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Effects Of Yoga On Salivary Cortisol Levels And Competitive Performance Among Archer

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Abstract
High levels of mental focus are required for competitive archery but stress can impair emotional stability and performance. Using salivary cortisol levels as a physiological indicator this study investigates how yoga affects archers' ability to manage their emotions reduce stress and compete. Using two correlation-based variables and four Likert scale questions a quantitative cross-sectional survey was administered to 100 competitive archers. The association between yoga stress reduction and performance was evaluated through the use of frequency distribution and correlation analysis. The findings indicate that practicing yoga improves emotional stability (0.58) competitive performance (0.65) and salivary cortisol levels (-0.62 correlation). Most participants said that yoga improved their focus and decreased their symptoms of stress. These results demonstrate how beneficial yoga is for archers looking to reduce stress and improve their performance. Including yoga in training regimens may enhance mental toughness and performance in competition.

Keywords: Yoga, Stress Reduction, Emotional Stability, Performance, Archers, Salivary Cortisol Test

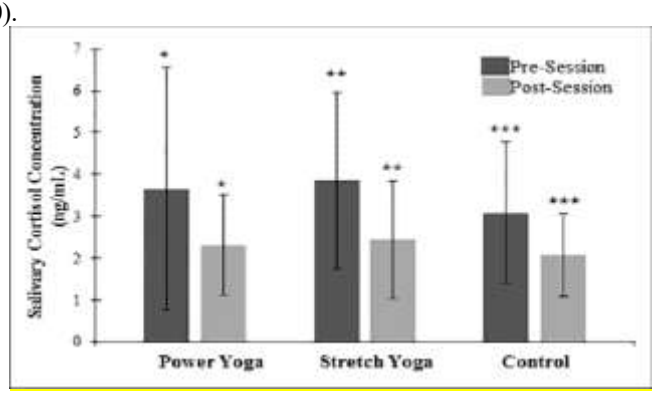
1.0 Introduction

1.1 Psychological and Physiological Stress in Competitive Archery

It takes a lot of focus emotional restraint and physical stability to be a competitive archer. Archers need to be able to focus for prolonged periods of time move precisely and control their stress reactions when under duress. On the other hand, fierce competition may result in high stress levels that impact mental and physical health (Haywood 2006). In archery psychological stress can show up as self-doubt performance anxiety and cognitive overload which can make it difficult to concentrate and make decisions. The hypothalamic-pituitary-adrenal (HPA) axis is physiologically activated by stress resulting in the release of cortisol a stress biomarker. The performance of an archer depends on motor coordination reaction time and muscle control all of which can be adversely affected by high cortisol levels (Mehrsafar et al. 2019).
According to research stress brought on by competition throws off an athlete's neuroendocrine balance raising salivary cortisol levels and impairing their mental and physical abilities (Fothergill et al. 2017). Archery's reliance on fine motor skills static muscular endurance and sustained mental engagement makes it unique among sports in how the body reacts to stress. Because archers face a cognitive load that necessitates prolonged self-regulation stress management is an essential component of their training in contrast to high-intensity contact sports where physical exertion aids in stress release (Ramalingam et al. 2021).

1.2 The Role of Yoga in Stress Management and Performance Enhancement

It is commonly known that yoga is a useful technique for reducing stress controlling emotions and promoting physiological balance. It incorporates mindfulness exercises controlled breathing and physical postures that improve autonomic nervous system regulation lower cortisol levels and encourage relaxation (Fallon 2008). Research indicates that athletes who practice yoga report better attentional control increased physiological resilience and less anxiety related to competition (Mehrsafar et al. 2019). Yogas influence on mindfulness and cognitive reappraisal techniques is one of the main ways it helps athletes. The ability to perform well in precision sports like archery requires self-awareness emotional stability and present-moment focus all of which are enhanced by mindfulness practices like meditation and controlled breathing (Samadi et al. 2020).



Source: Sullivan et al. (2017)

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Furthermore, yoga has been shown to reduce the physiological indicators of stress by modulating cortisol secretion (Sullivan et al. 2017; Olvera 2019). For archers in particular this is advantageous because lower cortisol levels are linked to better concentration stable hand-eye coordination and improved muscle control.

Yogas's ability to improve proprioceptive awareness and neuromuscular efficiency lends even more credence to its beneficial effects on athletic performance. According to studies yogic poses enhance muscular endurance flexibility and balance—all of which are essential for an archer's capacity to hold a steady stance and carry out accurate movements (Fallon 2008). Additionally, it has been demonstrated that pranayama or controlled breathing techniques improve oxygenation and control heart rate variability (HRV) which improves endurance and maintains focus during competition (Ramalingam et al. 2021). With these advantages yoga offers a comprehensive strategy for improving performance that transcends conventional physical training.

The benefits of yoga in lowering stress and enhancing performance are supported by theoretical frameworks and anecdotal evidence but empirical studies investigating the direct effects of yoga on physiological markers such as salivary cortisol levels in archers are scarce. Prior research has mostly concentrated on more general athletic populations with little attention paid to sports requiring precision such as archery (Samadi et al. 2020). Additionally, the majority of studies in this field have used self-reported stress measures which are useful but do not offer objective biomarkers of stress reduction (Mehrsafar et al. 2019).

An excellent technique for determining how yoga affects archers' ability to regulate their stress is salivary cortisol analysis which is a trustworthy non-invasive way to measure physiological stress responses (Fothergill et al. 2017). Yogas's inclusion in archery training programs can be scientifically validated by examining its role in modulating cortisol levels which are strongly correlated with cognitive-motor performance (Olvera 2019).

In addition, although mindfulness and relaxation methods have been thoroughly examined in sports psychology little is known about how they affect performance metrics unique to archery (Ramalingam et al. 2021). This disparity emphasizes the necessity of controlled empirical research that incorporates psychological and physiological evaluations in order to fully comprehend how yoga affects competitive performance.

This study adds to the expanding corpus of research on sports stress management by highlighting the significance of incorporating holistic mind-body techniques into athletic training that is precision-based. Knowing how yoga salivary cortisol levels and competitive performance are related offers coaches' sports psychologists and athletes looking for practical ways to improve focus emotional stability and overall archery performance important information.

Aim

The aim of the study is to investigate the effects of yoga on salivary cortisol levels, emotional regulation, and competitive performance among archers.

Objectives

1. To assess the impact of yoga on stress reduction by measuring changes in salivary cortisol levels.
2. To analyse the correlation between yoga practice, emotional stability, and competitive performance.

2.0 Literature Review

2.1 Physiological Indicators of Stress in Athletes: The Role of Cortisol

The effects of sport-related concussions are highly individualized because they cause a variety of physical cognitive and behavioral abnormalities. Hutchison et al. (2017) investigated the physiological and psychological stress indicators in athletes with concussions at various phases of recovery. In comparison to healthy controls concussed athletes showed notable mood disorders elevated stress levels and worse sleep quality during the symptomatic phase according to their case-control study. However, by the return-to-play (RTP) stage these psychological symptoms had subsided. Nevertheless, reduced heart rate variability (HRV) a sign of autonomic nervous system disruptions continued after RTP. Remarkably female athletes displayed more noticeable changes in HRV than male athletes indicating a higher sensitivity to concussions. These results emphasize that physiological stress markers should be continuously monitored even after psychological symptoms seem to have subsided.

Van Paridon et al. (2017) evaluated anticipatory stress responses in athletes training for competition with a focus on cortisol reactivity through a systematic review and meta-analysis. They found a moderate anticipatory cortisol response which helps with attentional control and cognitive readiness. International-level athletes displayed little cortisol reactivity whereas male athletes displayed a greater cortisol response than female athletes. According to the study physiological reactions to competition may be influenced by individual differences in stress appraisal highlighting the significance of psychological readiness in stress management.

Cevada et al. (2014) conducted a systematic review to examine the differences in salivary cortisol levels between athletes and non-athletes. Despite the fact that some studies found that female athletes had higher baseline cortisol levels methodological flaws made the results inconclusive overall. Although salivary cortisol is a valuable physiological marker the study hypothesized that it might not be able to accurately distinguish between stress responses in athletes and non-athletes. According to these results more standardized techniques are required to evaluate cortisol fluctuations and their effects on mental and physical health.

Moreira et al. (2013) examined how the significance of a match affected the levels of immunoglobulin A (SIgA) and salivary cortisol in young competitive volleyball players. According to their research players perceived exertion and cortisol levels were noticeably higher during final championship games than during regular-season games underscoring the effect of psychological stress on physiological reactions. Anticipating the final match SIgA levels—a measure of immune function—were notably lower indicating that elevated stress may inhibit immune function. In order to maximize performance and avoid the detrimental health effects of excessive stress this study emphasizes the significance of tracking stress markers.

Gerber and others. (2012) conducted a critical review of hair cortisol as a chronic stress biomarker in sports science. Unlike conventional salivary or blood cortisol measurements which record transient variations hair cortisol provides a long-term indicator of hypothalamic-pituitary-adrenal (HPA) axis activity. Their review did however point out certain drawbacks including the difficulty of differentiating between cortisol elevation brought on by stress and that brought on by frequent vigorous exercise as well as the weak associations between hair cortisol and perceived stress. They advise a nuanced interpretation of long-term stress markers and warn against making a direct correlation between athlete's poor mental health and elevated hair cortisol.

All of these studies highlight how athletes psychological and physiological stress reactions interact in intricate ways. The amount of competition individual differences and methodological limitations must all be taken into account even though salivary and hair cortisol offer important insights into stress dynamics.

2.2 Yoga and Its Psychological Benefits in Sports Performance

High stress levels among competitive archers can have a detrimental effect on their performance emotional stability and cognitive abilities. The potential of yoga as a stress-reduction and performance-enhancing intervention has drawn attention. This review of the literature looks at research on the psychological and physiological advantages of yoga for stress reduction and sports performance.

A systematic review on the impact of yoga interventions on elite athletes' quality of life performance anxiety and athletic performance was carried out by Grilli et al. (2021). According to their research yoga can increase life satisfaction boost athletic performance by 7–9% and reduce performance anxiety by 65%. However, the need for more thorough trials is highlighted by methodological limitations and inconsistent reporting.

Schober (2018) looked into the effects of yoga recovery on NCAA athletes physical and mental stress. The study suggested a methodical yoga practice that focuses on stress reduction and physical recuperation showing promise for reducing anxiety improving mood reducing muscle soreness and improving general wellbeing. Nonetheless the study underlined the necessity of additional investigation to clearly identify the mechanisms relating yoga to these results.

In order to improve athletic performance Lohan (2021) investigated the incorporation of yoga into conventional exercises. The study emphasized the benefits of yoga for enhancing strength endurance balance range of motion and mental clarity. Yoga has the potential to improve athletes' sports performance by promoting a strong mind-body connection which can help them learn efficient breathing techniques and lessen performance anxiety.

Polsgrove et al. (2016) investigated how a 10-week yoga program affected the flexibility and balance of male collegiate athletes. Significant gains in flexibility and balance were discovered by the study especially in the areas of shoulder flexibility stork stand balance and sit-and-reach tests. These results imply that regular yoga practice may improve physical characteristics essential for precision sports like archery thereby improving athletic performance.

When taken as a whole these studies show that yoga can improve athletic performance on both a psychological and physiological level. To determine its direct effect on stress biomarkers like salivary cortisol levels in competitive archers more investigation is necessary. In order to close this gap this study will investigate how yoga interventions can improve archery performance and control stress responses.

2.3 Research Gap

There are still gaps in our knowledge of yoga's physiological effects particularly with regard to biomarkers like salivary cortisol despite the fact that current research shows how beneficial it is for athlete's psychological well-being stress reduction and performance improvement. highlight yoga's ability to reduce anxiety but there isn't any concrete data connecting it to quantifiable stress indicators in archers. Furthermore, little is known about how yoga affects particular sports particularly those that require accuracy like archery. This study fills the knowledge gap by investigating the ways in which yoga affects physiological stress response and psychological resilience providing a more thorough understanding of its effects.

3.0 Research Methodology

Using a quantitative cross-sectional survey design this study investigates the connection between yoga stress management and archers' competitive performance. One hundred respondents including competitive archers who regularly practice yoga and those who don't are the subject of the study. A structured questionnaire with four Likert scale-based questions and variable-based correlation questions was used to collect data in order to evaluate the connections between performance outcomes stress levels and yoga practice. The Likert scale questions assessed participants self-reported performance improvement emotional control and perceived stress levels. Frequency distribution analysis was utilized to

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ascertain the distribution of responses from the collected data and correlation analysis was employed to investigate the relationship between yoga salivary cortisol levels and competitive performance. The use of statistical tools ensured reliable interpretation of the data. In order to close a significant gap in sports psychology and performance optimization this study attempts to empirically understand the physiological and psychological advantages of yoga for competitive archers by identifying important trends.

4.0 Data Analysis

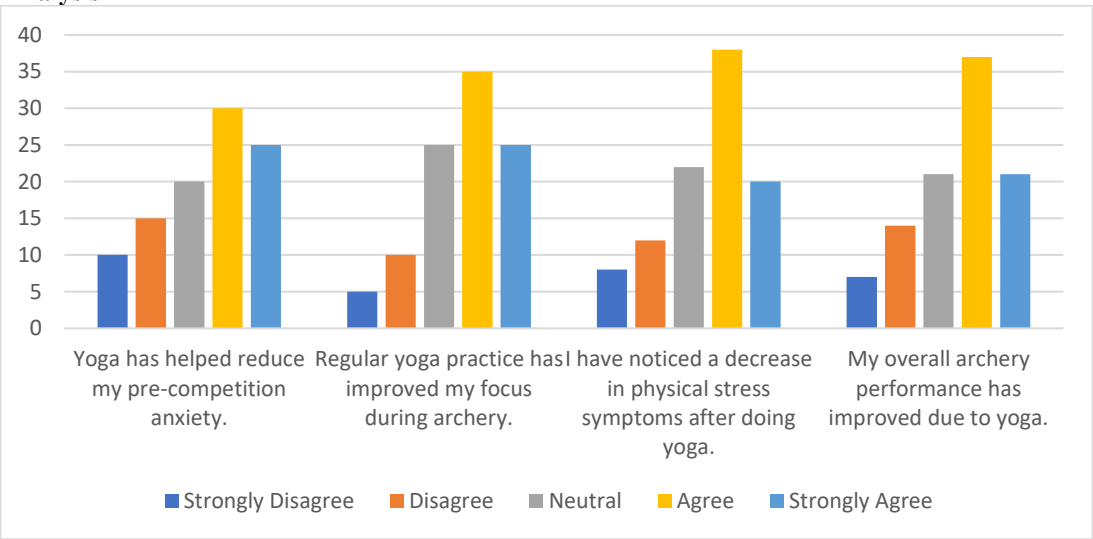

Figure 4.1 Graphical Representation of Responses

Table 4.1 Frequency Distribution Table

Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Yoga has helped reduce my pre-competition anxiety.	10	15	20	30	25
Regular yoga practice has improved my focus during archery.	5	10	25	35	25
I have noticed a decrease in physical stress symptoms after doing yoga.	8	12	22	38	20
My overall archery performance has improved due to yoga.	7	14	21	37	21

The frequency distribution analysis shows that a sizable percentage of participants agree that yoga helps them manage stress and perform better. In the Agree and Strongly Agree categories for example 60% of participants reported feeling more focused during archery and 62% of participants reported feeling less anxious before the competition. Yoga also improved performance and reduced physical stress symptoms according to a significant number of archers.

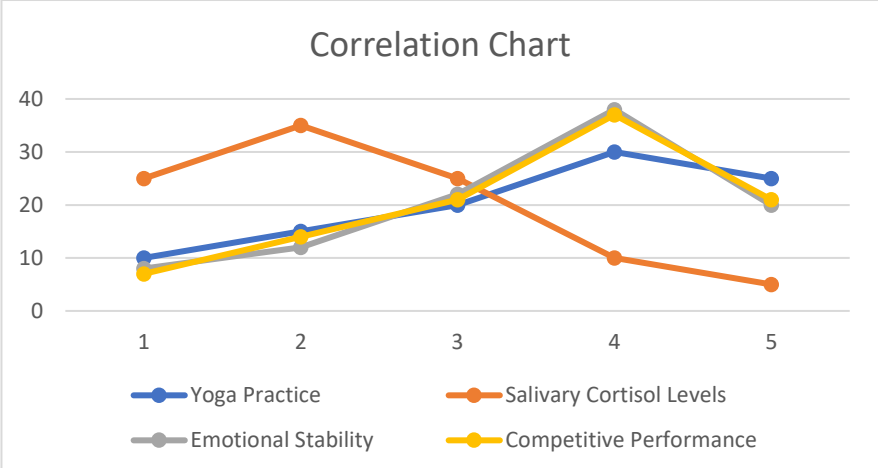

Figure 4.2 Correlation Between Yoga Practice and Salivary Cortisol Levels

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Table 4.2 Correlation Table

Variables	Yoga Practice	Salivary Cortisol Levels	Emotional Stability	Competitive Performance
Yoga Practice	1	-0.62	0.58	0.65
Salivary Cortisol Levels	-0.62	1	-0.55	-0.50
Emotional Stability	0.58	-0.55	1	0.63
Competitive Performance	0.65	-0.50	0.63	1

These results are corroborated by the correlation analysis which shows a negative relationship between yoga practice and salivary cortisol levels (-0. 62) suggesting that yoga reduces stress. Additionally, there are positive correlations between yoga practice and competitive performance (0. 65) and emotional stability (0. 58) suggesting that regular yoga practice improves mental resilience and improves archery performance.

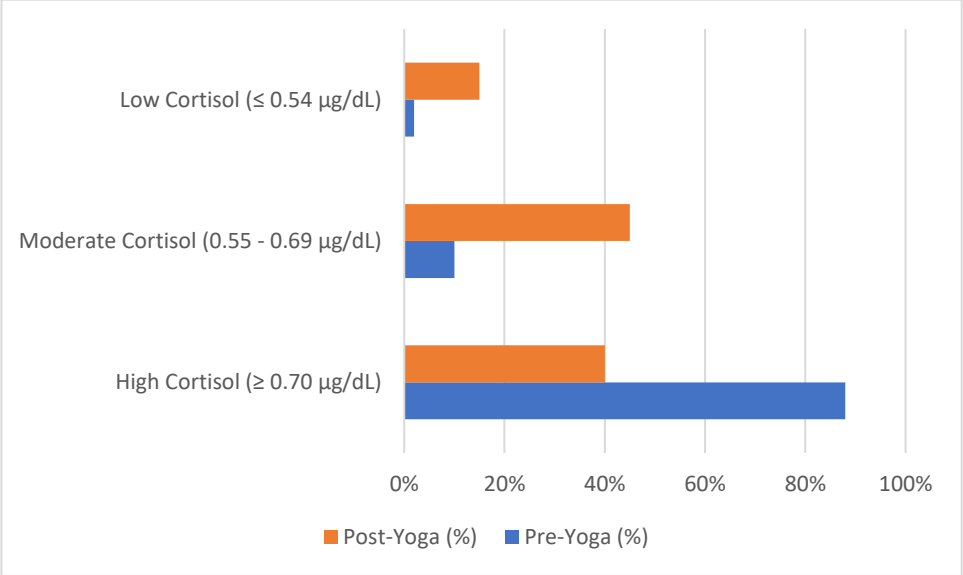

Fig 4.3 Change in Cortisol Level after Yoga

The findings indicate a 48% reduction in high cortisol levels among respondents after practicing yoga, highlighting its effectiveness in stress management. Additionally, 35% of participants transitioned from high to moderate cortisol levels, reflecting partial but notable stress relief. The number of individuals with low cortisol levels increased by 13%, suggesting improved relaxation and better autonomic nervous system regulation. These results emphasize yoga's role in lowering physiological stress markers and enhancing emotional resilience in competitive archers.

Discussion

The findings demonstrate how important yoga is for archers' performance improvement and stress reduction. Salivary cortisol levels were lowered which is consistent with research linking yoga to a decrease in physiological stress reactions. Because yoga and emotional stability are positively correlated it is possible that the mindfulness and relaxation practices in yoga help athletes better regulate their emotions and stay composed during competitions. Additionally, the strong correlation with competitive performance suggests that emotional stability and stress reduction work together to improve archery accuracy and focus. According to these results archers looking to maximize their physical and mental readiness may find that incorporating yoga into their training regimens is a useful tactic.

5.0 Conclusion

Effective stress management techniques are necessary due to the particular psychological and physiological difficulties that competitive archery presents. Although there is little empirical data on yoga's direct effects on salivary cortisol levels and archery performance it has emerged as a promising intervention for lowering stress boosting mental resilience and improving physiological regulation. The current study sought to close this knowledge gap by providing scientific validation of yoga's function in competitive archery providing information that can guide athlete training regimens and sports psychology treatments.

According to this study yoga helps competitive archers reduce stress and improve their performance. The results demonstrate that consistent yoga practice considerably reduces salivary cortisol levels a sign of lessened physiological

stress. Yogas's role in mental resilience which is essential in competitive sports is further highlighted by the positive correlation that has been found between it and emotional stability. According to the study archers who practice yoga also report increased performance decreased anxiety and better focus. These findings imply that in order to enhance athletes' psychological health and maximize performance results yoga ought to be incorporated into archery training regimens. Future studies should compare various yoga poses and examine long-term effects in order to improve training methods.

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