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EFFECT OF MUSIC AND NOISE ON GROWTH AND MATURATION IN FEMALE ALBINO RAT

By

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ABSTRACT

Background: Noise stress is implicated in various illnesses of human, and it is responsible for increased morbidity associated with modern life style. Music induces emotions which are often accompanied by physiological reactions**. Objective:**Investigating the effect of light music and noise on growth and maturation from weaning to puberty in female rat with studying the histological structuresof pituitary, thyroid and ovaries**. Material and Methods**:Fifty animals were used in this work and divided into five equal groups:

- Control group.
- Rats exposed to noise for 60 days (over 90db, 1h/day).
- Rats exposed to music for 60 days (1h/day).
- Rats exposed to music then noise for 60days (2h/ day).
- Rats exposed to noise then music for 60days (2h/ day).

At the end of experiment, serum was obtained from the rats during the di-estrous phase for determination of:

1. Growth hormone.
2. TSH level.
3. Gonadotrophic hormones (FSH, LH).
4. Prolactin hormone.
5. Leptin hormone.

Histopathological study for pituitary, thyroid and ovaries were done.

Results: This study revealed that noise caused significant decrease in gonadotrophic hormones (LH, FSH) and TSH, with significant increase in serum leptin without any changes in both growth and prolactin hormones. In addition, it produced significant pathological changes in pituitary, thyroid, ovaries and uterus. These changes included congested dilated blood sinusoids and loss of normal cellular arrangement. On the other hand, music caused insignificant changes in gonadotrophic hormones (LH, FSH) and TSH levels, with significant increase in leptin hormone without any changes in both growth and prolactin hormones levels. In addition, it produced insignificant pathological changes in pituitary, thyroid and ovaries as compared with the control group.

Conclusions: Exposure to noise stress could affect the process of reproduction but does not affect the process of growth. In addition, listening to light music does not disturb the process of reproduction or growth. Where there was an equilibrium in biochemical and histological results.

INTRODUCTION

Music has been a part of human society at least for the past 40,000 years and most likely much longer, where people typically interact with music and values it for its capacity to evoke and regulate emotions, provide enjoyment, comfort, relieve stress, alter mood and elicit relaxation responses **(Lundqvist et al., 2009).**

On the other hand, stress can be defined as the psycho- physiologic reaction of the organism to a variety of emotional or physical stimuli that threaten homeostasis. Noise stress not only causes the damage of auditory system, but also leads to incidence increase in other multiple body problems, such as paradoxical reaction of psycho-physiology, slow performance ability, sleep deprivation, boredom and inactive social behavior due to chemical and physiological modification of endocrine system **(Knott et al., 2010 and Lobarinas et al., 2013).**

This study aimed to clarify the effects of each music and noise stress on the process of growth and maturation in female albino rats since weaning till puberty.

MATERIAL AND METHODS

Animals: A total number of fifty offspring's female albino rats of local strain were the model of the present work. All rats were about the same age and their weight ranged between 35 - 40 gm. They were kept in suitable cages (30 × 35 × 30 cm for every 5 rats) made of zinc material with network bases to clarify the waste products of rats. Rats were maintained on balanced standard rat's cubes with free water supply. They were left for one week for acclimatization in the laboratory room at comfortable temperature with natural light – dark cycle.

Rats were divided into five equal groups:
Group I(Control group).
Group II (Noised group).
Group III (Music group).
Group IV (Music then noise group).
Group V (Noise then music group).

Induction of noise: Noise was induced by exposure of the animals to 90 dB of prerecorded noise delivered via high volume setting stress speaker placed one meter from the cages for one hour daily in a separate room away from other rats for 60 consecutive days **(Waye*et al.*, 2002**).

Induction of light music: Music was induced by exposure of the tested animals to prerecorded pieces of light music delivered via stereo speaker placed one meter from the cages, mild sound intensity levels at 60 dB for one hour daily in a separate room away from other rats for 60 consecutive days***(Angelucci et al., 2007).***

Detection of di–estrous phase through vaginal smear and examined under light microscope to detect the epithelial cells of different shape and size, leucocytes and mucus with disappearance of cornified cells ***(Zheng et al., 2014)***.

Blood sampling: At the end of experimental period, blood samples were obtained from each rat, centrifuged at 5000 rpm for 10 minutes to separate sera which were collected and stored frozen at -20?C until assayed for determination of:
1. Growth hormone ***(Lanes et al., 1985).***
2. Prolactin hormone ***(Duddly, 1990).***
3. Gonadotrophic hormones: FSH and LH ***(Uotila et al., 1981).***
4. T.S.H ***(Burger and Patel, 1977).***

5. Leptin hormone ***(Robert et al., 1996).***

Histopathological study: At the end of the experimental period, skull and abdominal cavities were opened, and then pituitary, thyroid and ovaries were exposed, dissected and excised. Samples were kept in 10% formalin solution. Paraffin blocks were made and different sections at different levels were obtained. Slides were stained with hematoxyline and eosine (Hx and E) and examined using a light microscope **(Yuksek et al., 2009).**

Statistical analysis:

Data were tabulated, coded then analyzed using the computer program SPSS (Statistical package for social science) version 17.0 to obtain**.** In the statistical comparison between the different groups, the significance of difference was tested using ANOVA (analysis of variance) to compare between more than two groups of numerical (parametric) data followed by post-hoc tukey test. P value <0.05 was considered statistically significant. Data were expressed as mean ±SD.

RESULTS

A) Biochemical study

Changes in serum FSH levels:

In control group, the mean ± standard deviation (S.D) of serum FSH level was 7.53 ±1.01 mg%. In noise group, the mean ± S.D of serum FSH level was 5.59 ± 0.80 mg% This level showed significant decrease in serum FSH level as compared with the control group. In music group, the mean ± S.D of serum FSH level was 6.97±0.93 mg%. This level showed insignificant decrease in serum FSH level as compared with the control group. In music followed by noise group, the mean ± S.D of serum FSH level was 5.70± 0.63 mg%. This level showed significant decrease in serum FSH level as compared with the control group.In noise followed by music group, the mean ± S.D of serum FSH level was 5.72±0 .79 mg%. This level showed significant decrease in serum FSH level as compared with the control group (Table 1).

Table (1): Changes in serum FSH levels.

Parameters \ Groups		G1 (Control)	G2 (Noise)	G3 (Music)	G4 (Music to Noise)	G5 (Noise to Music)	P
FSH(mIU/ml)	Mean	7.53	5.59	6.97	5.70	5.72	<0.001
	±SD	1.01	0.80	0.93	0.63	0.79	
Post-hoc	P1		<0.001	.63	0.001	<0.001	
	P2			0.008	0.99	0.99	
	P3				0.017	0.015	
	P4					1.00	

SD: standard deviation P: Probability P1: significance relative to G1 (Control)
P2: significance relative to G2 (Noise)P3: significance relative to G3 (Music)
P4: significance relative to G4 (Music to Noise)

Changes in serum LH hormone levels:

In control group, the mean ± standard deviation (S.D) of serum LH level was 5.60± 0.50 mg%. In noise group, the mean ± S.D of serum LH level was 4.42± 0.60 mg%. This level showed significant decrease in serum LH level as compared with the control group. In music group, the mean ± S.D of serum LH level was 5.39±0.73 mg%. This level showed insignificant decrease in serum LH level as compared with the control group. In music followed by noise group, the mean ± S.D of serum LH level was 5.27± 0.62 mg%. This level showed insignificant decrease in serum LH level as compared with the control group. In noise followed by music group, the mean ± S.D of serum LH level was 5.06± 0.56 mg%. This level showed insignificant decrease in serum LH level as compared with the control group (Table 2).

Table (2): Changes in serum LH hormone levels.

Parameters \ Groups		G1 (Control)	G2 (Noise)	G3 (Music)	G4 (Music to Noise)	G5 (Noise to Music)	P
LH(mIU/ml)	Mean	5.60	4.42	5.39	5.27	5.06	0.003
	±SD	0.50	0.60	0.73	0.62	0.56	
Post-hoc	P1		0.002	0.9	0.8	0.35	
	P2			0.01	0.04	0.17	
	P3				0.99	0.74	
	P4					0.94	

SD: standard deviation P: Probability P1: significance relative to G1 (Control)
P2: significance relative to G2 (Noise)P3: significance relative to G3 (Music)
P4: significance relative to G4 (Music to Noise)

Changes in serum TSH levels:

In control group, the mean ± standard deviation (S.D) of serum TSH level was 3.10 ± 0.20 mg%. In noise group, the mean ± S.D of serum TSH level was 2.02± 0.41 mg%. This level showed significant decrease in serum TSH level as compared with the control group. In music group, the mean ± S.D of serum TSH level was 3.39±0.49 mg%. This level showed insignificant increase in serum TSH level as compared with the control group. In music followed by noise group, the mean ± S.D of serum TSH level was 2.33± 0.51 mg%. This level showed insignificant decrease in serum TSH level as compared with the control group. In noise followed by music group, the mean ± S.D of serum TSH level was 1.89± 0.50 mg%. This level showed significant decrease in serum TSH level as compared with the control group (Table 3).

Table (3): Changes in serum TSH levels.

Parameters \ Groups		G1 (Control)	G2 (Noise)	G3 (Music)	G4 (Music to Noise)	G5 (Noise to Music)	P
TSH (uIU/dl)	Mean	3.10	2.02	3.39	2.33	1.89	<0.001
	±SD	.20	0.41	0.49	0.51	0.50	
Post-hoc	P1		<0.001	0.64	0.008	<0.001	
	P2			<0.001	0.57	0.97	
	P3				<0.001	<0.001	
	P4					<0.001	

SD: standard deviation P: Probability P1: significance relative to G1 (Control)
P2: significance relative to G2 (Noise)P3: significance relative to G3 (Music)
P4: significance relative to G4 (Music to Noise)

Changes in serum GH levels:

In control group, the mean ± standard deviation (S.D) of serum GH level was 4.90 ± 0.77 mg%. Comparing with other different groups this level showed insignificant changes in other different groups (Table 4).

Table (4): Changes in serum GH levels.

Parameters \ Groups		G1 (Control)	G2 (Noise)	G3 (Music)	G4 (Music to Noise)	G5 (Noise to Music)	P
GH (ng/ml)	Mean	4.9	5.00	4.91	4.88	4.99	0.99
	±SD	0.77	0.49	0.64	0.85	0.39	

Changes in serum Leptin hormone levels:

In control group, the mean ± standard deviation (S.D) of serum Leptin level was 0.59 ± 0.03 mg%. In group II noise group, the mean ± S.D of serum leptin level was 0.82± 0.07 mg%. This level showed significant increase in serum leptin level as compared with the control group. In music group, the mean ± S.D of serum leptin level was 0.73±0.7 mg%. This level showed significant increase in serum leptin level as compared with the control group. In music followed by noise group, the mean ± S.D of serum leptin level was 0.66± 0.8 mg%. This level showed insignificant increase in serum Leptin level as compared with the control group. In noise followed by music group, the mean ± S.D of serum Leptin level was 0.66± 0.10 mg%. This level showed insignificant increase in serum Leptin level as compared with the control group (Table 5).

Table (5): Changes in serum Leptin hormone levels.

Parameters \ Groups		G1 (Control)	G2 (Noise)	G3 (Music)	G4 (Music to Noise)	G5 (Noise to Music)	P
Leptin(ng/ml)	Mean	0.59	0.82	0.73	0.66	0.66	<0.001
	±SD	0.03	0.07	0.07	0.08	0.10	
Post-hoc	P1		<0.001	0.002	0.2	0.2	
	P2			0.07	<0.001	<0.001	
	P3				0.31	0.25	
	P4					1.00	

SD: standard deviation P: Probability P1: significance relative to G1 (Control)
P2: significance relative to G2 (Noise)P3: significance relative to G3 (Music)
P4: significance relative to G4 (Music to Noise)

Changes in serum prolactin hormone levels:

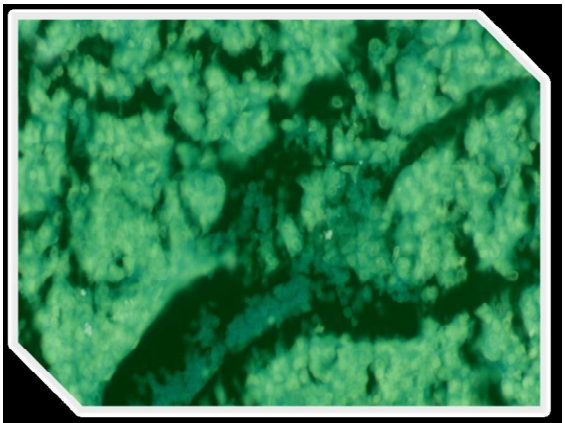
In control group, the mean ± standard deviation (S.D) of serum GH level was 18.20 ± 3.07 mg%. In comparison with other different groups this level showed insignificant changes in other different groups (Table 6).

Table (6): Changes in serum prolactin hormone levels.

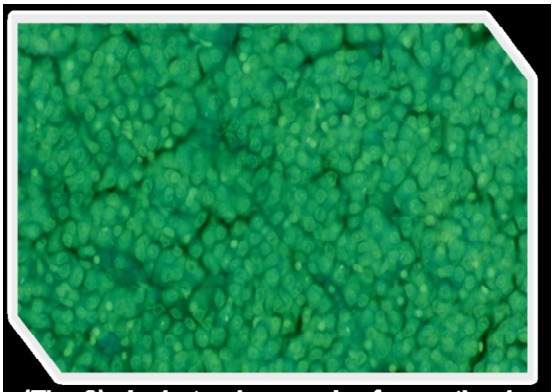
Parameters \ Groups		G1 (Control)	G2 (Noise)	G3 (Music)	G4 (Music to Noise)	G5 (Noise to Music)	P
PRL(ng/ml)	Mean	18.20	19.91	20.33	19.06	19.20	0.8
	±SD	3.07	4.30	4.20	3.86	4.29	

B. Histopathological study

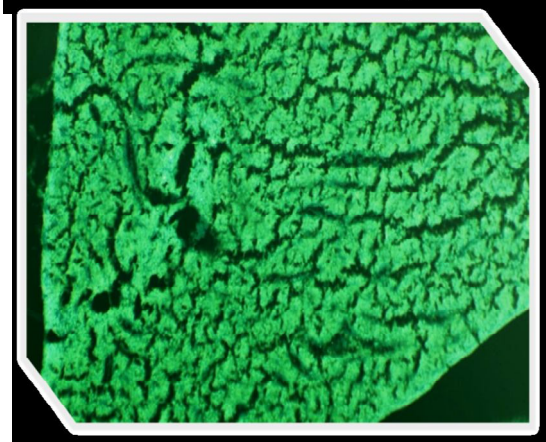
While tissues pituitary glands, thyroid and ovaries in control and music groups appeared normal, they expressed notable pathological changes in the noise group. In animals exposed to music and noise, results were mixed.



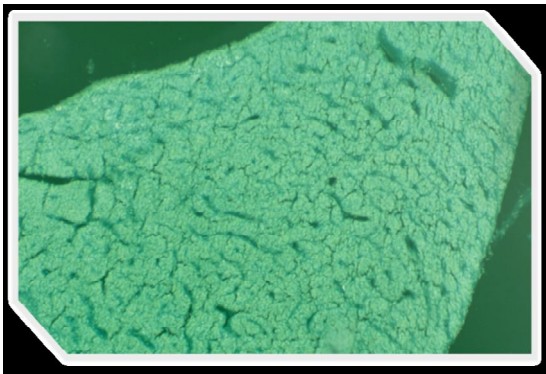
(Fig. 1): A photomicrograph of a section in the pituitary gland of (noise group rats) showed marked congested dilated blood sinusoids and loss of normal cellular arrangement. (Hx&E x 400)



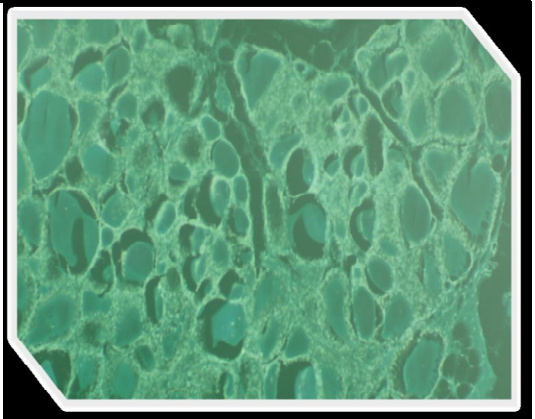
(Fig. 2): A photomicrograph of a section in the pituitary gland of (music group rats) showed normal structure of cells, connective tissues septae and blood sinusoid. (Hx&E x 100)



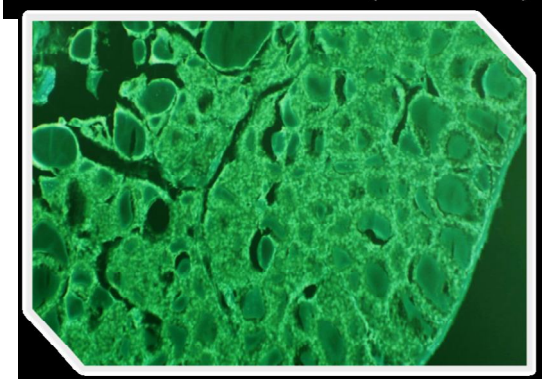
(Fig. 3): A photomicrograph of a section in the pituitary gland of (music followed by noise group rats) showed mild dilated congested blood vessels with normal cellular arrangement and normal nuclei of different cells. (Hx&E x 100)



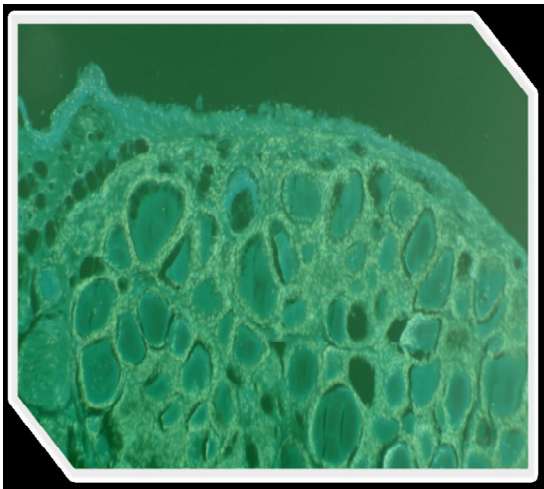
(Fig. 4): A photomicrograph of a section in the pituitary gland of (noise followed by music group rats) showed mild to moderate dilated congested blood vessels with normal cellular arrangement and normal nuclei of different cells. (Hx&E x 100)



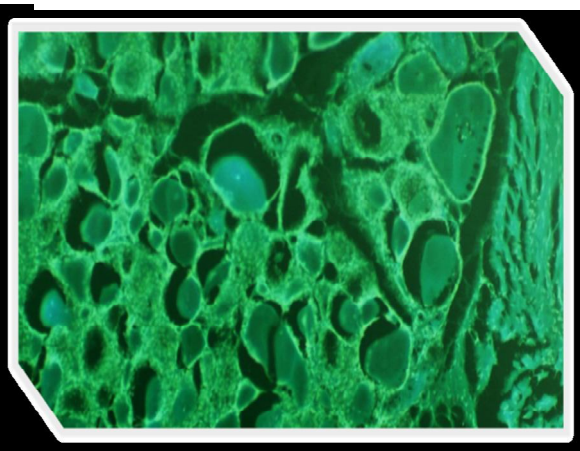
(Fig. 5): A photomicrograph of a section in the thyroid gland of (noise group rats) showed variable sized thyroid follicles, empty colloid peripheral scalloping and dilated congested blood vessel. (Hx&E x 100)



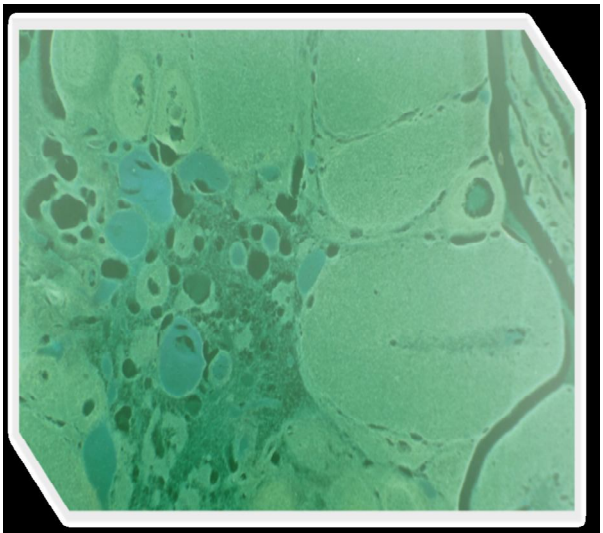
(Fig. 6): A photomicrograph of a section in the thyroid gland of (music group rats) showed normal thyroid follicle filled with colloid, covered with cuboidal epithelium with rounded nuclei and stroma show some fibroblast, collagen fibers and blood vessels. (Hx&E x 100)



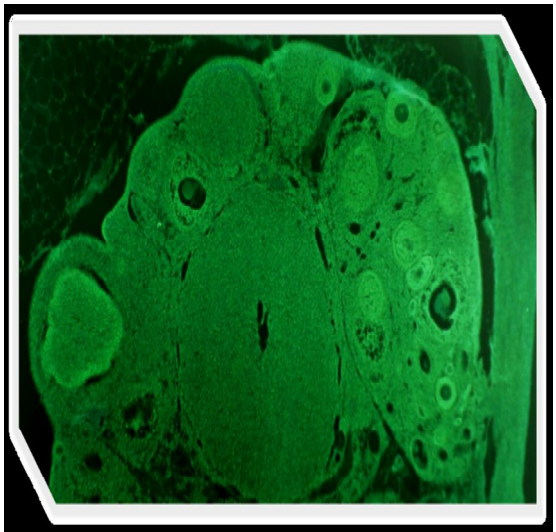
(Fig. 7): A photomicrograph of a section in the thyroid gland of (music followed by noise group rats) showed mild variability in size of thyroid follicles with peripheral scalloping and normal cellular arrangement with normal nuclei and collagen fibers. (Hx&E x 100)



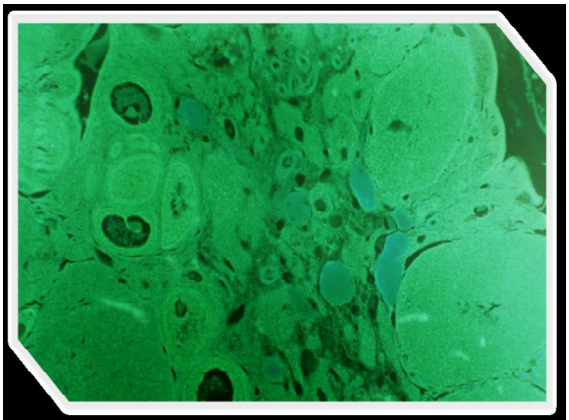
(Fig. 8): A photomicrograph of a section in the thyroid gland of (noise followed by music group rats) showed mild variability in size of thyroid follicles with few peripheral scalloping and normal cellular arrangement with mild congested dilated blood vessels. (Hx&E x 100)



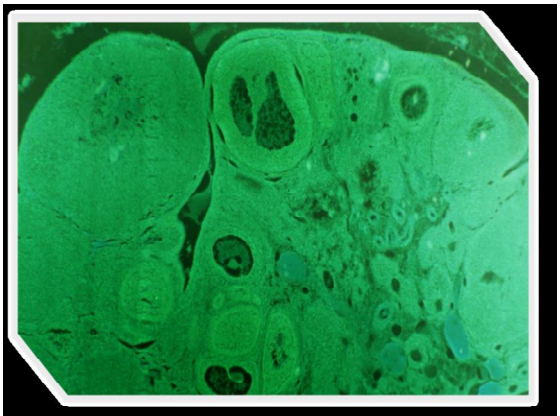
(Fig. 9): A photomicrograph of a section in the ovary of (noise group rats) showed marked dilated congested blood vessels, the rest of ovary showing cystically dilated follicles lined by granulose cells separated by normal ovarian stroma. (Hx&E x 100)



(Fig. 10): A photomicrograph of a section in the ovary of (music group rats) showed normal histology of graffian follicles of different maturation and corpus leuteum.(Hx&E x 100)



(Fig. 11): A photomicrograph of a section in the ovary of (music followed by noise group rats) showed mild to moderate dilated congested blood vessels and the rest of ovary showed cystically dilated follicles lined by granulose cells separated by normal ovarian stroma. (Hx&E x 100)



(Fig. 12): A photomicrograph of a section in the ovary of (noise followed by music group rats) showed moderate dilated congested blood vessels and the rest of ovary showed cystically dilated follicles lined by granulose cells separated by normal ovarian stroma and corpus leuteum. (Hx&E x 100)

DISCUSSION

This work was carried out to investigate the effect of music and noise on growth and maturation with some physiological, biochemical parameters and histological changes in the pituitary, thyroid, ovaries and uterus of offspring's female albino rats.This study must then be considered a pilot study and as such certainly raises more questions than answers.

The result of the present work showed, in noise group, significant decrease in serum LH level as compared with the control group. **Shannon et al. (2013)** reported that different stressors including infection, malnutrition, anxiety, noise and depression trigger a rise in glucocorticoids that suppress reproductive functions along the hypothalamic- pituitary- gonadal axis.This result was in agreement with the finding of **Kondoh et al. (2009) and Diab et al. (2012**) who reported that,noise stress results in stimulation of adrenocortico-trophic hormone, adrenal hyperactivity and increased corticosterone secretion with LH reduction. This may be one of pathophysiological mechanism involved in follicular cyst pathogenesis. So, noise stress disturbed natural fertility through inhibition of hypothalamic– pituitary-gonadal axis, and decreased uterine receptivity through an ovarian independent pathway.

In music group, insignificant changes occurred in serum LH level as compared with the controlled group. Music stimuli activates certain neuronal structures as cortex and amygdala, and improves plasticity, neurogenesis and modulate defensive emotional system without any disturbance of body homeostasis **(Boso et al., 2006 and Roy et al., 2009)**.

In music followed by noise group, insignificant changes occurred in serum

LH level as compared with controlled group. Up regulation of activity within the mesolimbic dopaminergic system with corresponding effects on the reactivity to stress and pain or may be due to down-regulation of activity of the central nucleus of the amygdala with down-regulatory effects on levels of fear and worries, and on activity of hypothalamic and brainstem nuclei involved in the generation of the endocrine HPA axis, and vegetative stress responses or may be due to musical information consumes cognitive including attention resources **(Koelsch et al., 2008 and Okada et al., 2009).**

In noise followed by music group, insignificant changes occurred in serum LH level as compared with the controlled group. **Nilsson (2008) and Koelsch & Stegemann (2012)** reported that noise stress produces neurochemical response leading to loss of homeostatic equilibrium, motivating the organism to engage in activities that will restore it. Lifestyle choices that reduce stress are thought to be highly protective against diseases and music may be among these. **Lai et al. (2008) and Sutton & Debaker (2009**) reported that using of music to reduce stress is considered a palliative coping approach in the individuals where internal psychological strategies are enhanced in order to manage tension and minimize distress.

The result of the present workshowed, in noise group, significant decrease in serum FSH level as compared with the controlled group. **Diab et al. (2012**) reported that noise stress producessignificant reduction in sexual hormones levels (testosterone, LH, FSH, progesterone and estradiol) with moderate abnormal histological changes in testes and ovaries. Thus, the noise may act as severe deteriorative stress on other organs in the body.

In music group, there were insignificant changes in serum FSH level as compared with the controlled group. There is good and balance effect of music on physiological functions of the body where music focusing the patient's attention away from negative stimuli to something pleasant and encouraging. It occupies the patient's mind with something familiar and soothing, which allows the patient to escape into his or her own world (**Sutton and Debaker, 2009).**

In music followed by noise group, there was a significant decrease in serum FSH level as compared with the controlled group. So music intervention before noise had no role in improving the level of FSH level which disturbed by noise through alteration of the pituitary- ovarian axis.

This disagreed with **Mansky and Wallersted (2006) and Sarkamo et al. (2008)** who reported that music has been increasingly used as a therapeutic tool in the treatment of different diseases. It has been shown that music therapy not only reduced blood pressure, heart rate and patient anxiety, but had a significant effect on future events including reinfarction and death in acute coronary syndrome patients who underwent revascularization

In noise followed by music group, significant decrease in serum FSH level as compared with the controlled group. **Kondoh et al. (2009)** reported that noise stress results in stimulation of ACTH

release and increased corticosterone secretion with LH and FSH reduction. This may be one of pathophysiological mechanism involved in follicular cyst pathogenesis. Stress disturbs natural fertility through the inhibition of hypothalamic pituitary gonadal axis, so decreased uterine receptivity through an ovarian independent pathway.

This result disagreed with **Labbe et al. (2007) and Nilsson (2008)** who reported that listening to classical music immediately after a brief cognitive stressor resulted in an increased feeling of relaxation, reduction in anxietystateand improved hormonal disturbances when compared to groups who sat in silence or listened to heavy metal music.

The result of the present work showed, in noise group, highly significant decrease in serum TSH level as compared with controlled group. **Rook (2010) and Eman et al. (2013)**reported that noise and crowding stressors caused a significant increase of T3 and T4, while there was a significant decrease in TSH which predisposing to development of Grave's disease.

This result was agreed with **Murata et al. (2009) and Peterson et al. (2010)** who reported that stress has an effect on the immune system either directly or indirectly through the nervous and endocrine systems. The association of stress with Grave's disease is probably affect the immune response to TSH receptor through the modulation of hormones, neurotransmitters and cyto-kines. The disease can result in the production of stimulating anti-TSH receptor antibodies causing goiter and hyperthyroidism. Crowding and noise can be one of the environmental stressors which effects thyroid autoimmunity

In music group, insignificant changes occurred in serum TSH level as compared with the controlled group. Music stimuli activate certain neuronal structures as cortex and amygdala and improves plasticity, neurogenesis and modulate defensive emotional system, good wellbeing and mood of persons, and stimulates pleasant centers without any disturbance of neuroendocrine pathways **(Roy et al., 2009 and Hans, 2012)**.

In music followed by noise group, insignificant changes occurred in serum TSH level as compared with the controlled group. **Emanet al. (2013)** reported that music has been alleviating and relaxing effect which modulate and regulate HPA and ANS axis with decreasing stress hormones and modulation of immunity leading to amelioration in T3, T4 and TSH

In noise followed by music group, highly significant decrease occurred in serum TSH level as compared with the controlled group. **Panzani et al. (2011)** reported that psychological stress suggested as a risk factor for Graves' disease.

The result of the present work showed, in noise group, highly significant increase in serum leptin level. **Dong et al. (2015)** reported that noise stress produces over secretion of cortisone which is capable of stimulating the synthesis and secretion of adipocyte derived leptin which regulates food intake and energy expenditure.The

two hormones have wide ranging effect on metabolism, growth and reproduction.

In music group, there was significant increase in serum leptin hormone level as compared with the controlled group. **Alisa et al. (2012)**reported that music induces positive good mood and regulation of metabolism and energy balance through the regulation of HPA activity.

In music followed by noise group and noise followed by music group**,**results of the present study revealed insignificant changes in serum leptin hormone level as compared with the controlled group. So, intervention of music before or after noise lead to equilibrium and regulation of leptin release **(Dong et al., 2015)**.

The result of the present work showed, insignificant changes in serum GH level in experimental groups comparing with the controlled group. This result disagreed with **Zhenget al. (2014)** who reported that the secretion of growth hormone was significantly decreased in the rats exposed to high noise environment, compared to those exposed to standard condition and reduced noise. Also, **Conrad et al. (2007) and Nelson et al. (2008)** who reported that music increases levels of GH through reducing alteration in hypothalamic - anterior pituitary - peripheral hormone axes which produce cortisol and growth hormone.

The reason for this variation between our observation and these studies may be due to species variation, different nature of stress or age of rats.

The result of the present work showed**,** insignificant changes in serum prolactin level in experimental groups comparing with the control group. **Insana and Wilson (2008)** reported that the increase in peripheral concentrations of prolactin hormone is a typical response to physiological and psychological stressors, and the response is sometimes used as an index of stress intensity. **Eman et al. (2014)** who reported that noise and crowding stresses caused a significant decrease of estrogen, progesterone, LH and FSH levels and high significant increase in prolactin level. Also, **Huron (2011)**who reported that high prolactin concentrations are associated with pleasurable music induced sadness, whereas low prolactin concentrations are associated with unpleasant music-induced sadness.

Histopathological studies of pituitary gland in noise group ratsrevealed marked congested dilated blood sinusoids and loss of normal cellular arrangement as compared to controlled group. **Laijun et al. (2014)** reported that the possible mechanism leading to this phenomenon were the dopamine system, amygdala of the limbic system, and hippocampal complex system. These systems can be activated by stress factors such as noise leading to different degrees of pathological changes in brain glands.

In music group rats, there were normal structure of cells, connective tissues septae and blood sinusoid with no significant changes comparing with controlled group. **Sanyal et al. (2013)** reported that music positively modulates the morphological, biochemical and behavioral development of auditory pathway, hippocampus and brain neurons.

In music followed by noise and noise followed by music, mild to moderate dilated congested blood vessels with normal cellular arrangement, and normal nuclei of different cells comparing with control group. These changes may be due to regulation and modulations of the HPA axis, ANS and the immune system, by the calming effect of music, leads to less stress hormones, and decreases activity of the pituitary gland with little congestion in blood vessels **(Alisa et al., 2012 and Thoma et al., 2013).**

Histopathological studies of thyroid gland in noise group rats revealed, variable sized thyroid follicles some with empty colloid and some showing peripheral scalloping denoting hyper function also, there is dilated congested blood vessels. This agreed with **Rook (2010).**

Histopathological studies of thyroid gland in music group rats showed normal thyroid follicle filled with colloid and covered with cuboidal epithelium with rounded nuclei and stroma show some fibroblast, collagen fibers and blood vessels **(Enk et al., 2008 and Nilsson, 2008)**

Histopathological studies of thyroid gland in music followed by noise and noise followed by music groupsshowed mild to moderate variability in sized of thyroid follicles with peripheral scalloping denoting slight hyper function, and normal cellular arrangement with normal nuclei and collagen fibers comparing with controlled group. This result is due to alleviating and relaxing effect of music before stress which modulates and regulate hypothalamic pituitary adrenal axis**(Wakim et al., 2010 andKoelsch et al., 2011).**

Histopathological studies of the ovary in noise group rats showed marked dilated congested blood vessels, and the rest of ovary showing cystically dilated follicles lined by granulose cells separated by normal ovarian stroma.The mechanism of this result was due to the effect of noise stress on the pituitary- ovarian axis, and significant decrease in serum LH and FSH. Moreover, this indicates failure of ovulation and are similar to those of polycystic ovarian syndrome **(Eman et al., 2014)**

Histopathological studies of the ovary in music group revealed normal histology of graffianfollicles of different maturation and corpus leuteum as controlled group. **Chikahisa et al. (2007)** reported that music efficacy appear in form of positive good mood, improve emotions and wellbeing, and have anxiolytic effect through improving ovarian steroids estrogen and progesterone.

Histopathological studies of the ovary in music followed by noise, and noise followed by music groups showed moderate dilated congested blood vessels. The rest of ovary showed some cystically dilated follicles lined by granulose cells separated by normal ovarian stroma also corpus leuteum is present.This result reflects the prophylactic and alleviating effect of music intervention before or after noise and improving the levels of gonadotropic hormones **(Cervelllin and Lippi, 2011)**.

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تأثير الموسيقى والضوضاء على النمو والبلوغ فى أنثى الجرذان البيضاء

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خلفية البحث:الضوضاء من أهم العوامل التى تؤثر سلبا على صحة الإنسان ، وتعد واحدة من أكثر مشكلات الصحة العامة في القرن الحادي والعشرين خطورة. والموسيقى الهادئة تحظى بالتفاعل والتناغم مع الكثير من الناس لقدرتها على التأثير على الوظائف العاطفية وتوفير التمتع والراحة وتخفيف التوتر بما يؤدى الى الإسترخاء.

الهدف من البحث:التعرف على تأثير الموسيقى والضوضاء على النمو والبلوغ فى أنثى الفئران البيضاء، وأيضا دراسة التغير الباثولوجى للغدة النخامية والدرقية والمبايض لهذه الفئران.

مواد وطرق البحث: أجرى البحث على خمسين من إناث الجرذان البيضاء اللاتى قسمن إلى خمسة مجموعات متساوية:

- مجموعة ضابطة.
- مجموعة تعرضت للضوضاء فقط أكثر من 90 ديسبل لمدة 60 يوما(بمعدل ساعة يوميا).
- مجموعة تعرضت للموسيقى فقط لمدة 60 يوما(بمعدل ساعة يوميا).
- مجموعة تعرضت للموسيقى ثم للضوضاء لمدة 60 يوما (بمعدل ساعتين يوميا).
- مجموعة تعرضت للضوضاء ثم للموسيقى لمدة 60 يوما (بمعدل ساعتين يوميا).

وقد تم أخذ الأمصال فى نهاية هذه المدة لتحديد مستوى:

- هرمون النمو.
- الهرمون المحفز للغدة الدرقية.
- هرمونات التبويض والتحفيز لحويصلات المبايض.
- هرمون البرولاكتين.
- هرمون الليبتن.

أما بالنسبة للدراسة النسيجية، فلقد أخذت اجزاء صغيرة من الغدة النخامية والدرقية ومبايض الجرذان من كل المجموعات، وقد تم عمل قطاعات شمعية بالطرق المعروفة وصبغها بعدة صبغات.

نتائج البحث: أدى التعرض الى الضوضاء إلى نقص ذا دلالة إحصائية فى كل من نسبة الهرمونات المحفزه للتبويض والحويصلة، وأيضا الهرمون المحفز للغدة الدرقية، مع زيادة فى نسبة هرمون الليبتن، وعدم تغير فى هرمون النمو وهرمون البرولاكتين . وعلى الجانب الآخر، كان التعرض للموسيقى غير مؤثر بنتائج دالة إحصائيا بإستثناء زيادة هرمون الليبتن. كما أدى الإستماع للموسيقى قبل أو بعد الضوضاء إلى التحسن فى نسبة الهرمونات بنسب دالة إحصائيا.

وقد أدى التعرض للضوضاء إلى ظهور العديد من التغيرات النسيجية فى الغدة النخامية والدرقية ومبايض الجرذان منها تحطم بعض الخلايا وتمدد الأوعية الدموية وإحتقانها. أما التعرض للموسيقى فلم يظهر تغيرات نسيجية فعالة ، بينما التعرض للموسيقى والضوضاء معا أظهر تغيرات بسيطة ومتنوعة.

الإستنتاج: تؤثر الضوضاء تؤثر على عملية البلوغ وليس النمو،والموسيقى منفردة لا تحدث تغيرا ملحوظا حيث كان هناك توازناً فى النتائج البيوكيميائية والنسيجية، ولكنها قادرة على تخفيف الضرر الناتج من الضوضاء إذا تداخلت قبله أو بعده.