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The Effect of Music Therapy on the Feeding Behavior in Stressed Male Wistar Rat

[1]Attoui Nawel, [1]Bairi Abdelmadjid, [1,2]Tayaa Hakima, [1]Bouhali Imed Eddine, [1]Habbachi Wafa, [1]Zaafour Samir and [1]Tahraoui Abdelkrim

[1]Laboratory of Applied Neuro Endocrinology, Department of Biology,
Faculty of Science, BP 12 El-Hadjar, University Badji Mokhtar, 23000 Annaba, Algeria
[2]Department of Biology, Faculty of Science,
University Center Abdelhafid Boussouf, 43000 Mila, Algeria

Abstract: The relationship of stress and food is a complex one. It should be noted, first of all that stress is not a distinctive feature of human beings; indeed it is a major problem commonly faced by both humans and animals. The exposure to stress entails an alternation at the eating patterns of humans and rodents. With the application of music mediated therapy, sounds and rhythms come to be used as tools for developing its creativity and reconnecting with oneself to treat various health related problems (anxiety, chronic pain, pressure, learning difficulties, etc). This work aims at studying the effects of classical relaxing music as a treatment on rats with stress troubles. As this kind of music is distinguished by its unique potential of improving concentration and memory, it also plays a significant role in reestablishing and maintaining the physical and psychological well being. Thence, it can be considered as a holistic approach that merges both body and sensations.

Key words: Music Therapy · Rats · Stress · Diet · Behavior · Mozart 40th Symphony

INTRODUCTION

Environment is everything surrounding us. It is all natural and artificial elements within what unfolds life and every sensory information emanating: visual, auditory, olfactory, thermal [1]. Stress is a broad term with negative connotations. It refers to all the responses of an organism when subjected to stressful situations whether internal or environmental and that can compromise its homeostasis. Stress can be physical, physiological, infectious, chemical, environmental or psycho-emotional and induces physiological responses, psychosomatic and behavioral. However, stress is not always negative. Indeed, some types of stress as realistic deadlines and required changes are beneficial and induce adaptive biological and psychological reactions needed to increase motivation and performance. This is called “having stressed”. On the other hand, stress is negative when it consists of threatening situation perceived as binding during a shorter or a longer period and inducing degradation of performance and depletion of the body. This is called "distress".

The concept of stress has been introduced in biology by endocrinologist Hans Selye's who was the first to describe the mechanism of the "general adaptation syndrome (GAS)" bringing together all the answers that allow an organization has to deal with a stressful event [2]. This syndrome consists of three successive stages which are respectively: The Alarm reaction, resistance stage and the exhaustion stage [3]. The adaptation of an organism to environmental challenges involves stress response, mechanisms in heightening the central and peripheral circuitry: the HPA axis, the sympathetic system and the limbic system [4]. The HPA axis is the main mechanism for the animal to adequately address aversive condition and maintain homeostasis [5, 6].

Corresponding Author: Hakima Tayaa, Laboratory of Applied Neuro ndocrinology, Department of Biology,
Faculty of Science BP 12 El-Hadjar, University Badji Mokhtar, 23000 Annaba (Algeria) and
Department of Biology, Faculty of Science.University Center AbdelhafidBoussouf, 43000 Mila Algeria.

MATERIALS AND METHODS

Presentation of Biological Model: We used male albino rats Rattus rattus strain from the institute Pastor of Algiers (Algeria) to. The rats were bred in the laboratory in polyethylene cages lined with a bed of wood shavings. At the beginning, these rats weighed between 90 to 110 grams, whereas and at the time of the experiment, they weighed on average 240 ± 30 grams. These animals were accumulated to laboratory conditions.

Admission Stress: Our study consists of stressed rats with the smell of a predator (the cat) and a powerful sound Clackson. For a period of 10 minutes in a day, a group of rats were exposed to the smell of a cat collar; the second group is stressed with Clackson about 105 decibels while the last group is exposed to both stressors at the same time.

Presentation of Food: The food given to animals is crafted form of rods made of: sound, middling, soybean, CMV (SARL the local food producing mice and rats Bouzaréah-Algiers). A quantity of drinking water is presented in bottles and libitum. Each day we weighed rats and the food and every day as we begin by 250g of food.

Treatment Presentation

Treatment with Relaxing Music: The three groups of stressed rats are treated with a classic relaxing music for seven days (10 minutes / day). Music therapy: It uses sound and music in all its forms as a means of expression and communication. It aims at restoring and maintaining physical and mental health. This is a comprehensive approach that involves the body, the sensory, affective, intellectual and mental faculties [7].

Choice of Music: In this work we choose a classical and relaxing music or quieter symphony of Mozart called "« n°5in B flat Major, K22 ». The reason behind the choice of this type of music is because it is characterized by its clarity, elegance and transparency. It is known for its ability improves concentration, memory and spatial perception as well as strengthening some connections between different parts of the brain [8, 9].

Statistical Analysis: The results obtained from the different tests were statistically analyzed by descriptive methods metric giving the mean and standard deviation then they have been the subject of a comparison of average ("t" test of Student) at significance level $\alpha = 0.05$ with the XLSTAT 2009 software.

RESULTS

Food Intake: We measured body weight and food intake for a period of consecutive 07days during this period, the S / PS rats show a highly significant ($p < 0.001$) of food intake compared to control rats. Rats S / PS showed a highly significant decrease ($p < 0.001$) of food intake in comparison with rats T / PS. (Fig 1).

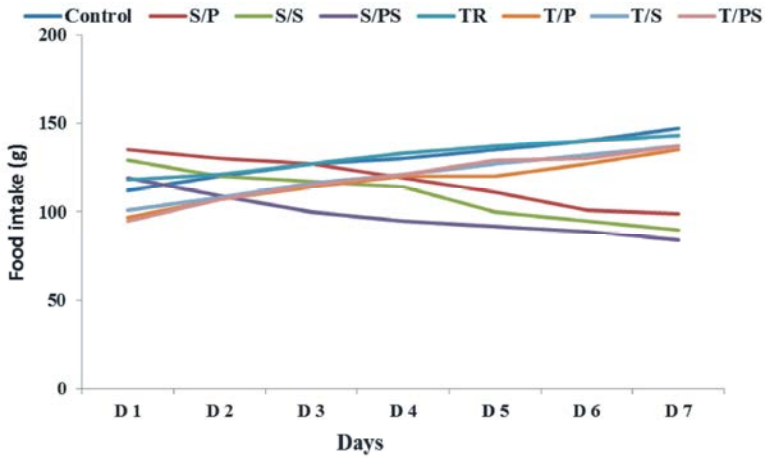

Fig. 1: Change in food intake (g) in control rats Male rats treated with the music; (SP) Tr: Stressed Rats with the smell of Predator and treated with music; (SS) Tr: Stressed Rats with a powerful and treated her with the music; (S: P + S): stressed rats with the smell of the predator and the powerful at the same time and then treated with music.

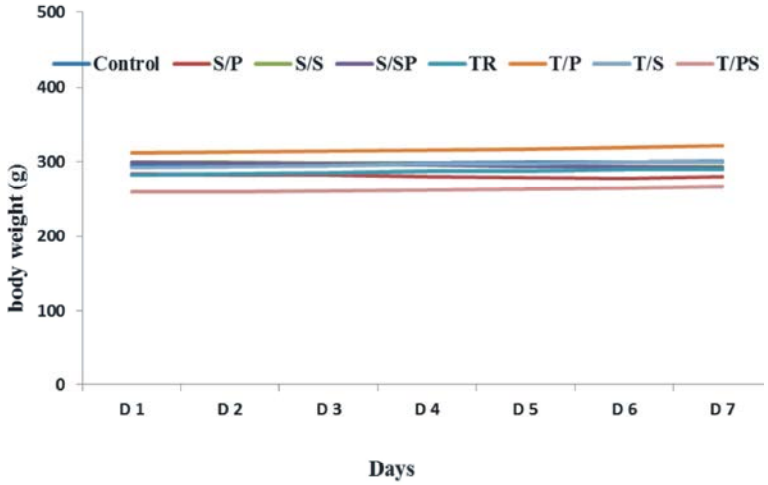

Fig. 2: Change in body weight (g) in control rats Male rats treated with the music; (SP) Tr: Stressed Rats with the smell of Predator and treated with music; (SS) Tr: Stressed Rats with a powerful and treated her with the music; (S: P + S): stressed rats with the smell of the predator and the powerful at the same time and then treated with music.

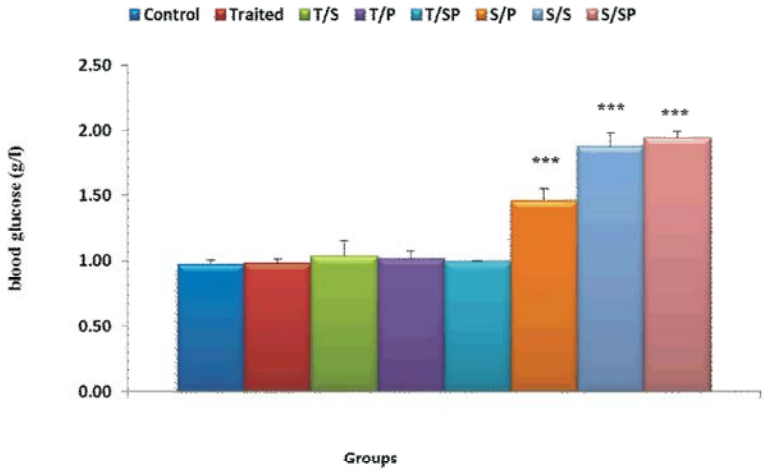

Fig. 3: Change in Blood Glucose (g / l) in control rats Male rats treated with the music; (SP) Tr: Stressed Rats with the smell of Predator and treated with music; (SS) Tr: Stressed Rats with a powerful and treated her with the music; (S: P + S): stressed rats with the smell of the predator and the powerful at the same time and then treated with music.

Corporal Weight: During this period, the stressed rats showed a highly significant decrease ($p < 0.001$) of the corporal weight compared with the control rats. Stressed rats show a highly significant ($p < 0.001$) compared to the rats treated stressed music (Fig 2).

Change in Bloof Glucose Level: Concerning the glucose, stressed rats showed a highly significant ($p < 0.001$) compared with control rats. Stressed rats show a highly significant ($p < 0.001$) compared to the rats treated stressed music (Fig 3).

DISCUSSION

The results obtained in this work showedneurobehavioral alterations including increased anxiety and also increasing signs of depression. This is besides a decrease in food intake with weight loss compared to the control; these relationships between stress and diet are the subject of complex and multiple interactions. The link usually allowed between stress and weight gain requires a change in eating habits. Several studies on laboratory animals subjected to stress

conditions indicate the impact of stress on food intake. However, give varying results depending on the subject causing a reduction or increase in food intake [10]. But most of the work indicates that stress inhibits food intake and weight gain in rats and in Kumar and Leibowit [11], Marissal, Sarrieau and Norme [12], regarded these to lipid in female, while males concerns the three macronutrients (protein, fat and carbohydrates) which induces weight loss. It causes high liver glycogen reserves and deposits of fatty tissue. Glucocorticoids are involved in the regulation of energy intake. This control depends on the concentration of circulating glucocorticoid, it is carried by a central action at both receivers pine that adrenalectomy leads to an increase of the MR and GR levels in rats, further increases the water taken, the -ci probably duel disposal of mineral corticoids (cont'd has adrenalectomy) that Media hydroelectric balance via receptors in the brain and or kidneys [13, 14].

Our results also showed a remarkable increase in the rate of blood glucose in rats against stress by witness. According to [15, 16].The liver plays a major role in blood glucose homeostasis by maintaining a balance between the absorption and storage of glucose via glycogenesis and release of glucose by glycogenolysis and gluconeogenesis. In recent years the mechanisms affecting glucose homeostasis have been found.Other mechanism is the activation of the hypothalamic-pituitary-adrenal axis (HHS), activation of the HPA axis by OP causes the secretion of glucocorticoids and thus a possible increase in blood sugar [18]. But after using music as therapy (music therapy) it was noted in the results obtained that there are no significant difference between the stresses treated rats and control rats so music can restore and maintain mental and physical health. It is a comprehensive approach that involves the body, sensory, affective.

How Reacts to Music on the Ear: The sound is perceived by the ear which is incredibly complex. It was she who serves as an interpreter between sound and the brain. It is composed of three parts, the outer ear, middle ear and inner ear, which is an integral part of the brain. Some of these neural networks are exclusively dedicated to the same music processing. Evidence has been repeatedly made by people who, after suffering brain damage, lost the power of speech, while they have kept intact their musical brain.Music therapy are a component of art therapy that involves using music as a therapeutic tool. Music therapy uses sound and music in all its forms, to restore, maintain or improve the mental, physical and emotional of a person. The Montpellier University Hospital team of neurological department proved by his scientific study that music could replace a drug for severe diseases such as Parkinson's and Alzheimer's. Indeed, they found that the use of music therapy decreases the sensation of pain and thus down 50 percent the use of anxiolytic and antidepressant used to treat these diseases [19].

The Effect of Music on the Brain: Music makes happy by acting directly on the brain. The intense pleasure felt by listening causes the secretion of dopamine in the brain if the music is appreciated the subject. This secretion then depends upon its musical culture, or of the moment of listening, while a sustained music is rather unpleasant. Dopamine is a neurotransmitter that acts to compensate pleasures such as food or addictions. It is derived from the amino acid tyrosine. Neuroscientists also argue that music affects brain activity. Listening to the slow and rhythmic music lowers blood pressures and heart rate, decreases muscle tension and rests.Music also has effects on intellectual performance, on aggression and on health. Seems it corresponds to an awakening as it opens a space or emotions are likely to expand our thinking and make us forget the pain. The emotional responses elicited by the music are as intense as some biological stimuli and extremely fast. This is even more true that it is identical for individuals musically experts or novices [19].

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