a)Application of noise:

Prepared Noise was applied by 5 different sources of unharmonic and high intensity music.

(II) Morphological studies:

Body weight:

Each rat was weighted at the beginning and the end of the experiment. Percentage of body weight changes was calculated. After one month , rats were scarified and blood was taken and put in centrifuge tube and centrifuged to obtained serum for the following examinations.

Physiological studies

Serum glucose was estimated according to method described by **Tietz (1995) .** Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) activity were estimated according to the method of **Schumann(2002)**,serum albumin and total protein (TP) were measured according to the method of **Burtis *et al* .(2006)** serum alkaline phosphatase was measured according to the method of **Abicht *et al* .(2001)**,serum gamma-gluttamyl transferase (GGT) was done using the method of **Kytzia *(2005)*,**serum total Bilirubin was measured according to the method of **Tietz *(*1995)**.

Data analysis:

The obtained results were statistically analyzed by using the student (T test) according to the method of **Snedecor and Cochran (1980).**, $P<0.05$ considerd significant while $P<0.01$ highly significant.

Histological and histochmical studies:

Rats from control and treated groups were sacrificed after month and small pieces of liver was taken for the histological and histochemical studies .Small piece of liver was fixed in 10% neutral buffered formal solution and Carnoy's fluid for the histological and histochemical studies .Paraffin section were prepared 5µm thickness and stained with Harris haematoxylin and eosin **(Drury and**

Wallington,1980). Proteins were detected by mercuric bromophenol blue method (**Mazia *et al*.,1953**).Polysaccharides were detected by PAS (periodic acSchiff)method (**Pearse,1977**).Mallory´s trichome stain for demonstrating collagen fibers (**Pearse,1977).**

Results

T**able (1): Percentage of body weight change in female albino rats after exposed to stress (noise), sulpiride , dual effect.**

Group / parameter		control	drug	Noise alone	Noise +drug
body weight change	**Mean**	**57.2**	**156**	**21.2**	**37.3**
	SE±	**1.6**	**2.5**	**0.6**	**1.3**
	P		**<0.01**	**<0.01**	**<0.01**
Of change%			**172.7**	**-62.9**	**-34.7**

In table (1) rats treated with sulpiride drug alone showed highly significant change body gain (P<0.01). On the other hand ,noise exposure group or noise exposure and treated with sulpiride recorded highly significant body weight lose (P<0.01). change
Rats treated with sulpiride drug alone showed no significant change on all the present biochemical
Parameters (except creatinine).

T**able (2): Serum glucose level (mg/dl) in female albino rats after exposed to stress (noise) sulpiride , dual effect.**

Group / parameter		control	drug	Noise alone	Noise +drug
Glucose (mg/dl)	**Mean**	**101.7**	**94.8**	**149.1**	**119.8**
	SE±	**1.3**	**1.98**	**1.2**	**1.6**
	P		**N.S**	**<0.01**	**<0.01**
Of change%			**-6.8**	**47.3**	**17.9**

Table (2) noise exposure group or noise exposure and treated with sulpiride recorded highly significant increase (P<0.01) in glucose level when compared with control group.

Table (3): Serum (ALT) activity (u/l) in female albino rats after exposed to stress (noise) sulpiride , dual effect.

Group / parameter		control	drug	Noise alone	Noise +drug
ALT (u/l)	Mean	39.6	39.1	62	50.3
	SE±	3.1	0.6	2.3	0.8
	P		N.S	<0.01	<0.01
Of change%			-1.2	56.5	27

Data represented in table (3) showed that rats treated with sulpiride drug alone caused no significant change in (ALT). On the other hand ,noise exposure group or noise exposure and treated with sulpiride recorded highly significant increase ($P<0.01$) of the (ALT) activity when compared with control group .

Regarding AST, ALP, activities, Bile level, no significant change were recorded in all groups (tables 4,5,6).

Table (4): Serum (AST) activities **(u/l) in female albino rats after exposed to stress (noise) sulpiride , dual effect.**

Group / parameter		control	drug	Noise alone	Noise +drug
AST (u/l)	Mean	28.0	22.5	31.0	27
	SE±	4.9	3.0	3.3	3.1
	P		N.S	N.S	N.S
Of change%			-19.6	10.7	-3.2

Table (5): Serum (ALP) activities **(u/l)) in female albino rats after exposed to stress (noise) sulpiride , dual effect.**

Group / parameter		control	drug	Noise alone	Noise +drug
ALP (u/l)	Mean	74.3	72.8	72.8	70.8
	SE±	3.0	3.1	3.4	3.4
	P		N.S	N.S	N.S
Of change%			-2.0	-2.0	-4.7

Table (6): Serum (BIL)level (mg/dl) in female albino rats after exposed to stress (noise) sulpiride , dual effect.

Group / parameter		control	drug	Noise alone	Noise +drug
BIL (mg/dl)	**Mean**	**0.3**	**0.3**	**0.2**	**0.3**
	SE±	**0.07**	**0.09**	**0.04**	**0.07**
	P		**N.S**	**N.S**	**N.S**
Of change%			**0**	**-33**	**0**

Table (7): Serum (GGT)level (u/l)) in female albino rats after exposed to stress (noise) sulpiride , dual effect.

Group / parameter		control	drug	Noise alone	Noise +drug
GGT (u/l)	**Mean**	**21.35**	**20.0**	**30.3**	**24.5**
	SE±	**0.86**	**0.6**	**1.37**	**1.4**
	P		**N.S**	**<0.01**	**<0.05**
Of change%			**-6.3**	**41.92**	**14.7**

In table (7) Noise exposure group showed highly significant increase (P<0.01) in (GGT) but noise exposure and treated with sulpiride recorded significant increase (P<0.05)when compared with control group.

Table (8): Serum (TP) level (g/dl) in female albino rats after exposed to stress (noise) sulpiride , dual effect.

Group / parameter		control	drug	Noise alone	Noise +drug
TP (g/dl)	**Mean**	**6.96**	**6.61**	**7.75**	**7.06**
	SE±	**0.1**	**0.2**	**0.2**	**0.2**
	P		**N.S**	**<0.01**	**N.S**
Of change%			**5.0-**	**11.3**	**1.4**

Data represented in table (8) showed noise group highly significant increase (P<0.01) of the (TP) level when compared with control group while treating stressed rat with sulpiride truned TP back to its normal level.

Regarding Albumin no significant change were recorded in all groups (table 9).

Table (9): Serum (Albumin) level (g/dl) in female albino rats after exposed to stress (noise) sulpiride , dual effect.

Group / parameter		control	drug	Noise alone	Noise +drug
Albumin (g/dl)	Mean	4.21	3.9	3.8	3.8
	SE±	0.3	0.2	0.1	0.2
	P		N.S	N.S	N.S
Of change%			-7	-9.7	-9.7

Table (10): Serum (Globulin)level (dl) in female albino rats after exposed to stress (noise) sulpiride , dual effect.

Group / parameter		control	drug	Noise alone	Noise +drug
Globulin (g/dl)	Mean	2.75	2.71	3.95	3.2
	SE±	0.3	0.2	0.2	0.2
	P		N.S	<0.01	N.S
Of change%			-1.4	43.6	16.36

Rats exposed to noise showed highly significant increase ($P<0.01$) of the (Globulin) level these increase turned back to normal value when rats treated with sulpiride in table (10)

Table (11): Serum (A/G Ratio) level in female albino rats after exposed to stress (noise) sulpiride , dual effect.

Group / parameter		control	drug	Noise alone	Noise +drug
A/G Ratio	Mean	1.53	1.43	0.96	1.2
	SE±	0.2	0.2	0.2	0.3
	P		N.S	<0.05	N.S
Of change%			-6.5	-37.2	-21.5

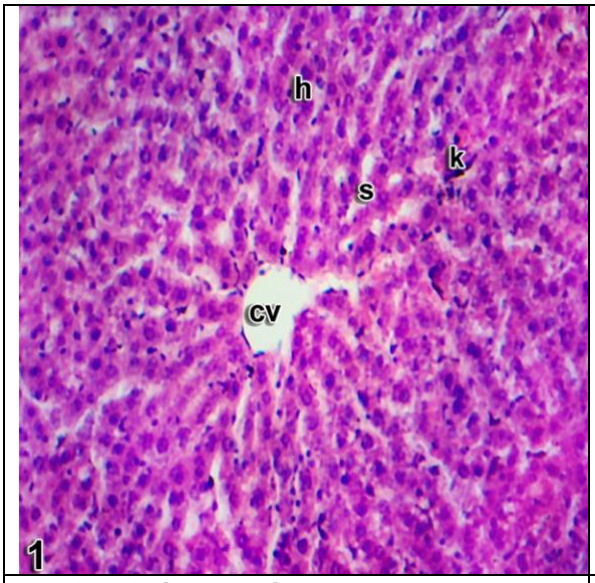
in table (11) noise exposure group recorded a significant decrease ($P<0.05$) in (A/G Ratio) but sulpiride ameliorated this effect to the normal value in noise exposure and treated with sulpiride.

Regarding Uric acid and Urea no significant change were recorded in all groups (table 12.13).

Drug treatment showed no detectable histological or histochemical change in liver tissue with the exception of increased lymphocytes especially in the portal area of the liver tissue.

Noise exposure showed some vacuolated hepatocytes with enlarged nuclei of the endothelial lining **(**Figs.3&4**)**. compared with the control group (Figs.1&2).

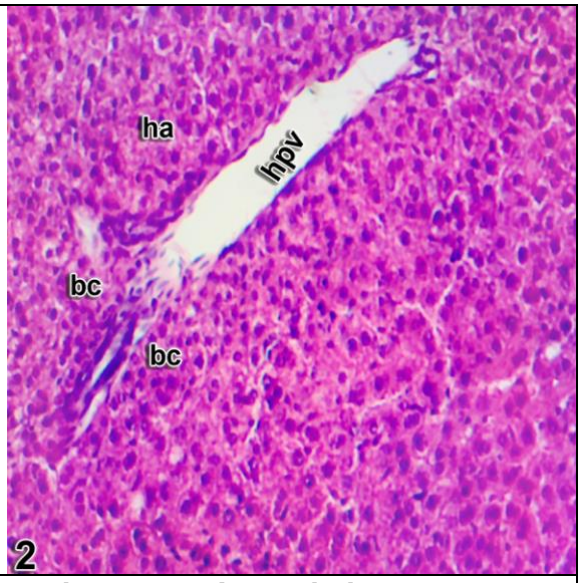
Drug treatment ameliorated these changes, but corrugated endothelial lining of the hepatic portal vein was detected with lymphocytic infiltration (Fig.5) .Increased collagen fibers were detected in the central and portal areas of the liver tissue of noise group with brightly stained RBCs in the dilated sinusoidal spaces (Figs.8&9**)**compared with the control group (Figs.6&7). Collagen fibers acquired normal appearance in group noise+ drug (Fig.11). Normal distribution of PSA+ ve materials was noticed in liver tissue of the control group **(**Figs.11&12) and noise +drug group (Figs.15&16), but noise exposure showed depleted hepatocytes, arterial walls and haemolysed RBCs(Figs.13&14). Depleted stain affinity of total protein was noticed in hepatocytes of the central areas of liver tissue of noise group (Figs.19&20) compared with the control one (Figs.17&18) .Deeply stained hemorrhagic areas and thickened arterial walls were also demonstrated. Normal total protein stain affinity was realized in liver tissue of group noise + drug.



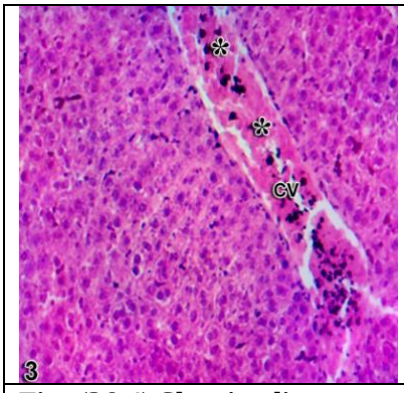
Figs(1&2) showing photomicrogrs of liver tissue of a control rat.

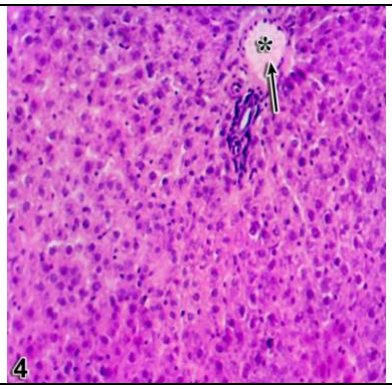
1-Showing the central areas of the liver tissue of a control rat.

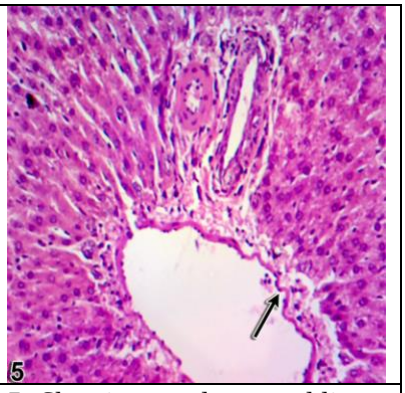
1- Showing well developed hepatocytes (h) , sinusoidal spaces (s), central vein (cv) and Kupffer cells (k) **(HX&Ex100)**



2-: Showing portal area which contains a branch of the hepatic portal vein (hpv), branch of the hepatic artery (ha) and bile canaliculi (bc) **(HX&Ex100)**



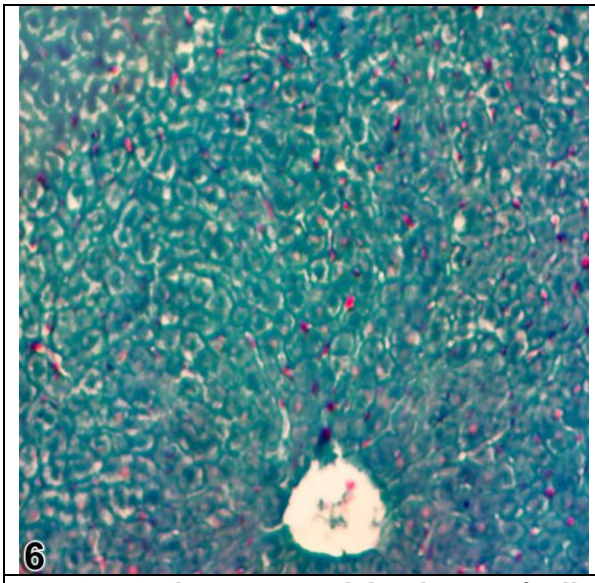


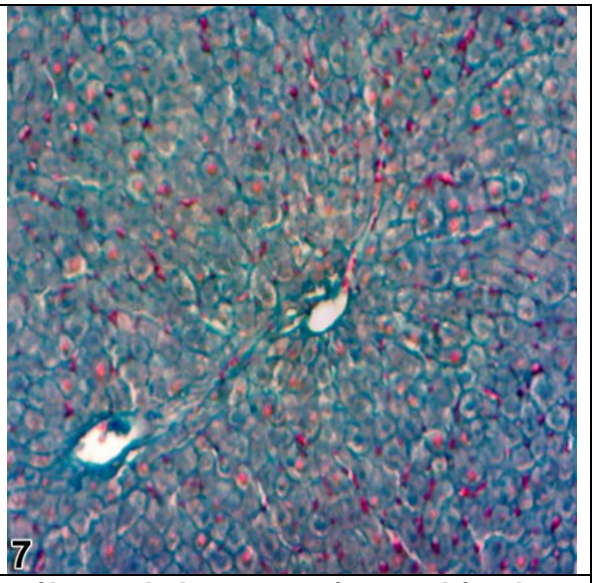


Figs.(3&4) Showing liver tissue of rats exposed to noise stress
3- Showing irregular central veins (cv) which contained haemolysed RBCs and haemosidrin granules (*) .

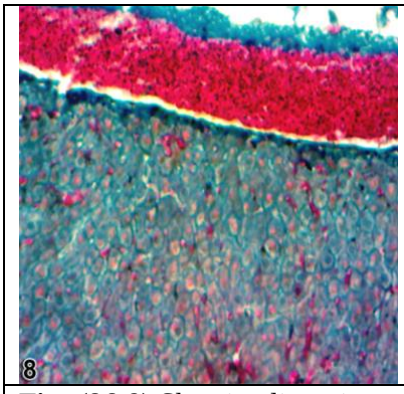
4- Showing some hepatocytes were vacuolated with enlarged nuclei. Also, enlarged nuclei of the endothelial lining (→) of the hpv were observed

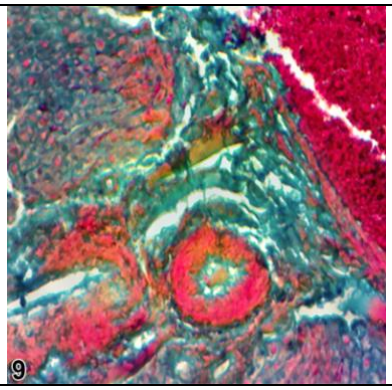
5- Showing nearly normal liver tissue of a rat exposed to noise and treated with the drug, but corrugated endothelial lining of the hpv was detected (→) with lymphocytic infiltration.

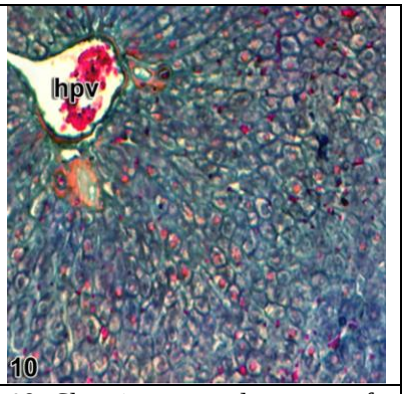




Figs.(6&7) Showing normal distribution of collagen fibers in the liver tissue of a control female rat. (Mallory′strichrome stain ×100)

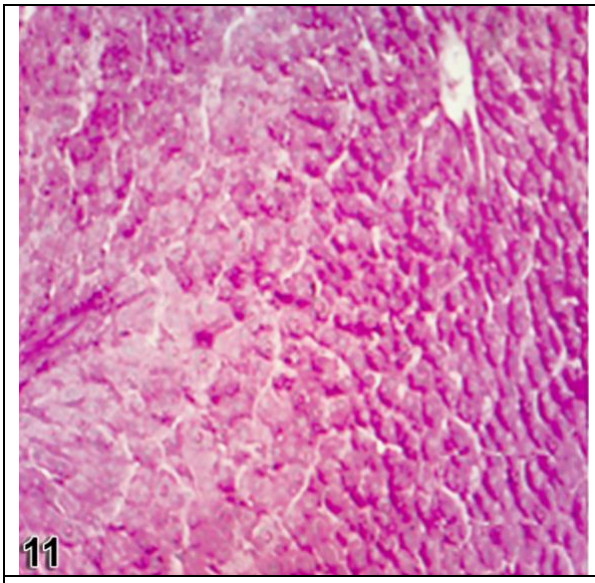


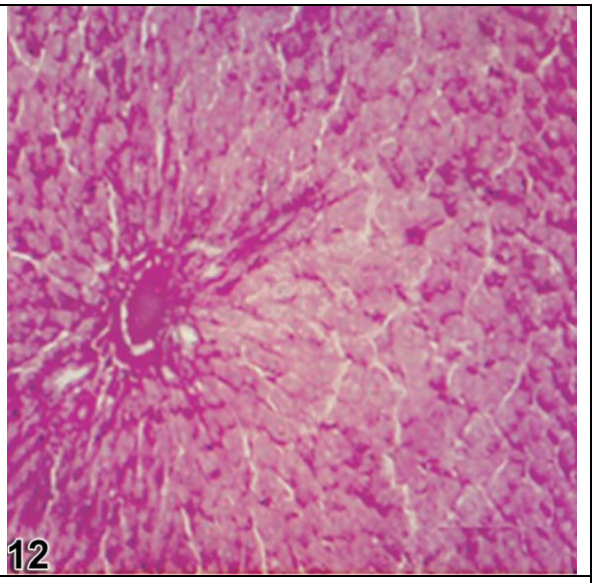




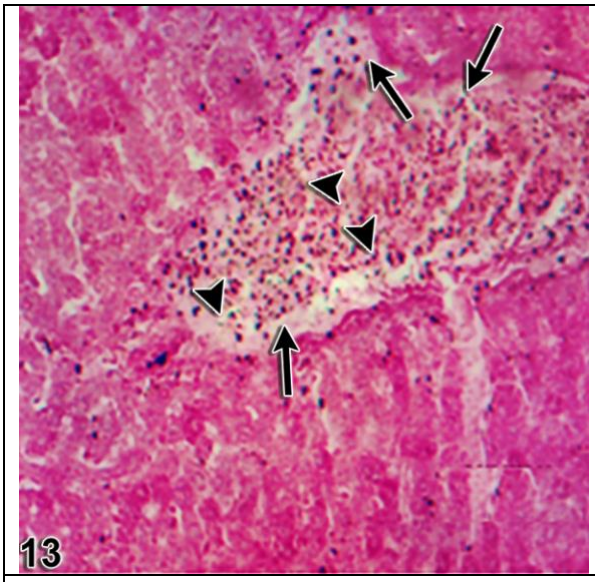
Figs.(8&9) Showing liver tissue of rats exposed to noise stress highly increased collagen fibers in and around the portal area, in and around the elongated wall of the central vein, walls of the congested blood vessels and dilated sinusoidal spaces which contained brightly red stained RBCs.

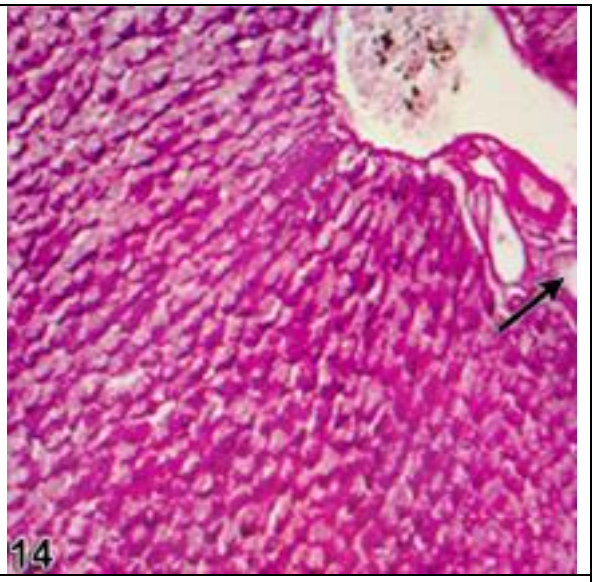
10- Showing normal content of collagen fibers in the liver tissue of a rat exposed to noise and treated with the drug. **Notice:** brightly stained haemolysed RBCs inside the hpv**(Mallory′strichrome stain ×100)**



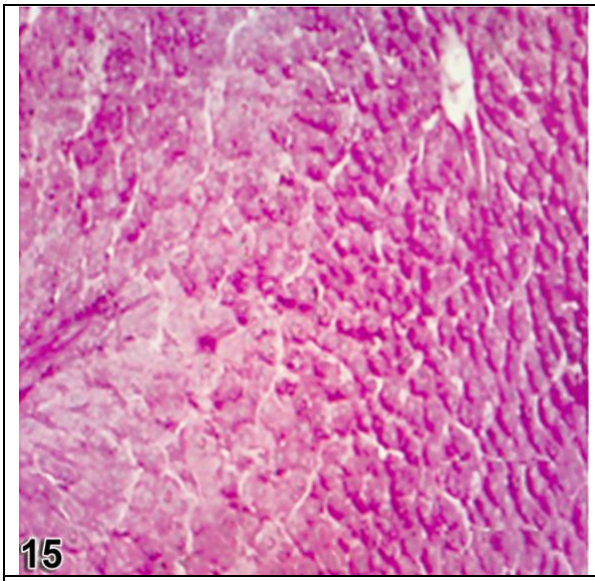


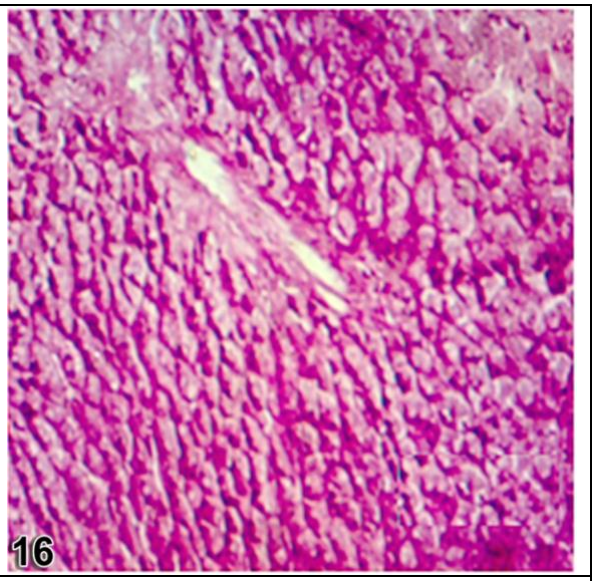
Figs.(11&12) Showing normal distribution of PAS +ve materials in the liver tissue of acontrol rat in the central and portal and areas appeared less stained(→) **(PAS×100)**



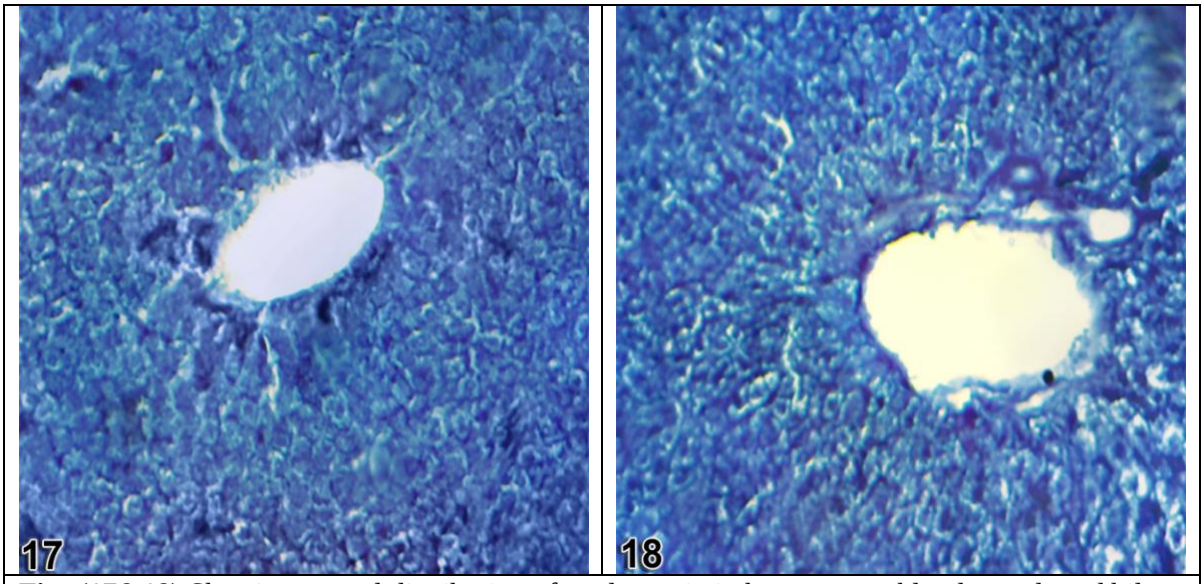


Figs.(13&14)Showing poorly stained hepatocytes in the central area and increased stain affinity of PAS +ve materials in the portal area of the liver tissue of a rat exposed to noise. The thickened arterial wall (→), haemolysed RBCs accepted pale red color, but haemosidrin granules accepted deep coloration **(►). (PASx100**)

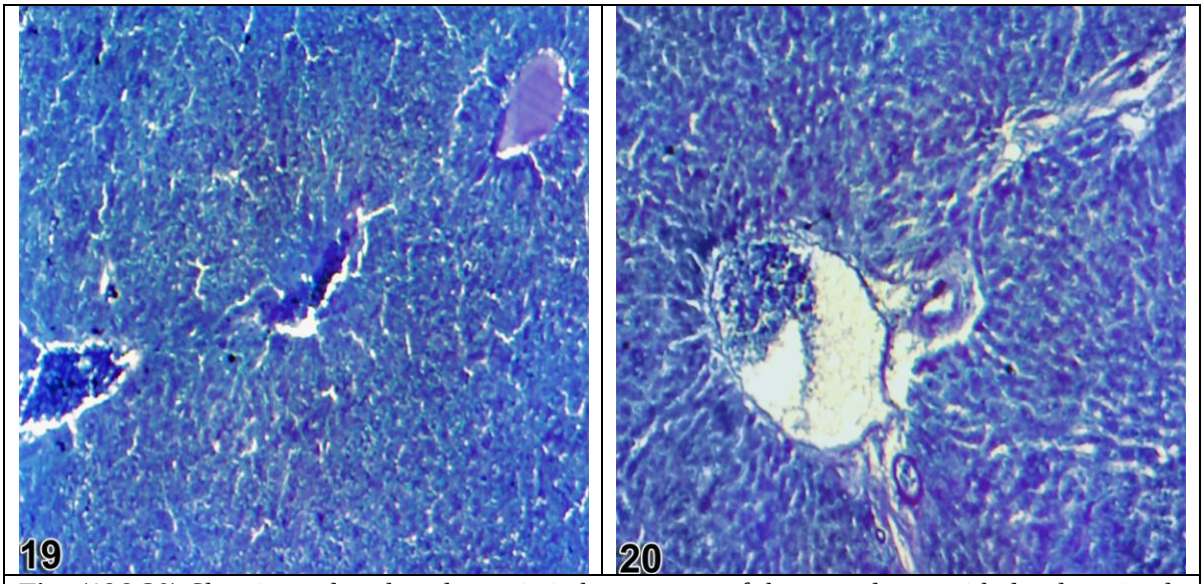




Figs.(15&16) Showing normal PAS +ve materials in hepatocytes of the liver tissue a rat exposed to noise and treated with the drug**. (PASx100)**



Figs.(17&18) Showing normal distribution of total protein in hepatocytes, blood vessels and bile canaliculi in the liver tissue of a control rat.



Figs.(19&20) Showing reduced total protein in hepatocytes of the central area with deeply stained hemorrhagic with deeply stained arterial wall and hepatocytes in the portal area.
(**Mercuric bromophenol bluex100**)

Discussion

1-Percentage of body weight change:

Long-term administration of neuroleptics causes weight gain leading to obesity, which affects the general health of the patient and interferes considerably with treatment compliance (**Awerman, 2010**).The present results revealed that Sulpiride significantly increased body weight gain in adult female rats ($p<0.01$) in comparison with control group. This may be due to the action of Sulpiride which mainly interacts with dopamine D2–D3 receptors in the brain (**Romero,2008**). Hyperphagia may be mediated by blockade of D2 receptors in the lateral perifornical hypothalamus **(Cyr,2009)**.

In **2008, Romero, reported** that the atypical agents as Sulpiride increased body weight gain and adiposity in female but not in male Wistar rats **.**
The results of the present study on rats showed a significant decreased in the percentage of body weight gain of rats after exposed to noise stress (exceeding 90 dB) this may be because chronic exposure to noise stress decreases body weight and food intake **(Marcelo *et al* .,2007)** .

2-serum glucose:

The present results revealed that glucose significantly increased when rats exposed to noise exceeds 90 dB in adult female rats ($p<0.01$) .
The hyperglycemia in female rats under noise stress may be related to stress hormone particularly cortisone , glucagon , and epinephrine which act synergistically both to increase glucose production and to reduce glucose clearance with hyperglycemia **(Radahmadi *et al*,.2006)**. The hyperglycemic effect of stress may be also due to sympathoadrenal stimulation which may cause a concomitant increase in glucagon level **(Tanck *et al*.,2002)**.Stress hyperglycemia may be also due to stimulation of hypothalamic noradrenergic activity and hepatic glucose output . So , if the central noradrenergic activity had been inhibited , the stress hyperglycemia also inhibited **(Fevolden *et al* ., 2002)**. Corticosterone , as one of the stress hormone can also lead to increase blood glucose. **(Sissel *et al*., 2005).**

3-Liver function:

Liver is a target organ and primary site of detoxification and is generally the major site of intense metabolism and is therefore prone to various disorders as a consequence of exposure to the stress of extrinsic as well as intrinsic forms. Liver plays important role in metabolism to maintain energy level and structural stability of body **(Guyton and Hall,2002).** The primary role of the liver in the metabolism is detoxification and disposition of foreign substance **(Boorman *et al*.,1990).**

The present study indicated highly significant increase ($p<0.01$) in serum alanine transaminase (ALT) and serum Gamma-gluttamyl transferase (GGT) activities in rat exposed to noise , noise+ drug .Liver affection during stress is of great value because the corticoids are normally metabolized and destroyed in the liver . The increase Gamma-glutamyltransferase (GGT) and (ALT) showed an intimate relation to the cell damage and necrosis and/ or increased the permeability of the cell membrane (**Boorman *et al*.,1990**) . The observed increase activity of serum ALT and GGT in the present work may be attributed to excessive release of such enzymes from the damaged liver cells into the blood circulation (**Behrman *et al*., 1992).**

4-Protein profiles:

The present study showed increase in serum total Protein& Globulin in rats exposed to noise and a decreased in Serum A/G ratio in female rats. **Martinez *et al*. (1992)** mentioned that in noise stress , produced a non proportional changes in protein efficiency ratio and protein productive value.
The increase in total serum protein may be du to increase in secretion of stress hormone particularly corticosteroids. Corticosteroids increase both the plasma protein and liver protein, this may be carried out by increasing, the rate of breakdown of extra hepatic protein, making increase quantities of amino acids available in the body fluid. This allows the liver to synthesize increased quantities of hepatic cellular protein and plasma proteins. Noise stress may also act through hormonal change which may alter the balance between tissue protein and circulating amino acids(**Blumenthal *et al*.,2000)**.
noise of most measured parameter.

The histopathological and histochemical studies:

Treatment of rats with sulpiride showed no detectable histological or histochmical changes in the liver tissue, but increased lymphocytes in and around the portal ares were be observed. Sulpiride is a selective dopamine D2 antagonist with

antipsychotic and antidepressant activities. In spite of the normal architecture of liver tissue observed in rats treated with sulpiride in the present study some authors detected many side effects post –treatment with it (**Ruther *et al*., 1999; Cohen, 2004; Toprak *et al*., 2005)** .Exposure to noise showed vacuolated hepatocytes with enlarged nuclei of them and the endothelial lining of the blood vessels with increased lymphoctic infiltration. Dilated hepatic portal veins and sinusoidal spaces with increased kupffer cells where also detected. Results of the present study showed congested hepatic portal vein with enlarged nuclei of their endothelial lining, these results are in accordance with those of **Kaplan and Wheeler (1983).** They stated that principal effect of stress on the liver is related solely to changes in hepatic blood flow specifically, this hypothesis suggested that emotional stress leads to vasospasm and centrilobular hypoxia and ultimately to liver damage however, as the broader physiological effect of the mediators of the stress response have become better understood. Highly affected endothelial lining of blood vessels of the liver tissue post- exposure to stress for a long time were observed by **Fraser *et al.* (1995).) .**It was suggested that stress influenced hepatic blood flow by inducing vasospasm and centrilobular hypoxia, leading to liver damage **(Chida *et al*.,2006)** . Increased risk factors for malignant transformation of cirrhotic lesions in Japanese patients exposed to stress were detected by **Tanaka *et al.* (1998)**. In **2004, Steel *et al.,*** stated that stress may account in part for rapid hepatocarcinoma development. **Glaser *et al.* (1985)** proved the association between rotational stress and carcinogen damage. Positive correlation between psychosocial stress and liver injury, inflammation and fibrosis were reported by **Vere *et al.* (2009)**. In the present study sings of improvement were observed in liver tissue of rats treated with the drug and exposed to noise, but some haemolysed RBCs were still detected inside the hepatic portal vein with increased kupffer cells. Sulpiride which belongs to narcoleptics class interferes with cerebral dopaminergic nervous transmissions stimulating a dopaminomimetic effect **(George *et al.*, 2001).** According to **Chida *et al*.(2006) the** vagus nerve from the brain to the liver when stimulated with anti- stress therapy (hypnosis, mediation, acupuncture) may actually improve or reduce the negative effect of stress on the liver. Highly increased collagen fibers were detected in and around the portal areas, dilated sinusoidal spaces and walls of blood vessels of the liver tissue exposed to noise. **Horn *et al.* (1985)** declared that the presence of collagen in the presinusoidal spaces might affect the blood supply to liver cells and would reduced the exchange of metabolites, perhaps causing hepatocellular dysfunction and necrosis. Liver of rats treated with the drug and noise showed normal appearance of collagen fibers. Polysaccharides were poorly stained in hepatocytes of the central areas of the liver tissue of rats exposed to noise, but increased stain affinity of PAS +ve materials was detected in the portal areas and thickened arterial walls. Haemolysed RBCs inside the blood vessel acquired pale red color. the present study showed that RBCs acquired deep red coloration and this may be due to high content of carbohydrates in them .In this respect **Junqueria and Carneiro(2003)** stated that RBCs contain 10% carbohydrates of their weights ; this may explain the increased stain affinity of polysaccharides inside the congested sinusoidal spaces and hemorrhagic areas. Decreased polysaccharides in liver tissue post-exposure to noise observed in the present study may be due to failure of hepatocytes to synthesize or store glycogen and may be also a result of maculation and degeneration observed in the hepatocytes. Rats treated with the drug and exposed to noise showed normal PAS+ve materials in liver tissue of them and this indicates the protective effect of sulipirde against the drastic effect of this type of stress.

Normal total protein was observed in the hepatic tissue of rats treated with the drug with a slight increase in the portal area due to increased lymphocytes. Highly reduced total protein was detected in hepatocytes of the central areas with deeply stained hemorrhagic areas in liver tissue of rats

exposed to noise compared with the control group. The arterial walls were deeply stained. Decreased total protein observed in the present study may be due to the degenerative changes noticed in the liver tissue or may be also due to increased reactive oxygen species production which harm the mitochondria (**Cogger *et a*l., 2004).**In rats exposed to noise and treated with the drug normal stain affinity of total protein was realized in hepatocytes of the central area ,but they were faintly stained in the portal area with deeply stained arterial walls. In this respect , the histological damage might result from an increase in the process of lipid proxidation and decreased activity of antioxidant enzymes of the body with the consequent damage of cellular membranes **(El Habit *et al*,2000; Junqueria and Carneiro,2003).**

In **2008, Katzung.** stated that the sulpiride is a drug with relatively minor adverse effects .It has been regarded by some psychiatrists as the safest neuroleptic.

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تأثير الضوضاء و العلاج بعقار السلبرايد على بعض المعايير الفسيولوحية والهستولوجية على اناث الجرذان البيضاء

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يعتبر الضوضاء من أكثر المؤثرات العصبية على الإنسان لذا تهدف هذه الدراسة إلى توضيح آثارها على بعض المعايير الفسيولوجية والهستولوجية وتمت هذه الدراسة على إناث الجرذان قسمت الى أربع مجموعات(٦ \ مجموعة) وكانت كالتالى .

المجموعة الأولى:- استخدمت كمجموعة ضابطة .

المجموعة الثانية :- مجموعة عولجت بعقار السلبرايد فقط.

المجموعة الثالثة :-مجموعة الجرذان التى تعرضت للضوضاء فقط يوميا لمدة ٣٠ يوماكثر من٩٠ديسبل

المجموعة الرابعة :-مجموعة الجرذان التى تعرضت للضوضاء وعولجت بعقار السلبرايد.
ولقد أوضحت نتائج هذا البحث أن المعالجة بعقار السلبرايد أظهرت زيادة فى وزن الجسم فقط بينما لم يحدث اى تغير فى باقى المعايير.

أما عند التعرض للزحام فقد كانت هناك زيادة إحصائية فى كل من : نسبة السكر فى الدم – وظائف الكبد –-البروتين الكلى-الجلوبلين- ولكن على الجانب الآخرأ وضحت الدراسة نقص ذو دلالة إحصائية فى وزن الجسم ونسبة الألبومين و الجلوبلين ولقد إتضح أن هذا العقار حسن الكثير من التغيرات الناتجةعن الضوضاء .لوحظ أن تعاطى عقار السلبرايد لم يظهر أى أثار جانبيه فى نسيج الكبد ولكن لوحظت زيادة فى الخلايا اللمفية أما التعرض للضوضاء فقط أظهرتغيرات هستولوجية وكميانسيجية عديدة بالنسيج الكبدى وأظهرت المعاملة بالعقار بعد التعرض للضوضاء تحسنا ملحوظا فى النسيج الكبدى. ولهذا ينصح باستخدام عقار السلبرايد فى الناس المعرضة للضوضاء.