THE UNIVERSITY OF LAHORE

IJPESS International Journal of Physical Education and Sports Sciences

Research Article

Volume 8, Issue 2, Jul-Dec 2024

Alteration of Human Growth Hormones Associated with Moderate Intensity Exercises among Female Students

Umbar Saddique, Alamgir Khan*, Muhammad Zafar Iqbal Butt

Department of Sports Sciences and Physical Education, University of the Punjab, Lahore, Pakistan

*Corresponding Author's Email: alamgir.sspe@pu.edu.pk

ABSTRACT

The functions of Human Growth Harmons (HGH) include growth, metabolism, and healing, and its level may be influenced by exercise. Growth Hormones link the production of Insulin Growth Factor-1 (IGF-1) development by increasing the glucose level in athletes. This study aimed to examine the impact of moderate intensity on HGH levels among female students. An experimental research design was used in this study, female students were randomly selected, representing a diverse range of body types and baseline health statuses from Punjab University in Lahore. The participants were divided into the experimental group (EG) and the control group (CG). Every group consisted of ten (10) participants. Ethical approval was taken from the ethical review and research board at the University of the Punjab Lahore. Subjects of the experimental group (EG) were given Eight (08) weeks of exercise protocol 5 days per week 40 minutes per day will be applied to the participants of the study, which exercise program included walking, slow running, fast and then slow running Pre and posttest were gathered Human Growth Harmons (HGH) level. Pre and post-tests were managed through the statistical package for social sciences (SPSS-32), and appropriate statistical tests will be applied. Based on data analysis and findings, the researcher concluded that has a positive impact on HGH levels.

Keywords: *Exercise, Female Students, Human Growth hormones, Insulin Growth Factor*

INTRODUCTION

Exercise is becoming more popular for both competitive and recreational reasons since it has numerous advantages for the body and mind. Because it effects many of the endocrine systems that are closely connected with the homeostatic system, Interest in its immediate and long-term effects on hormones has increased. Reactions as well as hormonology implications for reactions to exercise (Galbo, 1981; Hackney & Lane., 2015; Hossain et al., 2014; Nagamatsu et al., 2014).

The Human Growth Harmone (HGH/insulin) growth factor level-I (HGH/IGF-I) axis is particularly relevant to these interactions for several reasons. This axis is first activated by exercise, which may aid the body in adapting to training. The second is the growing understanding of the HGH deficiency clinical condition and the corresponding decreased capacity for exercise. Third, in the mistaken belief that abusing HGH will improve performance, amateur athletes use it (de Boer, 1995; Macintyre, 1987; Reinecke, 2010). Numerous studies have demonstrated that HGH levels rise in response to acute exercise at a threshold level of about 30% VO_2 max (percentage of maximal oxygen absorption). Anaerobic exercise and hypoxia can cause levels to spike up to 100 times, depending on the type and degree of activity. Some research has found no effect, or even that nocturnal HGH release is attenuated, long-term exercise (greater than 4 hours) has been shown to increase the percentage of HGH released during the latter part of sleep. Exercise induces basal-like production of HG in kids who are pubertal as opposed to prepubertal (Alon et al., 1998; Beckwith, 2014; Pritzlaff, 2000).

There is a great deal of dispute on the fundamental causes of the HGH elevation brought on by exercise. The opiate antagonist naloxone acts to have the opposite result on athletes, reducing the HGH reaction. However, in untrained normal males, naloxone boosts the HGH reaction to vigorous exercise. These differences may be the result of long-term exercise-induced changes in neuroendocrine balance. Rather than an endogenous ligand like Growth hormone-releasing peptide-6 (GHRP-6), the ultimate mechanisms are probably Atropine, Pyridostigmine, and changes in GHRH release (Boisseau & Delamarche, 2000; Møller & Jørgensen, 2009; Takarada et al., 2000). Even though there is a large amount of

DOI: https://doi.org/10.51846/the-sky.v8i2.3882 Received: 07-10-2024; Revised: 05-11-2024; Accepted: 29-11-2024

THE SKY-International Journal of Physical Education and Sports Sciences (IJPESS) (uol.edu.pk)

Published by: Department of Sports Sciences and Physical Education, Faculty of Allied Health Sciences, The University of Lahore, Pakistan.

literature HGH, there are still gaps and areas that require additional study. Further research is needed to determine safe and effective dosages for particular populations and circumstances, as well as to understand the mechanisms and long-term effects needed to understand how HGH interacts with other hormones like Insulin and cortisol and how it affects different physiological pathways. HGH may have anti-ageing properties, further studies are required to fully understand how HGH functions in the ageing process and how it affects age-related disorders and overall quality of life. By filling in these gaps, it is important to human the physiological functions of HGH and its possible therapeutic uses. The researcher can also assist ensure that HGH is used safely and effectively across a range of populations.

MATERIALS & METHODS

Research Design

In a brief period, the cross-sectional study investigates the relationship between exposures and outcomes. The evaluated correlations are regarded as hypothesis-generating and are supported by solid hypotheses. This style might be analytical or descriptive. In a cross-sectional study design, predetermined inclusion and exclusion criteria are used to select participants, and this selection process restricts randomization. By continually gathering data from the same participants over an extended period, longitudinal studies enable researchers to track changes or patterns within the same population and evaluate the causal connections between variables over time. Therefore keeping in view the need and demand of the study, in this research study the researcher adopted cross cross-sectional and longitudinal research design.

Participants of the study

The current study aimed to explore the risks and benefits of moderate-intensity exercise, investigating potential predictors' effects of moderate-intensity exercise in youth. This Cross-sectional and Longitudinal study was carried out among twenty (20) female student participants of the Sports sciences department from the University of Punjab Lahore, aged 18 to 22 years, which was divided into two groups (CG and EG). All subjects experienced HGH measurements and moderate-intensity exercise analysis for body composition parameters.

Collection of Blood Sample

Data is collected through the PHLEBOTOMY process. Twenty (20) participants voluntarily participated in the process, and data was collected through accurate methods devices and time. For the assessment of HGH, fifteen (15) ml of blood was collected from all subjects, through vein puncture, and a small amount of blood was collected into a test tube or vial. Each blood sample was marked with a separated identification code.

Blood Sampling and HGH immunoassay Analysis

Blood samples were collected for insulin-like growth factor (IGF-1) test by immunoassay analysis. Large series of samples can be readily and quickly evaluated using immunoassay analysis, which is a crucial feature for clinical laboratories considering the rising demand for HGH determination. The most common method for determining the amount of HGH in the blood is to utilize commercial immunoassay kits. When serum samples are measured using several immunoassay kits, the findings are wildly inconsistent. The details of the sample testing and its principles are given below. Firstly wear gloves, tie the tourniquet on the cubical vein collect the blood from the veins put it into a yellow tap vile and mention the name. Then to maintain the vile temperature put 2-8c ice pack in an isolation box to reach the lab. In the Lab start the centrifugation process at 1500-2000pm for 2-3min to separate serum and cells and then use the test proceeding technique Enzyme-Linked Immunosorbent ASSAY (ELISA). Chemiluminescence is an automated special chemistry technique of ELISA used in tests to give accurate results. Completing the centrifugation process vile putting the Chemiluminescence and chemical light pass out from solution and give absorbance.

Ethical Consideration

Before initiating the exercise intervention on the participants of EG, all the participants were made aware of the risks and benefits of participation in the study. Hence, all those participants who voluntarily participated and met the inclusion criteria were included in the study and then informed consent was taken from all the participants. Institutional permission was also obtained from the ethical and review board regarding the protocols of the study.

DATA ANALYSIS

After the exercise intervention, the results (pre- and post-test) were processed for analysis using suitable statistical tools (Mean (M), Standard deviation (SD), paired sample t-test, and independent sample t-test) through the application of statistical package for social sciences (SPSS, version 26).

This table 1 shows the mean and std. Values of HGH

levels for the experimental group before intervention. The $\bar{X}$ and std of EG in term of HGH was 2.77± 3.47.

Table 1. Pre-test data of EG in term HGH level

Pre-Intervention variable of EG	N	$\bar{X}$	Std.
HGH level	10	2.77	3.47

The table 2 shows the mean and std. Values of HGH levels for the experimental group after intervention. The $\bar{X}$ and std of EG in term of HGH was 5.79± 7.79.

Table 2. Post-test data of EG in term HGH level

Post intervention variable of EG	N	$\bar{X}$	Std.
HGH level	10	5.79	7.79

The table 3 shows the mean and std. Values of HGH level for the control group before intervention. The $\bar{X}$ and std of EG in term of HGH was 3.97± 3.85.

Table 3. Pre-test data of CG in term HGH level.

Pre-Intervention variable of CG	N	$\bar{X}$	Std.
HGH level	10	3.97	3.85

Table 4. Show the mean and std. Values of HGH levels for the control group before intervention. The $\bar{X}$ and std of EG in term of HGH was (2.31 2.11).

Table 4. Post-test data of CG in term HGH level

Post-Intervention variable of CG	N	$\bar{X}$	Std.
HGH level	10	2.31	2.11

The table 5 indicates the Comparison of the pre-test results of CG and EG (independent sample t-test). The values of HGH level of CG were (M =, 3.9730 SD = 3.85126) and EG (M = 2.77, SD = 3.47; $t_{(20)}$ = -0.733, p =0.81 > significant level = 0.05) thus no significant difference was observed in term of HGH in both CG and EG.

Table 5. Comparison of Pre-test of CG and EG (Independent sample t-test) in term of HGH

Variable (Pre-Intervention)	Group	N	$\bar{X}$	Std.	Df	t	Sig.
HGH level	CG	10	3.97	3.85	18	-0.73	0.81
	EG	10	2.77	3.47			

The table 6 indicates the Comparison of the pre- and Posttest of HGH of EG (Paired sample t-test). The values of HGH level of pre-test were (M = 2.77, SD = 3.47) and EG (M = 5.79, SD= 7.79); $t_{(20)}$ = --1.07, p =0.30 > significant level = 0.05) thus no statistical significance was observed in pre and posttest result of EG.

Table 6. Comparison of Pre and Posttest of EG (Paired sample t-test) in term of HGH

Variable (Pre-Intervention)	Group	N	$\bar{X}$	Std.	df	T	Sig.
HGH level	Pre	10	2.77	3.47	9	-1.07	0.30
	Post	10	5.79	7.79			

DISCUSSION

The main objective of the study is to analyze the impact he moderate-intensity exercise on HGH. The current study indicates that there is a significant (statistical) impact of moderate intensity on HGH levels. Such an emerging concept supported by (Paul Jenkins, 1998) shows that a number of the homeostatic systems that the endocrine system is intimately related to are affected by exercise.

In line with the current study, Exercise stimulates the release of HGH, leading researchers to investigate its potential as a clinical screening method for HGH insufficiency. In children with short stature, HGH deficiency was ruled out in 68% of patients with a 20 mU/L diagnostic criterion. However, when exercise was less strictly monitored, the results were found to be unreliable. (Lin & Tucci, 1974). It also promotes whole-body protein synthesis, which includes the synthesis of collagen and skeletal muscle proteins. Because the muscles Consume glucose and then non-esterified fatty acids (NEFA) as fuel throughout the metabolic reaction.

HGH is recognized as essential for female fertility. Women with HGH Deficiencies tend to have reduced fertility, but

HGH replacement therapy can improve their chances of conception (Alsat et al., 1998). While HGH plays a secondary role in regulating glucose and fat metabolism alongside catecholamine and insulin, the surge in HGH induced by exercise may be crucial for protein synthesis following exercise (Kraemer & Ratamess, 2005). HGH promotes muscle protein synthesis and prevents protein breakdown, which increases anabolism. Exercise volume and intensity have been linked to HGH concentrations. HGH raises IGF-I levels in the bloodstream. Since both hormones are important in the regulation of muscle mass, IGF-1 and HGH combined may be valuable indicators. In both men and women, luteinizing hormone is linked to reproductive function (Kraemer et al., 2020). In line with the present study, the study conducted by Raastad et al (2000) that the athletes engaged in one high-intensity and one moderate-intensity strength training session. When compared to the moderate-intensity regimen, the high-intensity approach produced more immediate reactions in terms of cortisol and testosterone. The acute HGH response does not significantly differ between the two strength regimes. Peake (2014) and Wahl et al (2010) found significantly higher after high-intensity intermittent exercise compared with continuous moderate-intensity.

CONCLUSION

In light of the analysis and findings, the researcher concluded that moderate-intensity exercise has a significant impact on HGH among female students which indicates various physiological benefits associated with HGH. Keeping in view the potential role of moderate-intensity exercise, it is suggested to make moderate-intensity exercise part of our routine activities.

DECLARATION

Authors' Contribution Statement: Umbar Saddique contributed to the study conceptualization and methodology design. Alamgir Khan led the overall coordination, including resources, data analysis, and the final manuscript preparation. Muhammad Zafar Iqbal Butt contributed to software development, validation, and visualization efforts. All authors have read and approved the final manuscript, ensuring its integrity and accuracy.

Ethical statement: This research adheres to the ethical guidelines established by the Committee on

Publication Ethics (COPE). All procedures and methodologies used in this study comply with COPE standards, ensuring transparency, integrity, and respect for all participants involved.

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

Alon, E., Anne, B. J., & Subburaman, M. (1998). Peak oxygen uptake, muscle volume, and the growth hormone-insulin-like growth factor-I axis in adolescent males. *Medicine & Science in Sports & Exercise*, *30*(4), 512-517.

Alsat, E., Guibourdenche, J., Couturier, A., & Evain-Brion, D. (1998). Physiological role of human placental growth hormone. *Molecular and Cellular Endocrinology*, *140*(1-2), 121-127.

Beckwith, H., & Yee, D. (2014). Insulin-like growth factors, insulin, and growth hormone signaling in breast cancer: implications for targeted therapy. *Endocrine Practice*, *20*(11), 1214-1221.

Boisseau, N., & Delamarche, P. (2000). Metabolic and hormonal responses to exercise in children and adolescents. *Sports Medicine*, *30*, 405-422.

de Boer, H., Blok, G. J., & van der Veen, E. A. (1995). Clinical aspects of growth hormone deficiency in adults. *Endocrine Reviews*, *16*(1), 63-86.

Galbo, H. (1981). Endocrinology and metabolism in exercise. *International Journal of Sports Medicine*, *2*(04), 203-211.

Hackney, A. C., & Lane, A. R. (2015). Exercise and the regulation of endocrine hormones. *Progress in Molecular Biology and Translational Science*, *135*, 293-311.

Hossain, M. N., Lee, J., Choi, H., Kwak, Y. S., & Kim, J. (2024). The impact of exercise on depression: how moving makes your brain and body feel better. *Physical Activity and Nutrition*, *28*(2), 43.

Kraemer, W. J., & Ratamess, N. A. (2005). Hormonal responses and adaptations to resistance exercise and training. *Sports Medicine*, *35*, 339-361.

Kraemer, W. J., Ratamess, N. A., Hymer, W. C., Nindl, B. C., & Fragala, M. S. (2020). Growth hormone (s), testosterone, insulin-like growth factors, and cortisol: roles and integration for cellular development and growth with exercise. *Frontiers in Endocrinology*, *11*, 33.

Lin, U., & Tucci, J. R. (1974). Provocative tests of growth-hormone release: a comparison of results with seven stimuli. *Annals of Internal Medicine*, *80*(4), 464-469.

Macintyre, J. G. (1987). Growth hormone and athletes. *Sports Medicine*, *4*, 129-142.

Møller, N., & Jørgensen, J. O. L. (2009). Effects of growth hormone on glucose, lipid, and protein metabolism in human subjects. *Endocrine Reviews*, *30*(2), 152-177.

Nagamatsu, L. S., Flicker, L., Kramer, A. F., Voss, M. W., Erickson, K. I., Hsu, C. L., & Liu-Ambrose, T. (2014). Exercise is medicine, for the body and the brain. *British Journal of Sports Medicine*, *48*(12), 943-944.

Peake, J. M., Tan, S. J., Markworth, J. F., Broadbent, J. A., Skinner, T. L., & Cameron-Smith, D. (2014). Metabolic and hormonal responses to isoenergetic high-intensity interval exercise and continuous moderate-intensity exercise. *American Journal of Physiology-Endocrinology and Metabolism*, *307*(7), E539-E552.

Pritzlaff, C. J. (2000). *The impact of acute exercise intensity and gender on pulsatile growth hormone (GH) release*. University of Virginia.

Raastad, T., Bjøro, T., & Hallen, J. (2000). Hormonal responses to high-and moderate-intensity strength exercise. *European Journal of Applied Physiology*, *82*, 121-128.

Reinecke, M. (2010). Influences of the environment on the endocrine and paracrine fish growth hormone–insulin-like growth factor-I system. *Journal of Fish Biology*, *76*(6), 1233-1254.

Takarada, Y., Nakamura, Y., Aruga, S., Onda, T., Miyazaki, S., & Ishii, N. (2000). Rapid increase in plasma growth hormone after low-intensity resistance exercise with vascular occlusion. *Journal of Applied Physiology*, *88*(1), 61-65.

Wahl, P., Zinner, C., Achtzehn, S., Bloch, W., & Mester, J. (2010). Effect of high-and low-intensity exercise and metabolic acidosis on levels of GH, IGF-I, IGFBP-3 and cortisol. *Growth Hormone & IGF Research*, *20*(5), 380-385

Cite this paper as:

Saddique, U., Khan, A., & Butt, M. Z. I. (2024). Alteration of Human Growth Hormones Associated Moderate Intensity Exercise among Female Students. *THE SKY-International Journal of Physical Education and Sports Sciences*, 8(2), 78-82