DETERMINATION OF CORTISOL LEVEL USING CHEMIFLEX, AMONG THIRD YEAR AND FOURTH YEAR BS MEDICAL TECHNOLOGY STUDENTS OF LPU-ST. CABRINI COLLEGE OF ALLIED MEDICINE AND ITS RELATION TO ACADEMIC PERFORMANCE

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Abstract

Cortisol is a steroid hormone made by humans' adrenal glands. It helps the body respond to stress, regulate blood sugar, and fight infections. The researchers measured the hormone cortisol using ARCHTIECT cortisol to know how much cortisol is present in the serum of selected students. The cortisol level was correlated to their general weighted average. Results reveal no significant correlation between cortisol level and the academic performance of the students. With a correlation of 0.0244 for the cortisol level and general weighted average, the results gathered by the researchers showed that there no significant correlation. As well as with number of hours of studying by the students and their cortisol level having a 0.0012 correlation. With that, the researchers accept the null hypothesis.

INTRODUCTION

Cortisol is a steroid hormone made by the adrenal glands. It helps the body respond to stress, regulate blood sugar, and fight infections. Human body also pumps out excess cortisol when anxious or under intense stress, which can affect ones health if the levels stay too high for too long. If the cortisol levels are too high or too low, one may have a condition that needs treatment. *Sohrabi & Stump (2015).*

According to Griffing (2014), cortisol is the main adrenal glucocorticoid and plays a central role in glucose metabolism and in the body's response to stress. Adrenal cortisol production is regulated by adrenocorticotropic hormone (ACTH), which is synthesized by the pituitary gland in response to hypothalamic corticotropin-releasing hormone (CRH). Serum cortisol in turn inhibits the production of both CRH and ACTH (negative feed-back loop), and this system self-regulates to control the proper level of cortisol production. The coordinated stimulatory and inhibitory connections between CRH, ACTH, and cortisol are referred to as the hypothalamic-pituitary-adrenal (HPA) axis.

According to Architect system (2011), the reference interval for serum cortisol before 10 a.m. is 3.7-19.4 µg/dL and 2.9-17.3 µg/dL after 5pm.

Chemiflex, a chemiluminescent microparticle immunoassay (CMIA) which is delayed a one-step immunoassay for the quantitative determination of cortisol in human serum is used in plasma. Serum is the specimen of choice on the said principle, so to be able to perform the procedure venipuncture is needed and the antecubital vein is the vein of choice in drawing blood. Serum cortisol level of the students will then be measured. To support the results that were gathered after measuring the cortisol level of each student, a prepared questionnaire will be given.

The researchers aim to measure the cortisol level of 3rd year and 4th year BSMT students and how it affects the academic performance, this study can give students an idea if cortisol level present in blood can help or distract them in studying. Thus, measuring their cortisol level may let them know what actions they need to do to cope up with stressful academic life. Also, this study may let them realize the different habits that they are doing that affect their cortisol level and their academic performance.

The researchers wants to find out the relationship of serum cortisol level to the academic performance of 3rd and 4th year BS Medical Technology students of LPU-St. Cabrini College of allied Medicine Inc. Also, to be able to point out the different study habits that might affect the academic performance and the cortisol level of the students.

The scope of this study is only to determine the cortisol level of 3rd year and 4th year Bachelor of Science in Medical Technology (BSMT) students of academic year 2015-2016 during the first semester only. Students are from LPU- St. Cabrini College of Allied Medicine Inc. Due to the cost of test, the researchers will only have 15 respondents for each year level, a total of 30 respondents. The respondents were purposively picked. The respondents' serum cortisol level was compared to their academic performance using their midterm general weighted average.

Venipuncture was performed at the laboratory of Lyceum of the Philippines – Laguna and the specimens were tested at Intercon Diagnostic Laboratory Inc. at Binondo, Manila.

Objectives

The main objective of the study is to measure the cortisol level of 3rd and 4th year B.S. Medical Technology students from Lyceum of the Philippines

- St. Cabrini. The specific objective of the study was to determine the relationship of cortisol level and the General Weighted Average (GWA) of the student. GWA will be used as the data for the academic performance of the students. This correlation will serve as assessment for the student if their glucocorticoid hormone do really help them from studying and attaining a higher academic performance. The study identified the different study habits of the students that might affect the academic performance and the cortisol level of the students.

Through a focused group discussion with the aid of prepared questionnaire, the researchers was able to determine the different study habits of the students, such as their number of units, how and when they study, how often they skip classes, the availability of learning resources that they have and other medical conditions. These factors might alter or affect the cortisol secretion and the academic performance of the students.

METHOD

This study is a descriptive type of research which presents the current status of the student's cortisol level using serum extraction and correlating the data to the GWA of the students. There were 30 student participants who were equally divided among the third and fourth year levels. The serum were collected from the participants and analyzed using Architect Cortisol assay which was done at a diagnostic laboratory in Manila. Plain red top tube was used in order to separate the serum and packed red cell and were delivered to the laboratory within for two (2) hours in a cooler -containing ice to maintain a low temperature. Chemiflex is the biological principle of the assay, using CMIA technology with flexible assay protocols. ARCHITECT Cortisol reagent Kit (8D15), was used in determing the cortisol level of each student. The said kit contains contains 1 bottle (6.6 mL/ 27.0 mL) Anti-cortisol (mouse, monoclonal) coated microparticles in TRIS/BIS-TRIS buffer with protein (bovine) stabilizer. It contains sodium azide and ProClin 300 as preservatives. The conjugate contains 1 bottle (5.9 mL/ 26.3 mL) Cortisol acridinium-labeled conjugate in citrate buffer with surfactant stabilizer, a minimum concentration of 0.7 ng/mL was used. ProClin 300 was used as preservative for the conjugate. Pre-Trigger solution contains 1.32% hydrogen peroxide. Trigger solution contains 0.35 N sodium hydroxide. Wash buffer contains phosphate buffered saline solution and antimicrobial agents as preservative.

Serum specimens that appear cloudy or contain particulate matter were centrifuged before testing. Following centrifugation, the specimens were pipetted into a sample cup or secondary tube. Specimens were mixed thoroughly after thawing by low speed vortexing or by gently inverting, and

centrifuged prior to use to remove red blood cells or particulate matter to ensure consistency in the results.

In loading the ARCHITECT Cortisol Reagent Kit on the system for the first time, the microparticle bottle was mixed to resuspend microparticles that have settled during shipment. The microparticle bottle was inverted 30 times and was visually inspected to ensure microparticles were resuspended but if microparticles remain adhered to the bottle, the bottle was continuously inverted until the microparticles have been completely resuspended. Once the microparticles have been resuspended, a septum was placed on the bottle.

The GWA of the students were obtained from the Registrar's office and the data were correlated with the cortisol level that resulted from the assay.

RESULTS AND DISCUSSION

Table 1shows the results cortisol level and GWA of the students. The cortisol level ranges from 3.90 ug/dL to 18.90 ug.dL with a mean of 8.41 and a standard deviation of 3.77. The GWA ranges from a high of 1.86 to a low of 4.01 with a mean of 2.53 and a standard deviation of 0.41. Though their cortisol level is still at its normal range, student D has the highest level of cortisol, measuring a total of 18.9 µg/dL while Student H has the lowest with 3.9 µg/dL level of cortisol. In contrary, it doesn't prove to be an effective interference to the GWA since the two extremes in cortisol doesn't have the highest nor the lowest GWA. In fact, the student (CC) having a highest GWA with 2.15, only have a low cortisol level at 7.6 µg/dL. Nevertheless, Student (DD) with the lowest GWA of 4.01 has a very high cortisol level measuring a total of 11.4 µg/dL. Students A and D has almost the same cortisol level and general weighted average, student A with 8.3 µg/dL cortisol level and 2.5 gwa while student D has 8.3 µg/dL cortisol level and 2.56 GWA.

Table 1. Cortisol level and general weighted average of the students**.**

Student	Cortisol level	GWA	Student	Cortisol level	GWA
A	8.3	2.50	P	5.4	2.39
B	9.2	2.25	Q	6.5	2.4
C	8.3	2.56	R	10	1.86
D	18.9	2.35	S	6.2	2.46
E	4.2	2.15	T	4.7	2.31

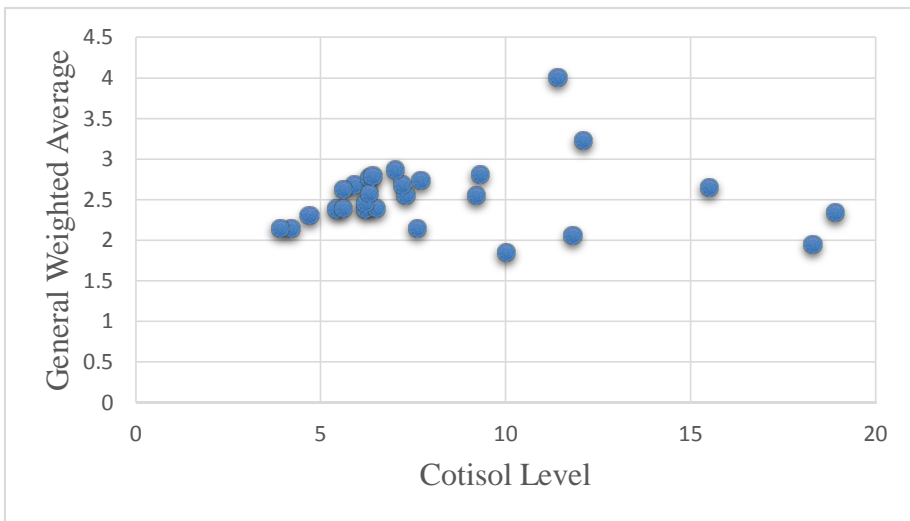|					
F	11.8	2.07	U	5.6	2.4
G	6.2	2.39	V	5.6	2.63
H	3.9	2.15	W	18.3	1.96
I	7.7	2.74	X	15.5	2.66
J	9.2	2.56	Y	6.3	2.77
K	9.3	2.82	Z	6.3	2.58
L	7.3	2.56	AA	6.4	2.8
M	7.2	2.69	BB	12.1	3.23
N	7	2.87	CC	7.6	2.15
O	5.9	2.69	DD	11.4	4.01

Figure 2. Scatterplot diagram of Serum Cortisol Level and General Weighted Average

Correlation analysis reveals an almost negligible relationship($r=.0244$) between the cortisol level and the GWA of the students. It further shows that the relationship was not significant ($p=.898$). The scatterplot chart shows an almost horizontal distribution of points. This result proves that, in order to attain a high academic performance one should exert an effort in studying. This

implies that no matter how high a student cortisol level is, there is no assurance that one will have a high general weighted average or vice versa.
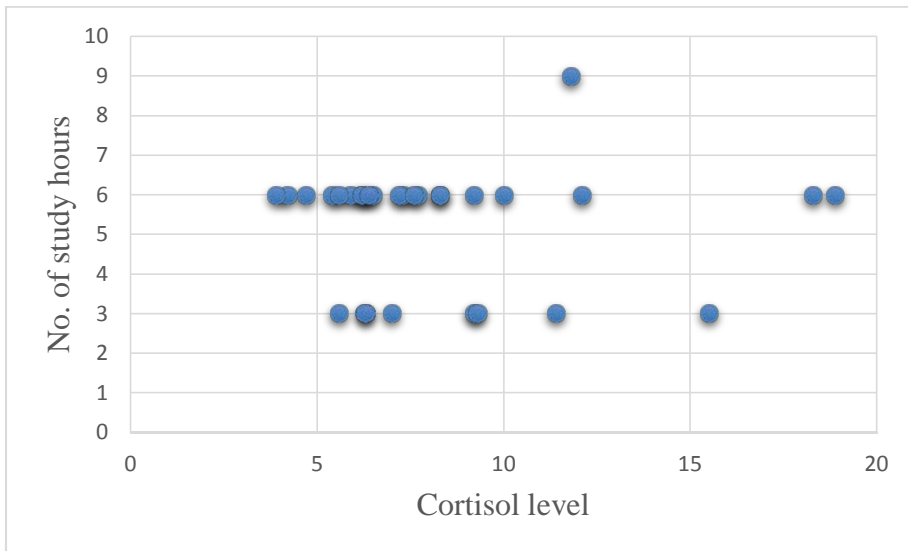

Figure 3. Scatterplot diagram of Serum cortisol level and length of study hours

The scatter chart shows the correlation between the numbers of study hours and the cortisol level of the students. There is an almost negligible relationship (r=.0012) between the cortisol level and the hours of study. Further it was further shown that the relationship is not significant (p=.932). The survey done, twenty one (21) out of thirty (30) students answered that they never skip classes. The learning resources of the students are mainly books and handouts in all of their courses. Eleven (11) students said that they are studying their lessons days before the exam and the same number said that they usually cram. Six students said that they are studying whenever they want and only two students answered that they are studying every day. Almost all of the respondents are studying in the bed room and few of them are in the living or dining room. Most of the students preferred to study either in a quiet place or while listening to music. Lastly, most of the respondents has no underlying medical conditions and very few of them said that they have asthma or allergy.

CONCLUSION AND RECOMMENDATION

The researchers concluded that there is no significant correlation

between the cortisol level and the academic performance of the selected students. The mean cortisol level is 8.41 with a standard deviation of 3.77. The mean GWA is 2.53 with a standard deviation of 0.41. The number of hours of study likewise has no significant relationship with the cortisol level.

For future research, stress and other mental factors such as depression may be correlated to cortisol. Other possible effects of cortisol may be studied.

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