



Detection of Cortisol Level via Enzyme Immunoassay Influenced by Exercise

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Abstract

Cortisol is among the human body's most necessary hormones. On any given day, cortisol's primary function is to control how our body creates and utilizes energy. This study examined the influence of exercise on the cortisol levels. Twenty female subjects had their cortisol levels determined before their morning exercise (Pre) and after their morning exercise (Post) using microplate enzyme immunoassay method. The result of study showed that there was significant difference ($P < 0.05$) in the cortisol levels before exercise $13.49 \pm 0.90 \mu\text{g/dl}$ Compared with after exercise $15.10 \pm 1.08 \mu\text{g/dl}$. It was also observed that there was no significant difference in the cortisol level ($P > 0.05$) obtained from the female subjects before and after exercise between the ages of 21-23, 24-26 and 27-29 years. Collectively, these results showed that exercise provoked increased in cortisol level.

Keyword: Cortisol, Immunoassay, Exercise, Hormone

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1. INTRODUCTION

It is well known that cortisol is a hormone which is a steroid. This hormone is produced adrenal cortex in human¹. This hormone is produced and released owing to low blood glucose and stress. Hence, it can increase blood sugar and can suppress immune system. Moreover, it can slow down bone formation².

In many countries Hydrocortisone is used for the treatment of cortisol deficient patients or simply when there lack of cortisol production. It is used a medicine to treat patients lack this essential cortisol. However, when cortisol is increased from normal level it can have effects on immune system, chronic disease risks and weight loss³. It was found that cortisol together with epinephrine can fight and can increase the level of energy⁴.

It is known that exercise can increase physical fitness and health⁵. There are two main categories of exercise which includes; aerobic and anaerobic exercise⁵. Aerobic exercise include walking, jogging etc. Anaerobic exercise includes weight lifting etc⁵. Exercises are performed for different reasons for improving body and enhancing the body needs. It can include building of muscles, also to improve our athletic skills,

weight loss etc. It is also known that exercise increase our heart rate and builds our muscles or weight loss, eventually to gain physical fitness and for our happiness too. As nowadays we know therapist or health care providers suggest exercise to many people and they call it wonder drug providing numerous benefits to the human body⁶.

Present study was focused on to ascertain the effect of exercise on cortisol level in females students of Madonna University.

2. MATERIALS AND METHODS

2.1 Subjects

A total of 20 subjects within age bracket 21-29years who are female students of Madonna University, Elele, Rivers state were recruited for this study. The study population did not have any metabolic disorder before and after the study.

2.2 Study Design

The pre sample was collected before the morning jogging exercise which lasted for one hour from 20 subjects into plain sample bottle, labeled and sent to the laboratory. After the exercise, the post sample was collected from the same 20 subjects again into plain sample bottle, labeled and sent to the laboratory for analysis.

2.3 Reagent

Cortisol concentration was determined using diagnostic automation incorporation cortisol EIA kit.

1.4 Estimation of cortisol

Method: Enzyme Immunoassay Method (Competitive enzyme immunoassay)

Procedure

The number of desired wells was secured in the holder. 25ul of standard, sample and control was dispensed into appropriate well.50ul of working cortisol reagent was added to each well and swirled for 30seconds to mix well.50ul of cortisol biotin reagent was dispensed into each well and thoroughly mixed for 30seconds.The wells were covered with foil and incubated at 25°C for 60minutes.It was washed five times using washing buffer.100ul of TMB was added to each tube, gently mixed for 10seconds then incubated at 25°C for 15minutes.50ul of stop solution was added to each well and gently mixed. The absorbance was read at 450nm using a spectrophotometer. The unknown was extrapolated from the standard curve obtained by plotting the concentration of the standard against the absorbance.

2.5 Statistical Analysis

For analysis of data, statistical software (SPSS version 17) was used. The results were expressed in mean± standard error of mean (SEM).

3. RESULTS AND DISCUSSIONS

Cortisol ($\mu\text{g}/\text{dl}$) concentration of 13.49 ± 0.90 before exercise (Pre) is significantly lower than 15.10 ± 1.08 after exercise (Post) ($P < 0.05$) as shown in table1 below. The result of study showed that there was significant difference in the cortisol levels before exercise (Pre) compared with after (Post) exercise ($p < 0.05$). This is contrary to result of previous authors⁷ who reported that exercise caused reduction in the levels of cortisol. It is known that Cortisol along with Epinephrin is best known for its contribution in the fight or flight response and temporary increase in energy production, at the expense of processes that are not required immediate survival⁴ because cortisol is one of body's natural reactions to stress, the main functions of this hormone involve preparing for fight-or-flight.

Table 1. Changes in cortisol level during exercise

| | Pre | Post | T | P |
|--------------------------------------|------------------|------------------|--------|-------|
| Cortisol ($\mu\text{g}/\text{dl}$) | 13.49 \pm 0.90 | 15.10 \pm 1.08 | -3.317 | 0.003 |

There was no significant difference in the cortisol ($\mu\text{g}/\text{dl}$) levels of 12.96 \pm 1.26, 14.65 \pm 1.68 and 13.33 \pm 2.38 obtained in subjects before exercise (pre-exercise) and cortisol ($\mu\text{g}/\text{dl}$) levels of 14.43 \pm 1.39, 16.00 \pm 1.87 and 15.75 \pm 3.72 obtained after exercise (post-exercise) at age groups 21-23, 24-26 and 27-29 years respectively ($P > 0.05$) as shown in table 4.2 below. The result of study showed that there was no significant difference in the cortisol level ($p > 0.05$) obtained from the female subjects before and after exercise between the ages of 21-23, 24-26 and 27-29 years as shown in table 2. This is suggestive that changes in cortisol concentrations is not affected by age. Study has reported significant difference in growth hormone concentration in pre exercise compared with the post exercise ⁸.

Table 2. Changes in cortisol level in different age groups

| Group | Age group (Years) | Cortisol ($\mu\text{g}/\text{dl}$) |
|-----------------|-------------------|--------------------------------------|
| Pre | 21-23 | 12.96 \pm 1.26 |
| | 24-26 | 14.65 \pm 1.68 |
| | 27-29 | 13.33 \pm 2.38 |
| Post | 21-23 | 14.43 \pm 1.39 |
| | 24-26 | 16.00 \pm 1.87 |
| | 27-29 | 15.75 \pm 3.72 |
| F | | 0.445 |
| P | | 0.814 |
| Post Hoc | | |
| 21-23 | 24-26 | .998 |
| | 27-29 | 1.000 |
| | 21-23 | .999 |
| | 24-26 | .910 |
| | 27-29 | .998 |
| 24-26 | 21-23 | .998 |
| | 27-29 | 1.000 |
| | 21-23 | 1.000 |
| | 24-26 | 1.000 |
| | 27-29 | 1.000 |
| 27-29 | 21-23 | 1.000 |
| | 24-26 | 1.000 |
| | 21-23 | 1.000 |
| | 24-26 | .994 |
| | 27-29 | 1.000 |
| 21-23 | 21-23 | .999 |
| | 24-26 | 1.000 |
| | 27-29 | 1.000 |
| | 24-26 | 1.000 |
| | 27-29 | 1.000 |
| 24-26 | 21-23 | .910 |

| | | |
|-------|-------|-------|
| | 24-26 | 1.000 |
| | 27-29 | .994 |
| | 21-23 | 1.000 |
| | 27-29 | 1.000 |
| 27-29 | 21-23 | .998 |
| | 24-26 | 1.000 |
| | 27-29 | 1.000 |
| | 21-23 | 1.000 |
| | 24-26 | 1.000 |

4. CONCLUSIONS

The study showed that exercise increase cortisol levels suggesting that exercise as a factor could cause elevated cortisol level in females.

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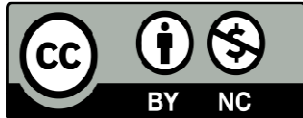
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CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

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