



AN ANALYSIS OF EFFICACY OF SALIVARY CORTISOL ON ATHLETES

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Abstract:

According to Martinez. AC, Seco. Calvo. J, & Turmari. J.A, 2010, to prevent the stress provoked during the competition season, and control the recovery periods, it is useful to monitor cortisol, stosterone, and the level of training. In popularity and benefits sports overcome regional, cultural, cast, creed, socio-economic and political boundaries and can be invoked with success in any community virtually all over the world. Sport is a timeless activity which human beings have been enjoying since ancient times, as exemplified by the Greek Olympic Games. Its popularity is steadily increasing better more than the cultural growth and civilization advancement. So, physical education profession is entering in to one of the most exciting and dynamic eras in its history (pubmed, 2016). The fitness, movement and increase in leisure time have created a market for physical education and sports programs to serve individuals in every walk of their life. Now a days society has given paramount emphasis on achieving and maintaining optimal health and wellbeing to its members. For the above purpose, Sports which consist of training, exercises and performance to improve physical abilities to helps in acquiring the skills connected with the technique of the sports through systematic performance. In the testing of physical abilities, visual evaluation leaves a gap between exercise and the effects of its systematic repetition. Our general understanding of training is that it significantly improves exercise-induced changes in the organism and each change is specifically dependent on the nature of exercise, intensity and its duration. Thus, each training exercise results in specific changes in the organism that is necessary to obtain the goal of the training. "Cortisol is a major hormone produced by the adrenal cortex, which is the primary luocorticoid secreted by the adrenal gland in response to ACTH stimulation or stress". (McGraw Hill Concise Dictionary of Modern Medicine, 2002) Cortisol is a stress hormone which is produced by the adrenal gland and seen in the saliva. Cortisol gives stress to sports persons. The increased amount of cortisol in saliva gives stress to a sports person and it will decrease his performance. The administration of the test has produced exact information to find out that in which time of a training day, a sports person produce higher level of cortisol hormone. By finding out this factor the coaches, trainers, physical education teachers can understand their students' stress and regulate their coaching according to the stress level. Carralho, & Regina. Celia, 2011, states that early morning salivary cortisol concentration is high. The present study is in conformity with the above study. In the light of the present study one can say that an athlete is facing more stress in the morning before his training session when compared to other times of the day. These findings will help the coaches, trainers and physical education teachers to understand their students' stress level and there after rejuvenate their coaching performances according to the stress level their ward.

Key Words: Saliva, Cortisol, Stress Athlete & Efficacy

1. Introduction:

According to Martinez. AC, Seco. Calvo. J, & Turmari. J.A, 2010, to prevent the stress provoked during the competiton season, and control the recovery periods, it is useful to monitor cortisol, testosterone, and the level of training. Helen. S. Bateup, Alan. Booth, Elizabeth.Shirtc, & Douglas. A. Granger, 2002 testosterone and cortisol levels increases in anticipation of the matches. Postgame levels of both hormones were higher than pregame levels. Sports is a competitive physical activity or games which, through casual organized participation, aims to use, maintain or improve physical ability and skills while providing enjoyment to participants, and in some cases, entertainment for spectators (Wikipedia,2016). Now a days as participants, spectators, or volunteers, people are attracted to sport arguably more than to any other activity. In popularity and benefits sports overcome regional, cultural, cast, creed, socio-economic and political boundaries and can be invoked with success virtually in any community thought out the world. The Popularity sport largely derives is due to its competition spirit at one side and fun and joy on the other side, for everyone, both participants and spectators alike. In contexts where people are facing with difficult and unrelenting challenges in their day-to-day lives, the value of this dimension of sport should not be underestimated (encyclopedia, 2016). Sport is a timeless activity which human beings have been enjoying since ancient times, as exemplified by the Greek Olympic

Games. Indeed, ethnographic and archaeological evidence such as cave paintings and the accounts of early European explorers indicate sports may well go back to the very beginning of humankind. Its popularity is steadily increasing better than the cultural growth and civilization advancement. So, physical education profession is entering one of the most exciting and dynamic eras in its history (pubmed, 2016).

Traditionally physical education profession has been viewed as providing services within the educational field, specifically to school and higher education centers. Recently, the scope of physical education has expanded tremendously. This growth has led not only to substantial increases in knowledge but also to the expansion programmes and the service to the public. Employment opportunities have grown from the traditional careers to non school settings such as health and fitness – related areas, sports management, sports medicine and sports media. This growth has been influenced by many factors. The fitness, movement and the increase in the leisure time has created a market for physical education and sports programs which serve individuals in every walk of their life. Now society has given paramount emphasis on achieving and maintaining optimal health and wellbeing to its members. Disease Prevention and health brand promotion serve as an impetus for expansion of professional opportunities, Physical activities are acknowledged an important factors in the attainment of optimal health for people of all ages (pubmed, 2016). Each day, virtually all people participate in some type of physical activity. For some, this may mean making their bed or preparing meals. For others, this might entail high-intensity exertion, such as running 1500 meters race and so on. Common to all activities, involvement of the cardiovascular response that take place can be brief and relatively minor, such a small increase in heart rate as one stands up from a chair and walks from one room to another. Alternatively, cardiovascular responses can be quiet complex; to the extent that blood flow during intense mountain biking is increased and preferentially directed towards the more metabolically active skeletal muscles. While much is already known about how the cardiovascular system adapts or responds to an acute bout of exercise, many key questions still remain unanswered. A thorough knowledge of cardiovascular physiology, its many terms, and acute exercise responses will help serve persons entering career in medicine, and athletic training (wikipedia, 2016).

Sports consist of training, exercises and performance to improve physical abilities helps in acquiring the skills connected with the technique of the systematic performance of the sports event. In the testing of physical abilities, visual evaluation leaves a gap between exercise and the effects of its systematic repetition. In the guiding of training, an essential problem arises due to the fact that a couple of months are necessary before the training effects are demonstrated in physical abilities and physical working capacity to a measurable extent. Therefore, only delayed feedback information on training effects may be obtained by the tests of physical abilities and competition results. Moreover, the main shortcoming of this feedback information is that the concerned changes reflect an integral action of various exercises, training methods, and regiments (sportsnet.com.2016). Systematically performed physical exercises will yield many positive changes in human organism. Our general understanding of training is that it significantly improves if we consider that all training effects are based on exercise-induced changes in the organism and each change is specifically dependent on the nature exercise, intensity and duration. Thus, each training exercise results in specific changes in the organism that is necessary to obtain the goal of the training. The top-level performance depends on effective training as well as on genetic peculiarities. Therefore, the tasks of training and of sport selection have to be discriminated but it must be emphasized that there are no genetically induced factors that directly determine the level of sports results in any event. The positive significance of genetic factors becomes apparent in training (pubmed, 2016) For many sports, the reliance on more than one energy system dictates the inclusion of various modes of exercise in the training regimen of the athlete. Training multiple energy systems and performing various types of training simultaneously, is referred to as concurrent training. Endurance training results in physiological adaptations (for example, increase in oxidative enzyme activity, capillary density, and mitochondrial content) that are conducive for improving and maintaining prolonged aerobic activities. Resistance training produces changes that are often in direct contrast to those seen during endurance training. Further these adaptations often include increases in muscle mass that may parallel decreases in mitochondrial volume density. Such contrasting adaptations either endurance or resistance training have created a hesitance on the part of both endurance and strength athletes to engage in the opposite form of training for fear that it may compromise desired training adaptations (wikipedia,2016).

In the last few decades sports have gained tremendous popularity all over the globe. The popularity of sports increasing at a fast pace and this happy trend is likely to continue in the future also. Sports have become an important social and cultural activity in the modern world because it contributes a lot towards the all round development of the personality and enhances the horizons of awareness among the competing sports men with regard to the fact that they are representing particular states or countries of their origin (encyclopedia, 2016). Performance in any sports activity depends to a large extent on physical fitness. Sports trainers concentrate on improving the physical fitness and mental abilities of a performer by improving their speed, strength, endurance and flexibility. The extent of the contribution of these factors for sports performance varies in different individuals, in different sports, at different stages of development and different level of competition. The importance of these factors must be identified, prioritized, assessed and modified to exhibit excellence in

performance. Training is usually defined as a “systematic process of repetitive, progressive, exercise or work involving also the learning process and acclimatization” (pubmed, 2016). Training refers to the acquisition of knowledge, skills, and attitudes for sports performance. It forms the core of apprenticeships and provides the backbone of content for professional development. The element of scientific basis of selection is being inducted in the procedures of selection of athletes at various levels in advanced countries. The knowledge from many scientific disciplines is being used for improving the criteria for selection of talent. Physical educational experts have designed test procedures for evaluating the fitness of young children (wikipedia, 2016).

Sport is an inherently social connector bringing together players, team, coaches, volunteers and spectators. A sports person is facing lots of barriers while performing his game or other activities related to sports. It may be physiological or psychological factors (encyclopedia, 2016). Stress is one of the important barriers that a sports person is facing every day. Stress may occur as a psychological factor or as a physiological factor or both. “It is a physical, chemical, or emotional factor that causes bodily or mental tension and may be a factor in disease causation”. (Merriam Webster, 2016). When considering the physiological factor it may be due to salivary cortisol. “Cortisol is a major hormone produced by the adrenal cortex, which is the primary glucocorticoid secreted by the adrenal gland in response to ACTH stimulation or stress”. (McGraw Hill Concise Dictionary of Modern Medicine, 2002). Cortisol is a stress hormone which is produced by the adrenal gland and seen in the saliva. Cortisol gives stress to sports persons. The increased amount of cortisol in saliva gives stress to a sports person and it will decrease his performance. Increasing of cortisol in saliva also creates ill effect to the health of an athlete. Sudden onset of severe pain in the lower back, abdomen or legs, vomiting, low blood pressure, loss of consciousness etc. producing too little of cortisol create disorders in a sports person. They are identified as; weight loss, muscle weakness, fatigue, low blood pressure, abdominal pain, dark patches of skin etc, in general producing too much or too little of cortisol hormone causing disorders in a person. For example the events such as sprinting, heavy weight lifting etc can increase cortisol level. The thing is that the cortisol level should be maintained as normal. Among the sports events, walking, yoga etc keep the cortisol level to a normal. Cortisol causes breakdown of protein, fat and produce new glucose. Higher levels of cortisol before competition were associated with feelings of tension, anxiety and hostility. These all are part of the stress. So in the case of a sports person, the cortisol level must be normal, otherwise it will affect badly on the performance (Dr. James L Wilson, 2012). This study was trying to find out the effect of cortisol hormone on the performance of a sports person. The administration of the test provides information to realize that in which time of a day while in training a sports person produce higher level of cortisol hormone. By finding out this factor the coaches, trainers, and physical education teachers can understand their students’ stress and regulate their coaching according to the stress level of the performer. The cortisol hormone also can be found out through the blood test. The reason for selecting saliva to find out cortisol hormone is mainly because to avoid confusion, the ease in collection of samples and uncertainty (Pubmed, 2016).

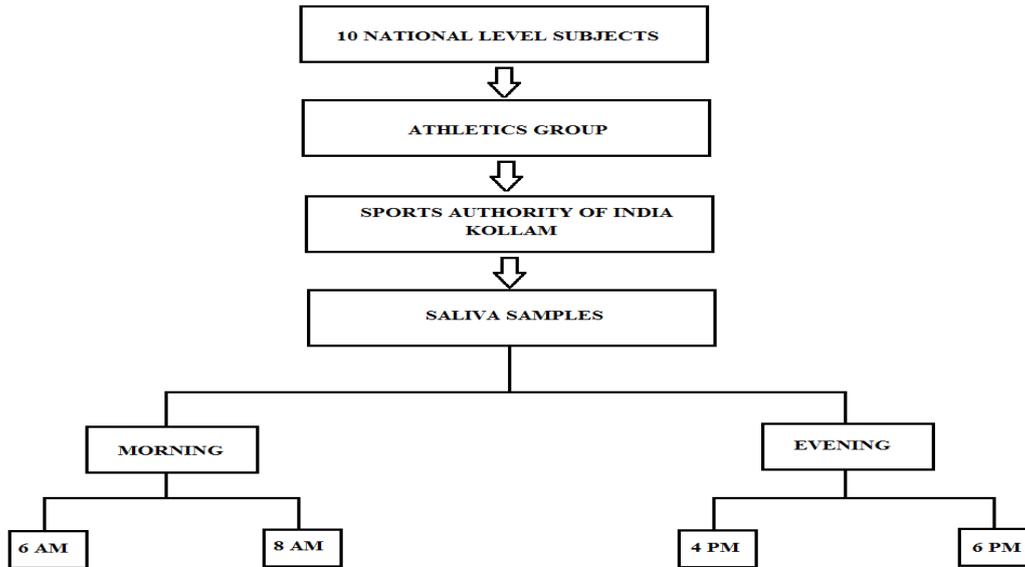
Saliva testing is an easy way to find out the cortisol level. It is adrenal gland, which is mainly responsible for all of our responses to stress. Levels of the main adrenal hormone, cortisol, rise and fall in a daily pattern that underlies the more erratic fluctuations caused by the stress response. Cortisol output by our adrenal glands is one of the most reliable indicators of our adrenal functions and how well our body is dealing with stress. The cortisol saliva test measures the levels of the stress hormones and provides an evaluation of how cortisol level differs throughout the day. The test involves simply spitting into a test tube. Cortisol is measured four times – in the morning (8AM), noon, evening (4PM) and night (11PM). Other steroid hormones, such as estrogen, progesterone, immunoglobulin (DHEAS) and testosterone can be measured along with cortisol in the saliva sample, if desired. Saliva tests are reliable indicators of the levels of all steroid hormones (cortisol, immunoglobulin and all sex steroids) in our body. However just as with blood tests, some labs are more reliable than others. The National Institutes of Health (NIH) and the World Health Organization (WHO), recognize saliva cortisol testing as being very accurate (pubmed, 2016).

Significance of the Problem:

This study reveals us that in what all times an athlete feels increased and decreased amount of stress level. The study may help the coaches and physical education teachers to select appropriate training for their students. The study also helps them to regulate their training programme according to the stress level of the athletes. The study shall help to increase the performance of athletes by getting proper training. For the present study the investigator administered salivary cortisol test in order to find out the level of stress among the athletes. Salivary cortisol test is to find out the amount of cortisol in human and cortisol is a stress indicator. In the present study the national level ten athletes were selected as the subjects from Sports Authority of India, Kollam. Athletes age ranged from 13-20 years. Ten national level athletes are selected for analysing the cortisol level. The test item selected for the study was salivary cortisol test. In order to find out the stress of athletes by cortisol, the salivary cortisol test is conducted the test involves simply spitting into a test tube. Cortisol is measured four times; morning 6 am before activity, morning 8 am after activity, evening 4 pm before activity and evening 6 pm after activity. The pure saliva must be collected as sample, there without even a single bubble in the saliva. The collected saliva samples are measured through Architech, a fully automatic machine which

shows the amount of cortisol in athletes. The collection of data was administrated in the following method. The saliva samples of 10 national level athletes (N=10) of Sports Authority of India collected four times. The samples are collected during training days. The pure saliva was collected as sample without even a single bubble in the saliva.

The cortisol in saliva is measured four times. For this few steps have to be followed. The first sample should be collected in the early morning 6 am. Athletes' mouths should be clean and fresh before collecting the saliva. Then the athlete can undertake for his training session. The second saliva sample should be collected at 8 am after completing the morning training session. The third sample collected in the evening 4 pm, before his evening training session. begin. The fourth and last sample should be taken at 6 pm after his training session. Each sample kept in a refrigerator after their collection. When all the samples are collected, it is brought to a medical lab to measure the cortisol level. After getting the results of saliva samples, it is being compared to each other. The following figure shows the procedures of collection of data which is adopted for the present study;



Scoring and Consolidation of Data:

All athletes were provided by 4 xeroid bottles in order to collect the saliva samples four times. After completing the collection, the samples are send to medical lab to measure the cortisol in saliva of athletes. The saliva is tested through a fully automatic machine called Architech. The cortisol in saliva will be measured and showed in Nano Gram (ng) in the machine.

Salivary Cortisol Level in Athletes:

S.No	Name of Athletes	Cortisol at 6 am Before Training	Cortisol at 8 am After Training	Cortisol at 4 pm Before Training	Cortisol at 6 pm After Training
1	Saifudhean	511 ng	455 ng	263 ng	305 ng
2	Riswan	679 ng	633 ng	364 ng	485 ng
3	Fahad	761ng	373 ng	246 ng	432 ng
4	Celestine	328 ng	205 ng	233 ng	295 ng
5	Akshay	830 ng	252 ng	247 ng	233 ng
6	Murshid	658 ng	277 ng	1023 ng	354 ng
7	Melbin	436 ng	251 ng	202 ng	689 ng
8	Abrin	604 ng	558 ng	257 ng	340 ng
9	Shivaraj	589 ng	415 ng	278 ng	423 ng
10	Adhithyan	330 ng	189 ng	308 ng	321 ng

Statistical Technique to be Employed:

The descriptive statistics such as mean; ANOVA and SPSS software aere used for the comparison of salivary cortisol level of athletes among four samples in a training day.

Conclusion:

Haneishi, Kanae, Andrew.C, Moore, & Christopher, 2007, researched on cortisol and stress responses during a game and practice state that salivary cortisol levels increased postgame for both starters and nonstarters; they increased to a greater extent for the starters. It appears that both physiological and psychological variables combine to contribute to the large stress hormone response to an actual competitive

game. According to Martinez. AC, Seco. Calvo. J, & Turmari. J.A, 2010, to prevent the stress provoked during the season, and control the recovery periods, it is useful to monitor cortisol, testosterone, and the level of training. Helen. S. Bateup, Alan. Booth, Elizabeth.Shirtc, & Douglas. A. Granger, 2002 state that testosterone and cortisol levels increased in anticipation of the matches. Postgame levels of both hormones were higher than pregame levels. Claudio. Heitor. Balthazar, Marcia. Carralho, & Regina. Celia, 2011, state that early morning salivary cortisol concentration, but not testosterone/cortisol ratio, could be used to predict performance in athletes during a professional triathlon competition. The present study was to find out the effect of cortisol hormone on a performing sports person. The administration of the test reveal that during training day a sports person have higher level of cortisol hormone in the morning section (6 am before an athlete's morning training section) than other times. In the light of the present study one can say that an athlete is facing more stress in the morning before his training session when compared to other times of the day. This finding will help the coaches, trainers, physical education teachers to understand their students' stress and there after rejuvenate their coaching according to the stress level. The test involves simply spitting into a test tube. The saliva four times; morning at 6 am before activity, morning at 8 am after activity, evening at 4 pm before activity and evening at 6 pm after activity. The pure saliva was collected as sample without even a single bubble in the saliva. The level of cortisol in collected saliva samples were measured by Architech, a fully automatic machine which shows the amount of cortisol in athletes. The collected data was statistically analyzed and compared in order to find out the significant difference in the cortisol level of athletes at various times. And it is statistically proved that there is a significant difference in the cortisol levels of athletes, especially in the morning section. An athlete produces higher level of cortisol in the morning, at 6 am before training. It conveys us that an athlete feels high level of stress in the morning session. The difference of samples proved by statistics is 0.05. The result of the study reveals that there is significant difference in the cortisol level of athletes in their training session especially early morning. Further, it reveals that there is a significant increase in the level of cortisol in athletes in the morning, before the training section.

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