

Music Performance Anxiety: Pilot Study with Gender Endocrine Biomarkers

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Abstract

Background: Musical-performance anxiety (MPA) is a manifestation with high prevalence among musicians. The scientific literature points to a consistent difference between genders, registering a ratio of 3:1. Evidence has shown that the hypothalamic-pituitary-adrenal (HPA) axis is related to anxiety.

Objectives: This study aimed to examine gender differences in the concentrations of ACTH and cortisol and their association with MPA.

Methods: The validated version for Portuguese Kenny Music Performance Anxiety Inventory (K-MPAI) was applied in 140 subjects. In the polar groups (10% from each edge of the distribution) dosages of cortisol and ACTH were applied.

Results: There was no significant difference inside the group that had the lowest score. However, in the group that achieved the highest score, men showed significantly lower KMPAI results than women ($p \leq 0.01$). The same occurred with blood concentrations of ACTH ($p \leq 0.05$). However, serum concentrations of cortisol in the male group were significantly higher ($p \leq 0.05$).

Conclusion: These results indicate that possibly there are other factors that modulate the performance anxiety and may explain other gender differences. It is hoped that this study may contribute to initiatives aimed at improving mental conditions in musical performance.

Keywords: Anxiety Disorders; Performance Anxiety; Social Phobia; Musical Performance; Biomarkers

Abbreviations

MPA: Musical-Performance Anxiety; HPA: Hypothalamic-Pituitary-Adrenal; ACTH: Adrenocorticotrophic Hormone; K-MPAI: Kenny Music Performance Anxiety Inventory; CRH: Corticotropin-Releasing Hormone

Introduction

The manifestation of anxiety has a high incidence in the population as a whole. There are especially vulnerable groups due to the exposure to anxiogenic situations, among which the musicians stand out. The musical performance requires a high level of skills in several parameters such as motor skills, attention and memory. This situation makes the performer particularly susceptible to anxiety [1]. In addition to that, a successful musical performance requires an exceptional fine motor control as well as a deep understanding of musical structure and of the performance tradition. With all this complexity involved in musical activity - also increased by the pressure of having an audience - it is not surprising that anxiety disorders are relatively common among musicians.

There are important studies that point to a worryingly high incidence, of about 50%, of MPA among professional musicians working in international symphony orchestras [1-4].

In Brazil there is a large population inserted in the musical environment. Only within the framework of classical music, there are 13 music conservatories with an average of 1000 students each; there are approximately 15 university schools of music that have more than 5,000 enrolled students and there are at about 10 orchestras in which approximately 600 professional musicians play. So, it can be said that around 20,000 people are directly involved in musical the performance activity. Consequently, based on epidemiological data, it is possible to conclude that at least 3,000 potentially have anxiety disorders, specifically musical performance anxiety (MPA). Instruments for assessment of MPA are currently available and, among them, the K-MPAI [5] validated version for Portuguese language of can be mentioned.

World scientific literature data point to a significant difference between females and males, registering a ratio of 3:1 respectively [6]. Until 1999 few studies have focused on the issue of gender differences concerning the clinical presentation of anxiety disorder, which led to more uncertainty about the causes for vulnerability to develop this clinical picture. Since then, an array of theories have been proposed to explain the relation between gender and anxiety disorders. Among them, the Gender-role socialization theory, the learned helplessness disease, the tension theory and information bias [6]. Furthermore, organic factors that could also increase the predisposition to MPA can be genetic and hormonal.

From the endocrine point of view, it is known that in response to stress, there is a production of Corticotropin-releasing hormone (CRH) by the hypothalamus, which causes an increase in the secretion by the pituitary gland of adrenocorticotrophic hormone (ACTH), beta-endorphin and other substances [7-9]. Sex hormones may also substantially influence in the clinical picture of a pre-existing anxiety disorder. This has a direct impact on the treatment, in which several factors are considered, including hormone therapy, oral contraceptive use, menstrual cycle, pregnancy, lactation, among others [10]. Moreover, neurotransmitter systems may be affected in the etiology of anxiety disorders and behavior by both the estrogen and the progesterone [11]. Given these differences, a greater disclosure of information on the specific features of the clinical picture, management and treatment is recommended [12].

With regard to the genetic basis, it is suggested that the higher prevalence in women is related to the fact that the predisposition to anxiety is a hereditary characteristic [13]. On the other hand, there are psychophysiological differences between men and women concerning anxiety that are related to situations of social exposure [14].

Hence, this study sought to determine whether endocrine variables (cortisol and ACTH) could explain, even partially, gender differences in MPA. The subject is of great relevance because, with the exception of some isolated initiatives, mental health specialized services for musicians are not commonly available, neither are projects that develop a specific approach for females targeting MPA treatment, except for some isolated initiatives.

Materials and Methods

The research consisted of a prospective study whose primary tested hypothesis was whether cortisol and ACTH concentrations, which are hormones related to anxiety, are significantly higher in females.

Sample

Inclusion criteria: adult UFSJ music students; Exclusion criteria: patients diagnosed with psychiatric diseases or uncompensated organic diseases or treated for those.

Ethics

All music students who met the inclusion criteria were told about the research and the intention of doing a prospective study to estab-

lish a relationship between blood levels of cortisol and of ACTH and anxiety levels. For this purpose, all subjects who participated in the research signed an informed consent form (ICF) approved by the UFSJ Human Research Ethics Committee (HRECs/UFSJ).

Application of K-MPAI

The validated version for Portuguese Kenny Music Performance Anxiety Inventory (KMPAI⁵), whose aim is to establish scores for the MPA, was applied.

Blood collection of polar groups

Blood samples for determination of serum cortisol and ACTH were taken from the 28 subjects that had the 14 highest and the 14 lowest scores in the K-MPAI range. The samples were collected in the early hours of the morning (between 08:00AM and 09:00AM) and the patients were instructed not to smoke, eat, or drink alcohol within 12 hours before the collection. The reference values adopted for serum Cortisol were 05-25 ug/dL and the plasma ACTH 06-76 pg/ml.

Statistics

Statistical analysis focused on establishing relationship among the following variables: anxiety levels, gender, serum cortisol and ACTH. Parametric statistical tests were applied.

Results and Discussion

The study population consisted of 140 subjects who met the inclusion criteria. 13 students who were not 18 years old at the time of application of K-MPAI and 07 students who were in psychiatric treatment were excluded. There were 89 students in the male group (mean score on the K-MPAI = 106.70; standard dv = 31.88) and 51 students in the female group (average scores in K-MPAI 109.03; standard dv = 35.52). The average age of the study population was 24.8 years. There was significant difference in scores of K-MPAI neither between the female and male groups nor in the lowest score group (14 students). However, in the highest score group (09 men and 05 women) the following pattern was detected: men presented a score in the K-MPAI significantly lower than women (♀=161 e ♂:145,5) (P ≤ 0.01). In relation to the hormonal dosages, it was demonstrated that, although the concentrations of both cortisol and ACTH were within the normal range (according to reference values), it was found that the ACTH concentrations in the highest K-MPAI score group were significantly higher in women (♀=20,3 e ♂:17,66) (p ≤ 0.05). On the other hand, serum concentrations of cortisol in the male group were significantly higher (♀=13,80 e ♂:14,68) (p ≤ 0.05). See following charts.

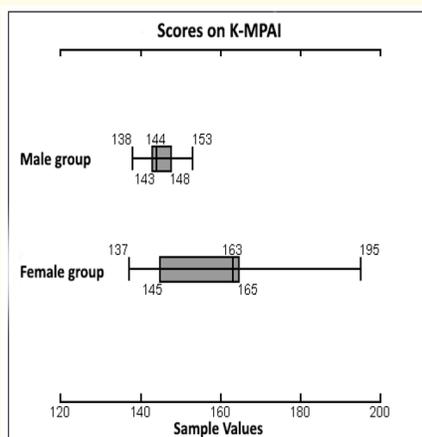


Chart 1: Comparison between the male sample and the female at K-MPAI.

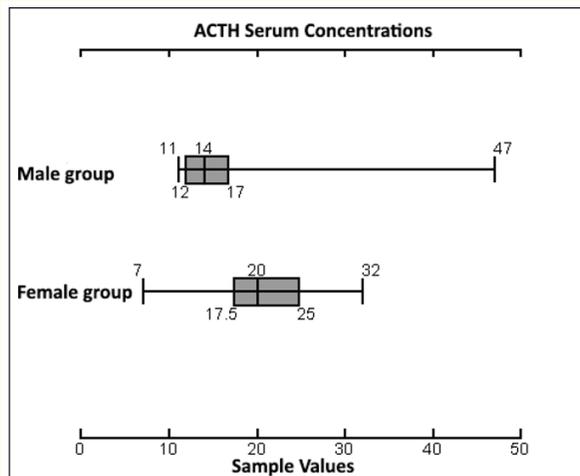


Chart 2: Comparison between the male sample and female in relation to serum concentrations of ACTH.

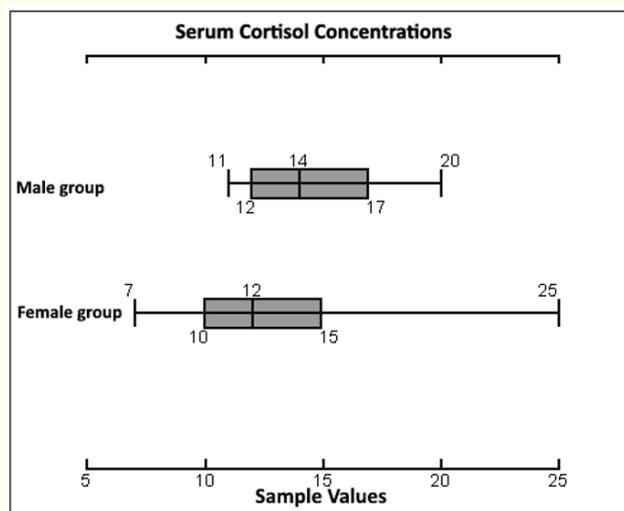


Chart 3: Comparison between the male sample and female in relation to serum concentrations of Cortisol.

Conclusion

The results indicate that the adrenocorticotrophic hormone (ACTH) possibly plays an important role in the genesis of MPA, and partly explain the gender differences. The registered difference in relation to cortisol behavior (higher in male sample) could be explained by the capacity of cortisol to inhibit the HPA axis, which consequently inhibits ACTH release in this group [9]. Cortisol, within the framework of this study, can raise the issue that this hormone, although relating to anxiety, has a component that can regulate the levels of anxiety in the male group, taking into account the results obtained at Kenny Music Performance Anxiety Inventory (K-MPAI).

There are other physiological and environmental factors that have influence on anxiety and are likely to explain other gender differences in MPA. It is hoped that this study will contribute to future initiatives aimed at improving the psychic conditions in musical performance and the development of pedagogical strategies to approach the problem in this area.

Conflict of Interest

There were no conflicts of interest in this study.

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