

**Prolactin Secretory Response During Academic Exercises in Young Adult Male Subjects.**

Ufearo, CS<sup>1</sup> Nwokocha, CR<sup>2</sup> Ikuenobe, CO<sup>3</sup> Egwurugwu, JN<sup>4</sup> Oluboyo, AO<sup>5</sup>

1. Department of Human Physiology, Faculty of Basic Medical Sciences, Nnamdi Azikiwe University, Nnewi Campus, Nigeria. (2). Department of Physiology, Faculty of Basic Medical Sciences, Delta State University, Abraka, Nigeria. (3). Department of Physiology, College of Medicine and Health Sciences, Madonna University, Okija, Nigeria. (4). Department of Physiology, Faculty of Medicine, Imo State University, Owerri, Nigeria. (5) Department of Chemical Pathology, Nnamdi Azikiwe University Teaching Hospital, Nnewi.

**ABSTRACT**

Academic stress involving examinations is known to induce alterations in prolactin (PRL) physiology in human subjects. In the present study, we investigated the PRL secretory response to academic exercise in 13 male medical students during regular university examinations. Blood samples were taken at 0 hour, 1 hour and 2½ hours of the exercise during morning hours, beginning at 09.00 hours. Samples were stored under -20°C until assayed. Serum PRL concentration was estimated by a solid phase enzyme-linked immunosorbent assay techniques. Mean ( $\pm$  sem) serum PRL concentrations were  $7.86 \pm 1.55$  ng/ml;  $19.73 \pm 5.72$  ng/ml; and  $13.65 \pm 2.72$  ng/ml at 0 hour, 1 hour and 2½ hours of exercise, respectively. We conclude that academic exercise induced elevation in PRL secretion but in a non-uniform pattern. The PRL secretory response showed two distinct patterns or phases: an exponential phase during the first 1 hour of exercise and a declining phase thereafter.

*Key words: Prolactin secretion, academic exercise, male subjects.*

**INTRODUCTION**

Prolactin (PRL) is a polypeptide hormone that is involved in a multitude of physiological processes. Academic work is one of the higher functions of the brain and involves a great deal of the learning and memory processes; thought processes, analysis of sensory information, language and other functions of the mind. There is ample evidence<sup>1</sup> to show that PRL secretion is responsive to academic stress in humans. Interestingly, while PRL secretion is controlled through the hypothalamic pituitary axis; the brain triggers the release of neuroendocrine secretions needed to respond to stress through the hypothalamic pituitary adrenal axis. Regular university examinations impose appreciable degree of mental stress on students. One then, wonders the impact of this examination-induced stress on the endocrine system. Already, physical stress is known to increase pre-receptor expression on human lymphocytes<sup>2</sup>, and plasma prolactin level is also known to increase both during stress and after acute aerobic exercise<sup>3-6</sup>. Nguyen, et al<sup>7</sup> reported a rise in plasma prolactin level during mental work involving

examination but no alteration in prolactin rhythm during mental work involving only lectures. It is not clear whether the examination-induced prolactin increases were sustained throughout the exercise period before declining at the end of the exercise or not. The work of Johansson, et al<sup>1</sup> suggests that the examination-induced prolactin rise is depressed subsequently by prolonged psychological stress. In the present study, we investigated the prolactin response to academic exercise in young adult male medical students taking the exercise duration time-course of the response as dependent variables.

**MATERIALS AND METHODS**

*Subjects:* A total of 13 male subjects were recruited for the study. Their mean age and body mass index (BMI) were 23.2 years (range: 21-25 years); and 22.6 (range: 18.7-26 kg/m) respectively. All the subjects were adjudged healthy and they gave their informed consent for the study. The local ethical committee of Madonna University College of Medicine and Health Sciences, Okija, Nigeria approved the study.



**Sample collection:** Blood samples were collected from the cubital vein between 0.900 - 12.00 hours according to standard procedures. Baseline samples were obtained before the commencement of the examination exercise, and subsequently at 1 hour, and 2<sup>1</sup>/<sub>2</sub> hours interval during the examination exercise. Sera were extracted into sample tubes and stored under -20C until assayed.

**Hormone assay:** Serum Concentrations of prolactin were measured by a solid phase enzyme-linked immunosorbent assay according to procedures described by Uotila, et al<sup>8</sup> with little modifications. The assays were performed on an automated micro-titer well reader (BioTek Instruments, Inc., Winooski, Vermont USA) using microwell ELISA enzyme immunoassay test kits for hPRL (Diagnostic Automation Inc., Calabasas, California, USA).

**Data analysis:** We analysed our data on SPSS program (version 11.0) and variables were expressed as mean ( $\pm$  s.e.m).

## RESULT

Mean ( $\pm$  sem) basal serum prolactin concentration in the male subjects was 7.86ng/ml  $\pm$  1.55. Thereafter, the mean serum prolactin concentrations were: 19.73ng/ml  $\pm$  5.72 and 13.65ng/ml  $\pm$  2.72 at 1hour and 2<sup>1</sup>/<sub>2</sub> hours of academic exercise respectively. The prolactin secretory response showed a biphasic pattern with maximum amplitude of 19.7ng/ml within the first 1 hour of academic exercise (see fig.1).

## DISCUSSION

Our studies indicate that endocrine function is altered to a reasonable degree by academic exercise. Our observed prolactin response to the academic exercise is similar, to a large extent, to previous reports<sup>1,7</sup>. However, we were able to observe that the rise in serum prolactin concentration was never sustained even with the sustained academic exercise. This response appears to agree at least, in part, with the views of Johansson, et al<sup>1</sup> on the effect of prolonged psychological stress on the endocrine system. We observed also that students become more stabilised at the middle of examinations

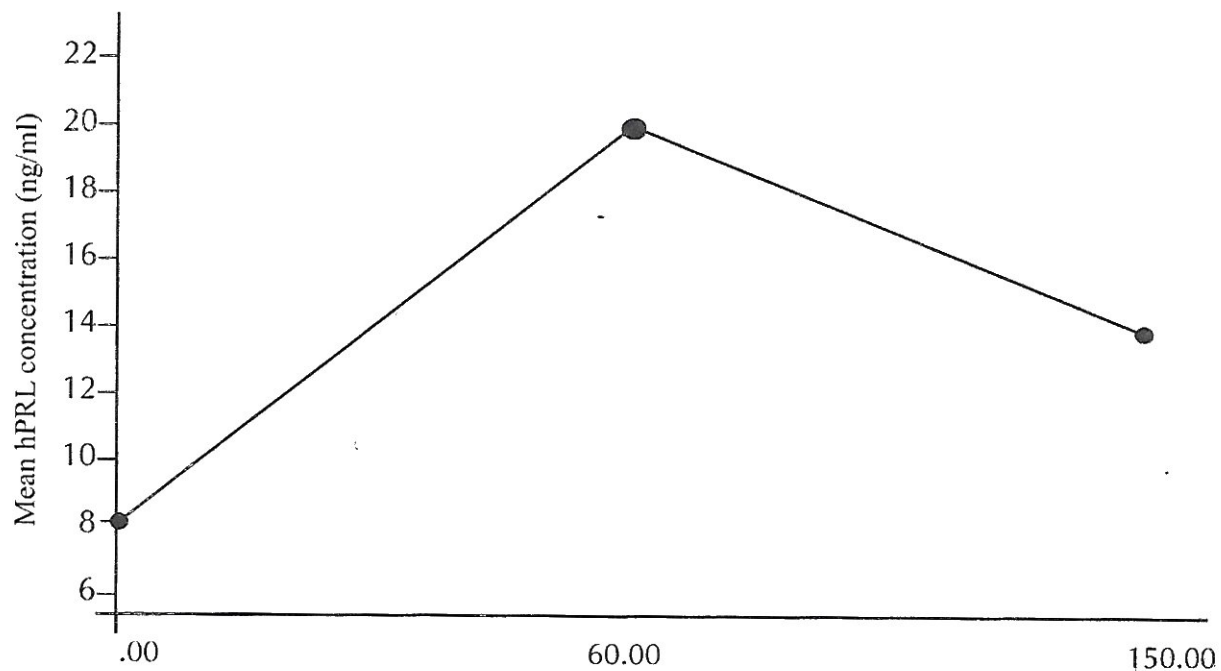
than at the commencement. This decline in the psychological stress will obviously induce a corresponding decline in the level of neuroendocrine secretagogues associated with stress. However, this may not have been enough to return the serum prolactin level to the baseline as our result could indicate. We feel that the impact of the continued memory physiology with the sustained exercise could be an important factor sustaining the rise in serum prolactin above the pre-examination level during the declining phase of the prolactin response. The question is then, at what duration of academic exercise can one confirm the definitive prolactin/endocrine response to mental challenge or academic exercise?

We suggest further investigations in this field, possibly, using a protocol that extends academic exercise far beyond the normal duration of university examinations. Such studies could also elucidate among other possibilities, the impact of chronic academic activities on human endocrine physiology.

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Duration of academic exercise (minutes)

Fig. 1: Bi-phasic response of prolactin secretion during academic exercise in young adult males.