

ADAPTOGENIC ACTIVITY OF AJASWAGANDHADHI LEHYAM AND ITS EFFECT ON CORTISOL LEVEL IN MALE WISTAR RATS

First Author: Cynthia Shankari

Lecturer, Dept of Anatomy, CSI College of Dental Sciences and Research, Madurai & Research Scholar, Bharath Institute of Higher Education and Research (BIHER), Chennai, Tamil Nadu, India

Second Author: K Prabhu

Associate Professor, Dept of Anatomy, Sree Balaji Medical College & Hospital, Bharath Institute of Higher Education and Research (BIHER), Chennai, Tamil Nadu, India

Corresponding Author

Cynthia Shankari

cynthiashankari@yahoo.com

ABSTRACT

Stress can be either acute or chronic. Stress is associated with altered hormonal secretions of cortisol. Cortisol is a steroid hormone, which is released during stress. Adaptogens are herbs that improve the responses to stress. In traditional medicine, the Ajaswagandhadhi Lehyam is found to reduce stress induced damage and thereby reduces oxidative stress, facilitating fertility in male Wistar rats because of its radical scavenging activity and also due to the presence of phenolic compounds and flavonoids.

This study deals with the adaptogenic activity of Ajaswagandhadhi Lehyam, bringing out the decrease in Cortisol level at different dosage of its administration on Wistar rats.

Key Words: Ajaswagandhadhi Lehyam, Adaptogens, Cortisol, Stress and Oxidative stress.

INTRODUCTION

Cortisol which is mainly known as 'Stress Hormone' is a main glucocorticoid released from zona fasciculata layer of Adrenal Cortex. When cortisol is released into the blood stream, it is capable to act on different parts of the body and helps to respond to stress. It acts in times of acute, chronic and traumatic stress.

Stress together with decrease in antioxidant level plays a significant role in reducing the fertilising potential of male Wistar rats. There is a relationship between stress and infertility. Prolonged exposure to elevated cortisol level has been shown to cause an increase in reactive oxygen species at cellular levels and increased oxidative stress which causes infertility.

Ajaswagandhadhi Lehyam contains adaptogenic herbs, which can combat and reduce stress. Ajaswagandhadhi Lehyam has been found to increase the production of Luteinizing hormone which is produced in gonadotropic cells in the anterior pituitary gland.

Luteinizing hormone supports the reproductive systems, thereby triggers the production of testosterone in male Wistar rats. Ajaswagandhadhi Lehyam is best known for its stress lowering effects as it acts on cortisol which reduces stress.

Methods and Methodology

Selection & Acclimatization of Experimental Animals

The study was conducted after obtaining Institutional ethical committee clearance. As per the standard practice, the rats were segregated based on their gender and male Wistar rats were selected and quarantined for 15 days before the commencement of experiment. They were fed on healthy diet and maintained in hygiene environment in animal house.

Treatment protocol

The acclimatized animals were divided into 4 groups of 3 animals each, designated as follows;

Group 1: Serves as normal control and receive normal saline and diet.

Group 2: Serves as Treatment control group and administered with 100 mg/Kg of Ajaswagandhadhi Lehyam suspended with 2ml of 1% CMC for 30 days orally.

Group 3: Serves as Treatment control group and administered with 200 mg/Kg of Ajaswagandhadhi Lehyam suspended with 2ml of 1% CMC for 30 days orally.

Group 4: Serves as Treatment control group and administered with 400 mg/Kg of Ajaswagandhadhi Lehyam suspended with 2ml of 1% CMC for 30 days orally.

Methodology

Blood sampling and Cortisol analysis

Blood samples were collected through cardiac puncture with anticoagulant (EDTA).The procedures continued with centrifugation (Eppendorf) for 15 min/1000 gm of force. Enzyme-linked immunosorbent assay (ELISA) analyses of Cortisol levels were observed using a Rat Cortisol ELISA Kit.

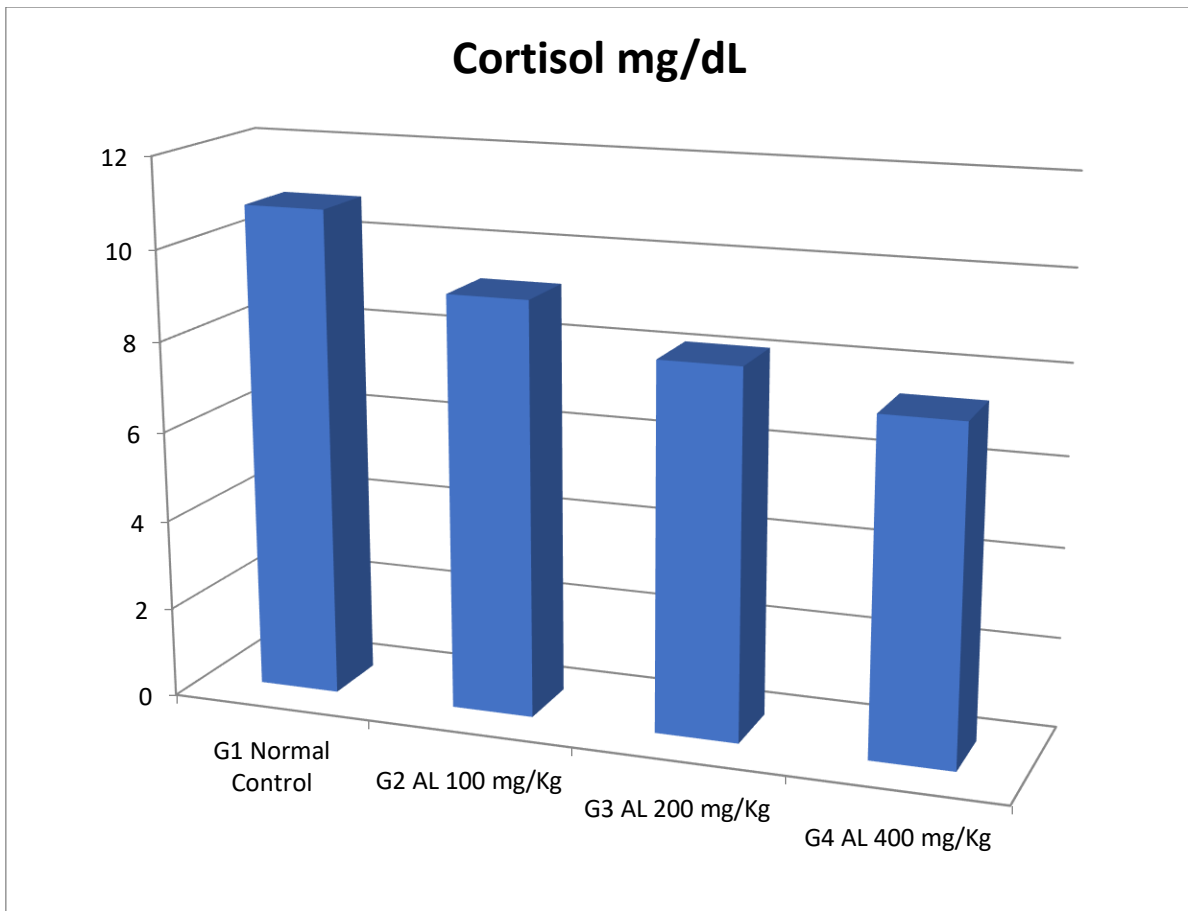
Table No. 1
Effect of Aswagandha lehyam on Cortisol levels

Groups	Treatments	Cortisol microgram /dl
G1	Normal Control 10 ml /kg Normal Saline	10.83 ± 0.78
G2	Ajaswagandhadhi lehyam 100 mg/Kg	9.20 ± 0.65*
G3	Ajaswagandhadhi lehyam 200 mg/Kg	8.15 ± 0.58*
G4	Ajaswagandhadhi lehyam 400 mg/Kg	7.40 ± 0.47*

***Values are significantly different from normal control at P<0.01**

The statistical analysis was carried out by one way analysis of variance (ANOVA) followed by Newmann Keul's multiple range tests. The values are represented as Mean ± SEM. Probability value of P<0.01 was determined to be statistically significant.

Psychological stress may affect brain function and biological clock resulting in disturbance of hypothalamo-pituitary control of hormone production. The effect on the brain is ultimately manifested in other organs owing to hormonal regulation through hypothalamo-pituitary axis. This disturbance in hypothalamus-pituitary-gonadal axis may adversely affect spermatogenesis [1].



The above chart depicts the 3 dimensional representations of cortisol values corresponding to each group category of experiment which indicates the reduction in cortisol value as the dosage increases.

There have been several reports linking male infertility to stress [2]. Cortisol is the hormone produced in response to stress [3], and increased level of cortisol may reduce the functional activity of LH, thereby reducing testosterone level [4]. Psychological stress leads to low testosterone levels due to reduction in LH pulse frequency.

Reduced testosterone level in turn reduces libido and leads to oligospermatogenesis [5]. The reduction of stress level and improvement in male factor fertility as a result of treatment with aswagandhadhi lehyam, offer direct evidence in favour of stress as a cause of male infertility.

Aswagandha lehyam has the capability of combating stress-induced infertility. The effect was obvious given a significant number (15% in normozoospermic men) upon treatment. This activity may be due to the presence of a number of alkaloids, ergostane steroids and amino acids, including tryptophan, central nervous system inhibitors, centrally acting hypotensive agents, and serotonin agonists in the lehyam.

Among the major effects, it balances hormone levels, reduces oxidative stress and possibly improves detoxification processes in the body. We have earlier shown that disturbed hormone

levels correlate well with infertility; therefore, correction of this imbalance by aswagandhadhi lehyam could be one of the major factors contributing to fertility improvement.

Conclusion

Oxidative stress could be a critical molecular linkage between the hypothalamic pituitary adrenal (HPA) and a dysfunction. It was also reported that the stress induced increase in cortisol levels accelerates production of reactive oxygen species which leads to infertility.

From the above study it is concluded that Ajaswagandhadhi Lehyam reduces cortisol level considerably and thus decreases oxidative stress promoting fertility in male Wistar rats.

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