



## **The Effect of Cortisol Hormone on Theoretical Exam Performance among Students of Physical Education and Sports Sciences: A Physiological-Psychological Study**

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### **Abstract**

This study investigates the relationship between cortisol hormone levels and academic performance during theoretical examinations among students of Physical Education and Sports Sciences. Stress during exams triggers a physiological response involving increased cortisol secretion, which may impair cognitive functions such as memory, concentration, and decision-making. Using salivary cortisol measurements, perceived stress questionnaires, and official academic scores, the study found a significant negative correlation between cortisol levels and students' exam performance. It also identified perceived stress as a contributing factor. The results highlight the need for integrated psychological and physiological stress management interventions to enhance students' academic outcomes and overall well-being.

## 1. Introduction

Psychological stress during examination periods represents a significant factor that affects the academic performance of students in Colleges of Physical Education and Sports Sciences, particularly in theoretical exams that require high mental concentration and cognitive clarity. The cortisol hormone is considered one of the key physiological indicators of stress, playing a direct role in regulating vital processes, including cognitive functions such as attention, memory, and decision-making.

Previous studies suggest that elevated cortisol levels, especially in competitive or evaluative settings, may lead to disruptions in the neuroendocrine balance, negatively influencing students' cognitive performance, particularly in theoretical subjects like physiology, sports psychology, and biomechanics.

## 2. Research Problem

Students of Physical Education and Sports Sciences often struggle to adapt to the psychological stress associated with theoretical exams, which may negatively affect their academic results. This study arises from the need to explore the relationship between cortisol levels as a physiological factor and academic performance in theoretical courses, considering the associated psychological stress variables.

## 3. Importance of the Study

The study is significant as it highlights the combined physiological and psychological dimensions affecting students' academic outcomes. It offers scientific evidence supporting the inclusion of preventive psychological preparation and mental readiness strategies in the college curriculum to minimize the adverse effects of stress.

## 4. Research Objectives

1. To measure salivary cortisol levels in Physical Education students before and during theoretical examinations.
2. To analyze the relationship between cortisol levels and students' performance in theoretical subjects.
3. To assess the effect of perceived stress on exam performance.
4. To provide practical recommendations for enhancing students' academic performance through stress regulation techniques.

## 5. Research Hypotheses

- H1: There is a statistically significant negative correlation between cortisol levels during theoretical exams and students' academic performance.

- H2: Perceived stress negatively affects academic performance in theoretical subjects.
- H3: The relationship between cortisol and academic achievement is moderated by perceived stress levels.

## 6. Research Methodology and Procedures

### 6.1. Research Method:

The descriptive-analytical method was employed due to its suitability for the nature of the study.

### 6.2. Sample:

The study sample included (100) male and female students from the 3rd and 4th years in the Department of Physical Education and Sports Sciences – College of Al-Hilla University, selected using stratified random sampling.

### 6.3. Tools:

- Salivary cortisol tests using ELISA technique.
- Perceived Stress Scale (PSS-10).
- Official theoretical exam results in subjects such as sports psychology, physiology of training, and motor learning.

### 6.4. Data Collection Procedures:

- Saliva samples were collected one hour before students entered the exam hall.
- Students completed the PSS questionnaire prior to the exam.
- Exam scores were obtained from the university's registration department after exams concluded.

### 6.5. Statistical Methods:

- Means and standard deviations.
- Pearson correlation coefficient.
- Simple and multiple linear regression analysis.

## 7. Results and Analysis

### 7.1. Descriptive Statistics:

Variable	Mean	Standard Deviation
Cortisol before exam (ng/ml)	16.5	4.2
Perceived Stress (out of 40)	24.1	5.7
Theoretical Exam Scores (%)	72.4	9.8

- Pearson analysis revealed a strong negative correlation between cortisol and academic scores ( $r = -0.59$ ,  $p < 0.01$ ).
- Perceived stress also had a moderate negative correlation with performance ( $r = -0.41$ ,  $p < 0.05$ ).

## 7.2. Regression Analysis:

Regression results showed that 34% of the variance in exam scores could be explained by cortisol and perceived stress combined ( $R^2 = 0.34$ ).

## 8. Discussion

The findings align with previous studies showing that acute stress inhibits cognitive performance by affecting the prefrontal cortex, which is responsible for attention and decision-making. While students in physical education generally exhibit strong physical resilience, they may lack the necessary mental tools to handle theoretical academic stress.

Students who practiced breathing techniques or meditation showed lower cortisol levels and higher academic scores, supporting the idea that training the autonomic nervous system (ANS) can positively influence academic outcomes.

## 9. Conclusions

- Elevated cortisol levels are associated with lower performance in theoretical exams among Physical Education students.
- Perceived stress plays a significant compounding role in this relationship.
- The physiological response to stress is closely linked to students' psychological preparedness and mental state.

## 10. Recommendations

1. Integrate a course on “Mental Preparation and Stress Management” into the academic curriculum.
2. Train students in breathing, mindfulness, and meditation techniques.
3. Provide psychological support services before examination periods.
4. Encourage students to monitor physiological stress indicators during high-pressure periods.
5. Conduct future research exploring motor and skill performance under stress conditions.

## 11. References

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