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RESEARCH ARTICLE

“AN OVERVIEW OF DHEA-S LEVELS IN CHRONIC STRESS-PROSPECTIVE STUDY”

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Abstract

Background: Increased stress levels are associated with various health issues due to the dysregulation of HPA axis, more so when the stress is chronic in nature. As the DHEA-S is a catabolic hormone the chronic stress levels may be involved with long term diseases like early ageing, hypertension, cancer and various other diseases

Objectives: The aim of this study was to see the effect of perceived chronic stress in a subset of healthy population of male and female volunteers who willingly participated in the study. The selected male and female population was then stratified into age and stress matched groups and then one time DHEA-S levels were ascertained to see for changes in the DHEA-S values.

Methods: DHEA-S levels were measured within 6 hours of collection of the Blood Samples, randomly collected at different time points in the day by Chemiluminescence method which was then statistically evaluated by using Mini Tab statistical tool.

Results: There was no significant correlation in both genders when age and stress matched.

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Introduction:-

Stress can be categorized generally as acute stress and chronic stress which can be because of physical, emotional and psychological strain on the human body. The Human body responds to stress generally by the releasing hormones like cortisol, Adrenaline and noradrenaline depending on the stress level and the situation encountered. The “Fight and Flight” response is usually encountered during Acute stress situations which is an immediate response. Other chemicals such as DHEA and DHEA-S may also be released to tide over the crisis in addition when the stress or response is sustained and prolonged such as in chronic stress due to chronic activation and dysregulation of HPA access there can be continuous release of these hormones leading to generalized stressed environment impacting the homeostasis of the normal body. When the stress hormones cortisol, adrenaline and noradrenaline are constantly increased due to the continuous stimulation by ACTH on Zona Fasciculata (5-6) of the adrenal glands in chronic stress than causes deleterious effect on the body. These hormones in larger amounts than leads to the production of oxidants and free radicals in the body

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which than causes cardiovascular disease, atherosclerosis, anxiety premature aging, cancer, chronic diseases and neuromodulation (1-5,13).

The Other hormones release by the adrenal gland from Zona Reticularis like DHEA,DHEA-S(5-6) arealso released in small amounts from ovaries, testis, brain tissue in males and females respectively. There can be interconversion between DHEA and DHEA-S hormones at cellular level(15)and some amounts also get converted into androgens in males and estrogens and androgens in females respectively which happens predominantly in the fat tissue(5-6).

There are conflicting reports from different scientists on the levels of DHEA and DHEA-S in acute and chronic stress. Various studies have reported higher values of DHEA in acute stress and lower values of DHEA-S in chronic stress whereas as some studies have not found any link to the levels of DHEA or DHEA-S in either acute or chronic stress(7-11).

The aim of this study was to find whether the DHEA-S levels vary in chronic stress in age and stress matched controls in randomly selected healthy male and female volunteers who had come for health check-ups.

Materials and Methods:-

Volunteers were enrolled from the Padmashree Diagnostic Centre,Bangalore,India who had come for a general health checkup were randomly selected and a prospective cohort study group was set up with 500 volunteers consisting of 250 males and 250 females to find out the corelative effect of percieve chronic stress levels and DHEA-S levels.

Age and stress matched stratification was done and various groups were inbuilt in the study among the selected male and female individuals for the study.

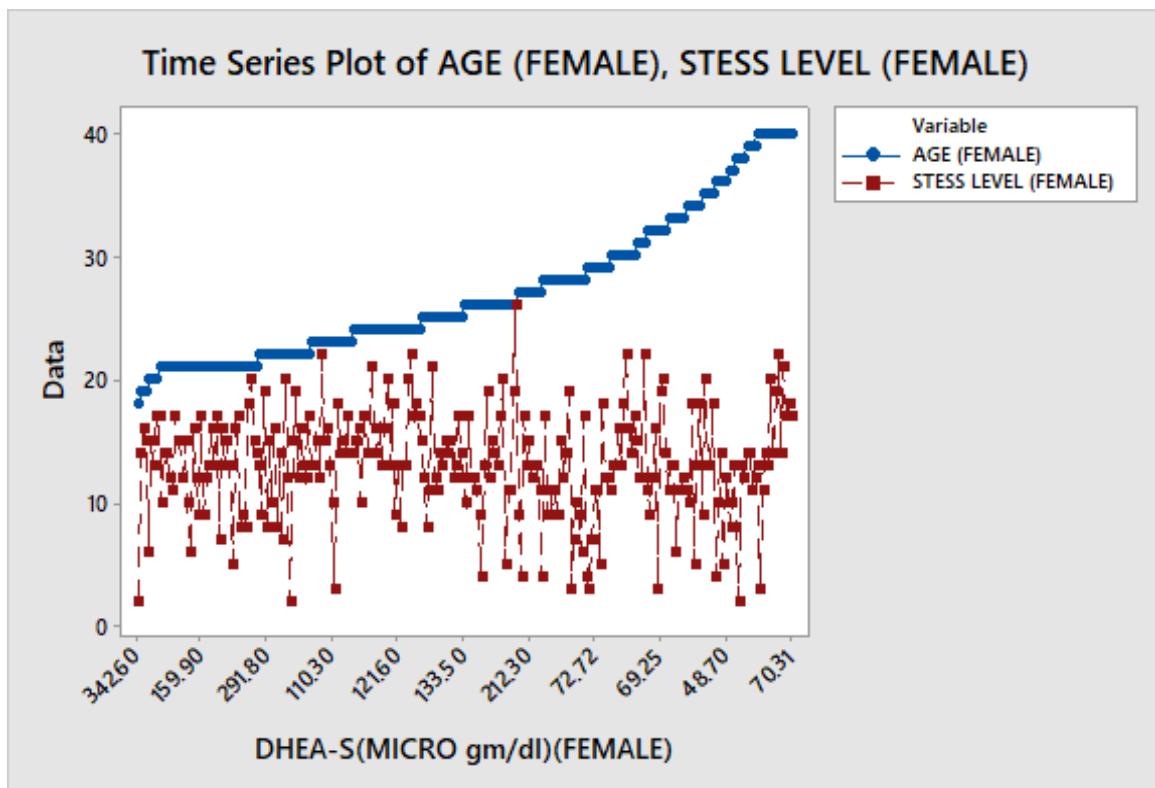
A prior consent form was obtained from the volunteers after a proper explanation about the objective of the study. Answering of DASS-21 questionnaire to access the stress levels was a mandatory requirement for the enrollment of the volunteers before collecting the blood samples. The DASS-21 had 21 questions which further had a score of 0,1,2,3,4. The volunteer had to answer these 21 questions and a total score was calculated and then categorization of stress levels as Normal,Mild,Moderate,severe and very severe(for simplifying the process we had clubbed severe and very severe into a single category as "severe").The samples were randomly collected during the day (previous day fasting was not made mandatory criteria for enrollment) and were processed within 6 hours of collection and the DHEA-S values were determined on the same day.Analysis was done by Chemiluminescence method.The Stress levels were divided into normal, mild, moderate and Severe. No other parameters such as BMI, Smoking, menstrual cycle phase and physical exercises were documentedfor the study.

The Mini Tab statistical tool was used for statistical evaluation to correlate DHEA-S levels and stress levels in male and female population in age and stress matchedgroups.

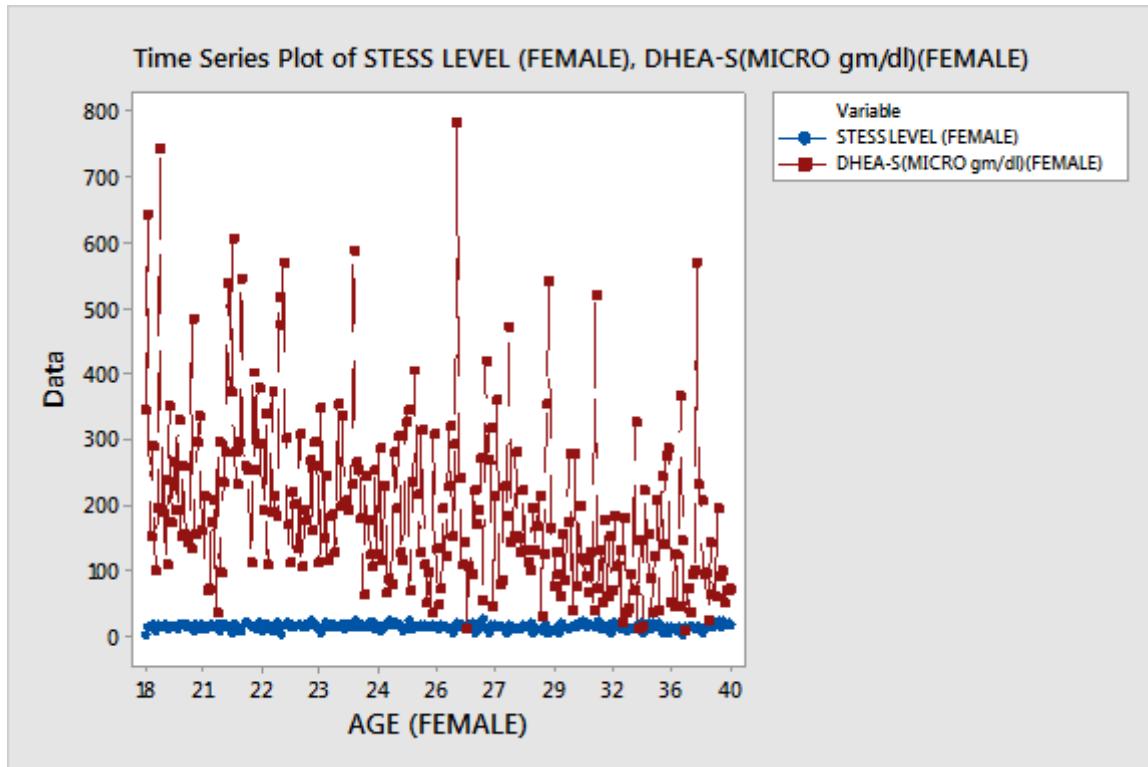
Results:-

The statistic results are depicted below in the form of DHEA-S levels against the stress levels for females in graph (A) and also the DHEA-S levels against the age groups in graph (B).

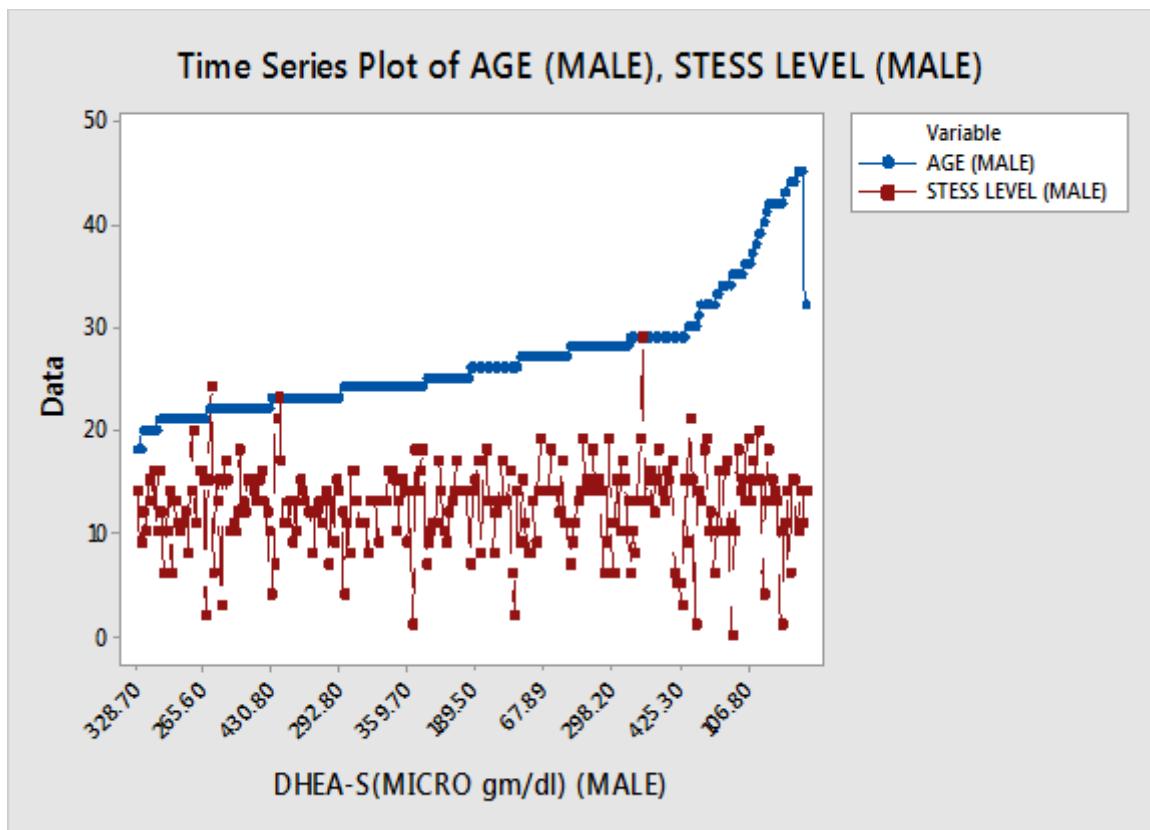
The statistic results are depicted below in the form of DHEA-S levels against the stress levels for Males in graph (C) and also the DHEA-S levels against the age groups in graph (D).



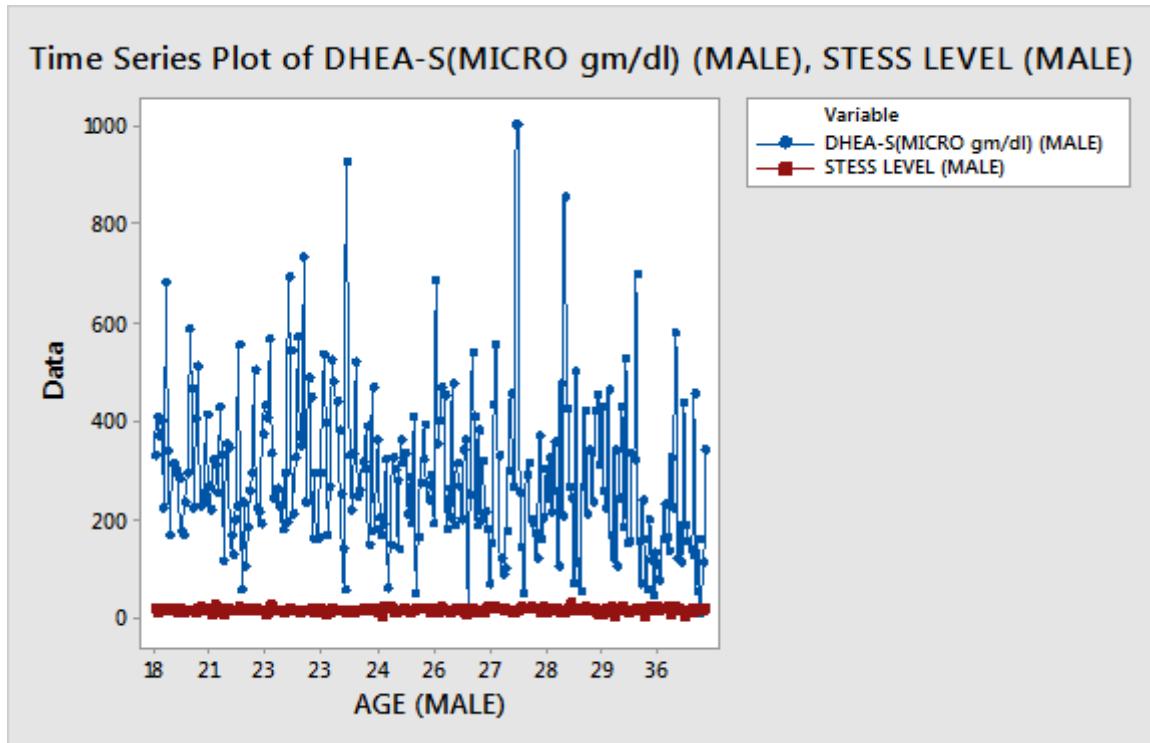
Graph A representing stress levels and DHEA-S Levels in females



Graph B representing Age and DHEA-S Levels in females



Graph C representing stress levels and DHEA-S Levels in Males



Graph D representing Age and DHEA-S Levels in Males

The results depicted in the graph doesn't show any significant correlation between age and stress levels with the DHEA-S levels.

Discussion:-

The corelative studies between DHEA-S levels and stress levels were reported in various studies were contradictory in nature. Some studies documented lower values of DHEA-S in stressed individuals and some studies did not find any correlation between DHEA-S and chronic stress levels. We carried out this study taking only two parameters stress levels and DHEA-S levels in age and stress matched male and female individuals without considering any other parameters. The plausible variations observed in various studies may be due to inbuilt hormone homeostasis in the body with an inherent property to maintain an optimal level of hormone balance for normal functioning of the body with minimal fluctuations.

We decided to check this hypothesis by considering only the stress levels and correlate DHEA-S levels without considering the phases of menstrual cycle in females, BMI, smoking status and physical exercises in female population. Similarly, DHEA-S levels and stress levels in males were only considered without considering, BMI, smoking status and physical exercises. DHEA-S one time measurement was analyzed to understand the intricacies involved in measuring just the DHEA-S levels and chronic stress levels in our study surprisingly, contrary to the other studies we found that the males had lower levels of DHEA-S levels as compared to females with same age and stress matched controls, which were observed in few of the studies which showed lower levels of DHEA-S and stress levels in females. In view of the dynamic status of the hormone levels and their fluctuations which is a normal phenomenon should be considered before interpreting the results. The one-time peripheral blood sample measurement of DHEA-S levels in our opinion may not be sufficient tool to find a correlation, as these hormones are in dynamic state and vary as per the physiological status more often to keep the body in homeostatic state. The inter convertibility of these hormones (15) makes it more difficult to understand and correlate its levels when in dynamic state. Chronic stress which is again inter observer dependent and subject to individual perception is another highly variable parameter. When these two highly variable parameters are correlated it becomes more difficult to find a link between these two parameters. This may be the probable reason why different authors have different conclusions regarding the DHEA-S values and chronic stress. It's of paramount importance to collect the right sample at a destined point in the day preferably early morning fasting blood sample and select an ideal method for analyte estimation like RIA or HPLC for proper estimation and better correlation.

In our study we did not have any significant correlation between DHEA-S levels and increasing levels of perceived chronic stress and age. In few studies a lower level of DHEA-S levels in females with chronic stress were observed.

Limitations:

We had a shortfall in our study as we had not included the BMI, smoking status, menstrual phase, physical exercises in females, similarly in males the BMI, smoking status and physical exercises were not considered while enrolling the volunteers for the study may have skewed up the final findings. But it gives us an insight of the variability that exists in measuring of two highly variable entities against a homeostatic environment which the body intricately balances. We would like to conclude with a positive note that further studies are required to evaluate and design studies appropriately for better correlation to account for the inter human variability, ethnic differences, inherent genetic variability (12), human body's ability to maintain homeostatic environment in measuring of the hormones which are in dynamic state, the method of estimation which plays an important role in determining the exact values for a proper correlation.

Conclusion:-

This study doesn't demonstrate any significant correlation between DHEA-S levels and increasing levels of perceived chronic stress in both the genders.

References:-

1. Theorell T (1997) Fighting for and losing or gaining control in life. *Acta Physiol Scand Suppl* 640: 107–111.
2. Henderson M, Glozier N, Holland Elliott K (2005) Long term sickness absence. *BMJ* 330: 802–803.
3. Kivimaki M, Nyberg ST, Batty GD, Fransson EI, Heikkila K, et al. (2012) Job strain as a risk factor for coronary heart disease: a collaborative meta-analysis of individual participant data. *Lancet*.

4. Epel ES, Blackburn EH, Lin J, Dhabhar FS, Adler NE, et al. (2004) Accelerated telomere shortening in response to life stress. *Proc Natl Acad Sci U S A* 101: 17312–17315.
5. Wolkowitz OM, Epel ES, Reus VI, Mellon SH (2010) Depression gets old fast: do stress and depression accelerate cell aging? *Depress Anxiety* 27: 327–338.
6. Labrie, F; Luu-The, V; Labrie, C; Simard, J; “DHEA and its transformation into androgens and estrogens in peripheral target tissues: introcrinology”. *Front. Neuroendocrinol* 2001. 22, 185–212.
7. Dr.B.Geetharani,“Impact of psychological stress at work is related to lower levels of DHEA and DHEA-S levels”.*International Journal of Statistics and Systems* ISSN 0973-2675 Volume 12, Number 1 (2017), pp. 1-13
8. Goodyer IM, Herbert J, Altham PM, Pearson J, Secher SM, et al. (1996) Adrenal secretion during major depression in 8- to 16-year-olds, I. Altered diurnal rhythms in salivary cortisol and dehydroepiandrosterone (DHEA) at presentation. *Psychol Med* 26: 245–256.
9. Kroboth PD, Salek FS, Pittenger AL, Fabian TJ, Frye RF (1999) DHEA and DHEA-S: a review. *J Clin Pharmacol* 39: 327–348.
12. Hasselhorn HM, Theorell T, Vingard E (2001) Endocrine and immunologic parameters indicative of 6-month prognosis after the onset of low back pain or neck/shoulder pain. *Spine (Phila Pa 1976)* 26: E24–29.
10. Schell E, Theorell T, Hasson D, Arnetz B, Saraste H (2008) Stress biomarkers' associations to pain in the neck, shoulder and back in healthy media workers: 12- month prospective follow-up. *Eur Spine J* 17: 393–405.
11. Ohlsson C, Labrie F, Barrett-Connor E, Karlsson MK, Ljunggren O, et al. (2010) Low serum levels of dehydroepiandrosterone sulfate predict all-cause and cardiovascular mortality in elderly Swedish men. *J Clin Endocrinol Metab* 95: 4406–4414.
12. Rotter JI, Wong FL, Lifrak ET, Parker LN (1985) A genetic component to the variation of dehydroepiandrosterone sulfate. *Metabolism* 34: 731–736.
13. Jeckel CM, Lopes RP, Berleze MC, Luz C, Feix L, et al. (2010) Neuroendocrine and immunological correlates of chronic stress in 'strictly healthy' populations. *Neuroimmunomodulation* 17: 9–18.
14. Brzoza Z, Kasperska-Zajac A, Badura-Brzoza K, Matysiakiewicz J, Hese RT, et al. (2008) Decline in dehydroepiandrosterone sulfate observed in chronic urticaria is associated with psychological distress. *Psychosom Med* 70: 723–728.
15. Rosenfeld RS, Rosenberg BJ, Fukushima DK, Hellman L (1975) 24-Hour secretory pattern of dehydroisoandrosterone and dehydroisoandrosterone sulfate. *J Clin Endocrinol Metab* 40: 850–855.