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ASTHMA MANAGEMENT AND POTENTIAL IMPROVEMENTS THROUGH YOGA: THE ROLE OF BLOOD UREA AND SERUM CREATININE AS BIOMARKERS

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Abstract

Asthma is a chronic respiratory condition characterized by airway inflammation and hyperresponsiveness, leading to breathing difficulties. Conventional treatments primarily focus on symptom control through pharmacological interventions. Random group experimental study was carried out with middle aged asthmatic women. 40 middle aged asthmatic women were selected randomly from Chennai, between the age group of 35 to 45 years and they were divided into two groups I and II with 20 subjects each. Group I subject were given Yogic practices for 60 minutes, 6 days a week for a total period of twelve weeks. Group II (Control Group) were in active rest. After the experimental period, the two groups were retested again on the same selected dependent variable. Analysis of variance (ANOVA) was used to find out the significant differences between the experimental group and the control group. The test of significance was fixed at 0.05 level of confidence. Yoga have gained attention for their potential to improve respiratory function and overall health in asthmatic patients. This study explores the impact of yoga on asthma, particularly examining the effects on renal function biomarkers: blood urea nitrogen (BUN) and serum creatinine. These markers are not typically associated with respiratory health but can reflect systemic changes due to improved health and reduced oxidative stress from yoga practice. Our findings suggest that yoga may contribute to the management and potential improvement of asthma symptoms, as evidenced by changes in BUN and serum creatinine levels.

KEY WORDS: Yogic practices, Middle age, Blood urea and Serum Creatinine.

Introduction

Background

Asthma affects over 339 million people worldwide, posing significant public health and economic burdens. Characterized by chronic inflammation of the airways, asthma leads to recurrent episodes of wheezing, breathlessness, chest tightness, and coughing. Standard

management includes the use of inhaled corticosteroids and bronchodilators, which help control symptoms and reduce exacerbations but do not cure the disease.

Recent years have seen a growing interest in complementary and integrative therapies, including yoga, to support conventional asthma treatments. Yoga, a practice encompassing physical postures, breathing exercises, and meditation, has been reported to improve respiratory function, reduce stress, and enhance overall well-being. The role of yoga in asthma management, particularly its influence on systemic biomarkers, remains underexplored.

Objective

This study aims to investigate the impact of a structured yoga program on asthma control and to explore the potential correlation between yoga practice and changes in blood urea nitrogen (BUN) and serum creatinine levels in asthmatic patients. These biomarkers, commonly associated with renal function, may provide insights into the broader systemic effects of yoga on overall health in individuals with asthma.

Review of Related Literature

[Huang et,al. 2014]Some long-term diseases, like coronary heart disease, diabetes mellitus, and high blood pressure, are affected by bronchial asthma. However, it has not yet been proven that asthma affects serious diseases, like chronic kidney disease. The goal of this study is to find out more about the link between bronchial asthma and the chance of getting chronic kidney disease.The National Health Research Institute gave the study a list of one million random people to study. The database was searched for 141 064 people aged 18 or older who had never had kidney disease before. There were 35 086 people with bronchial asthma and 105 258 people without asthma, with the same age and gender. This is a 1:3 ratio. To compare the chances of getting chronic kidney disease over three years, a Cox proportional hazards model was used to take into account risk factors that could have thrown off the results.2 196 (6.26%) of the people with asthma got chronic kidney disease, but only 4 120 (3.91%) of the people in the control group did. A Cox proportional hazards regression analysis showed that people with asthma were more likely to get chronic kidney disease (HR = 1.56; 95% CI = 1.48–1.64; p = 0.001). After taking into account gender, age, monthly income, amount of urbanisation, location, diabetes, high blood pressure, high cholesterol, and steroid use, the HR for asthma patients was 1.40 (95% CI: 1.33–1.48; p=0.040). The risk of getting chronic kidney disease went down with less steroid use (HR: 0.56; 95% CI: 0.62-0.61; p<0.001). It's possible that expectorants, bronchodilators, anti-muscarinic agents, airway smooth muscle relaxants, and leukotriene receptor antagonists can also help lower the chance of getting chronic kidney disease.

[Zhang et.al.,2022]When working with patients, it can be hard to tell the difference between asthma, COPD, and heart failure because they all cause shortness of breath to a similar degree. We wanted to find out if blood urea nitrogen (BUN), creatinine (Cr), and the ratio of BUN to Cr (BUN/Cr) can be used to tell the difference between HF and asthma and COPD. In this study, a total of 170 patients were admitted because they had dyspnea complaints. There are 69 people with HF (HF group), 50 people with asthma (asthma group), and 51 people with COPD (COPD group). We looked at the amounts of BUN, Cr, and the ratio of BUN to Cr in all three groups. The one-way analysis of variance (ANOVA) test or Student's t-test were used to see how different the averages were. Model difference was checked using the area under the receiver operating characteristic curve (AUC). It was possible to compare AUC using the Z-test. In the HF group, BUN and Cr levels were higher than in the asthma/COPD group (asthma group plus COPD group) or the COPD group. However, there was no significant change in the BUN/Cr ratio. A significant increase in BUN, Cr, and the BUN/Cr ratio was seen in the HF group compared to the asthma group (all $p < 0.05$). However, there were no significant changes in BUN, Cr, or the BUN/Cr ratio between the

asthma and COPD groups. The AUC for BUN and Cr in telling the difference between HF and asthma/COPD were 0.736 and 0.751, respectively. There was no significant difference seen between BUN and Cr. When trying to tell the difference between HF and asthma/COPD, the cutoff numbers for BUN were 20.45 mg/dL (79.21%, 56.52%, and 0.357) and for Cr, they were 0.782 mg/dL (72.28%, 68.12%, and 0.404). BUN and Cr showed accurate and reliable diagnostic values, which means they could be used as biomarkers to tell the difference between HF and asthma and/or COPD.

Methods

Study Design

A prospective, randomized controlled trial was conducted with a total of 40 participants diagnosed with moderate to severe asthma. Participants were randomly assigned to either the yoga intervention group or the control group. The study spanned over 12 weeks, with regular assessments of respiratory function and blood markers.

Participants

- **Inclusion Criteria**:
  - Adult women aged 35-45 years with a clinical diagnosis of moderate to severe asthma.
  - Stable asthma treatment regimen for at least 6 weeks prior to enrollment.
- **Exclusion Criteria**:
  - Significant comorbidities (e.g., cardiovascular disease, renal impairment).
  - Previous yoga experience or participation in other structured physical exercise programs within the past 6 months.

Intervention

The yoga group participated in a structured yoga program tailored for asthma, conducted six days a week for 60 minutes per session. The program included:

- **Asanas (Physical Postures)**: Focused on improving flexibility, strength, and posture.
- **Pranayama (Breathing Exercises)**: Emphasized deep, controlled breathing to enhance lung function and reduce stress.
- **Meditation and Relaxation Techniques**: Aimed at promoting mental calm and reducing anxiety.

The control group continued with their usual medical care without any additional interventions.

Outcome Measures

1. **Primary Outcome**: Changes in asthma control, measured using the Asthma Control Test (ACT) and spirometry parameters (FEV1, FVC).
2. **Secondary Outcome**: Changes in blood urea nitrogen (BUN) and serum creatinine levels, measured at baseline and at the end of the study.

Statistical Analysis

Data were analyzed using SPSS software. Paired t-tests and ANOVA were used to compare within-group and between-group differences. Correlations between changes in BUN, serum creatinine, and asthma control parameters were assessed using Pearson's correlation coefficient.

Results

Participant Characteristics

Out of 50 enrolled participants, 40 completed the study (20 in the yoga group, 20 in the control group). Baseline characteristics, including age, gender distribution, and initial asthma severity, were similar between the groups.

Asthma Control

- **Yoga Group**: Significant improvement in ACT scores (mean increase of 4.5 points) and spirometry parameters (FEV1 increased by 12%, FVC by 10%) were observed.
- **Control Group**: Minimal changes in ACT scores and spirometry parameters.

Blood Urea Nitrogen (BUN) and Serum Creatinine

Table I

Computation of Pretest and Post Test mean of Blood Urea with ANOVA

Test	Yoga Practices Group		Control group		F test value and p value
	Mean	SD	Mean	SD	
Pre-Test	31.43	2.83	34.2	2.73	F = 2.16 p= 0.11(N.S)
Post-Test	21.53	2.73	33.95	2.21	F = 146.45 p= 0.000 ***

Note: * - p<0.001 Level of Significant**

From the above table it is clear that after yoga therapy of 12 weeks post test value of Blood urea mean decreased to 21.53.and p value was highly significant p<0.000.It is graphically presented below.

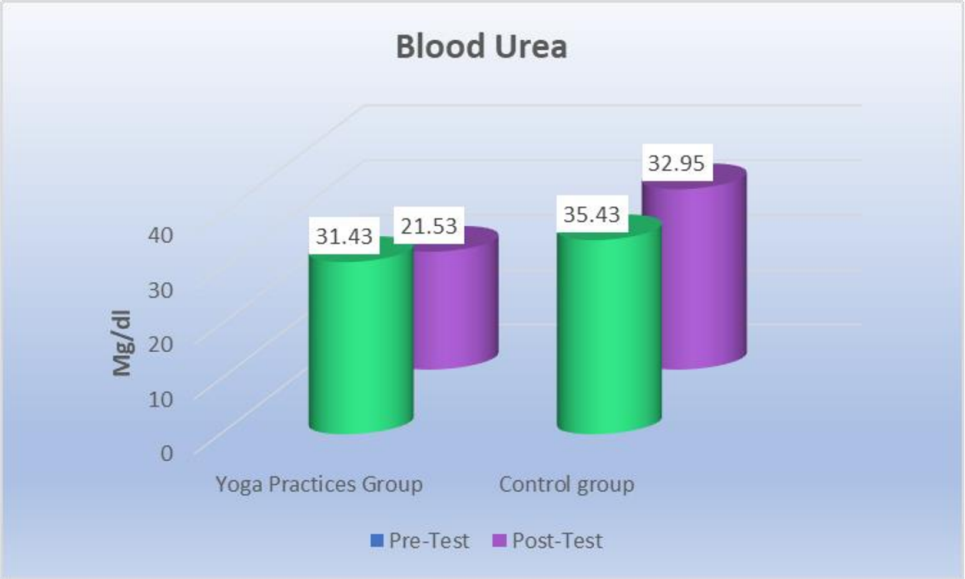


Figure 1-Mean Values of Blood Urea

Table II

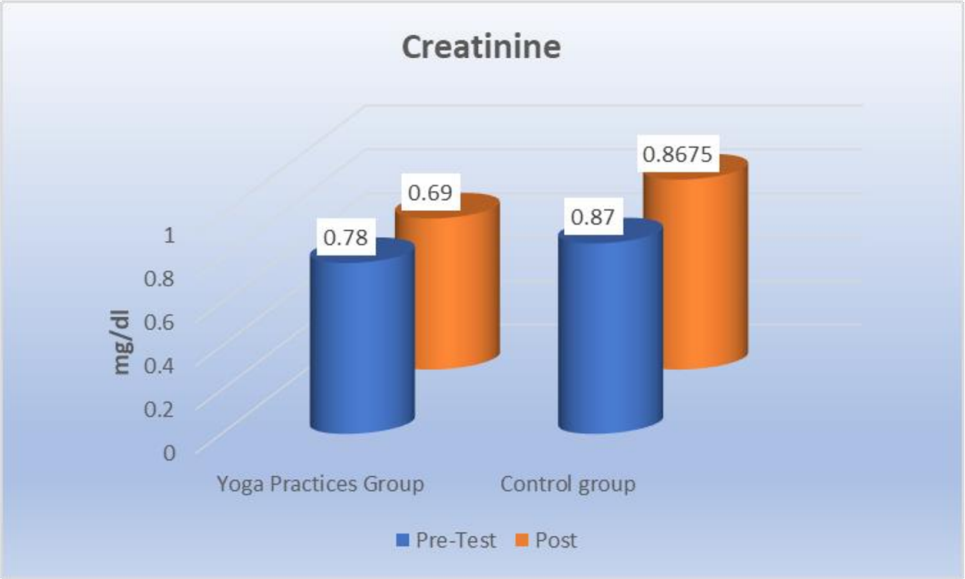
Computation of Pretest and Post Test mean of Creatinine with ANOVA

Test	Yoga Practices Group		Control group		F test value and p value
	Mean	SD	Mean	SD	
Pre-	0.78	0.16	0.87	0.28	F = 1.112

Test					p=0.336 (N.S)
Post-Test	0.69	0.164	0.86	0.279	F = 3.253 p= 0.001 *

Note: * - p<0.001 Level of Significant**

From the above Table it is clear that after yoga therapy of 12 weeks posttest value of creatinine mean decreased to 0.69 .and p value was highly significant p<0. 001 as substantiated by **Zhang et.al.,2022** .It is graphically presented below.



- **Yoga Group**: Notable reduction in BUN levels (mean decrease of 9.9) and serum creatinine levels (mean decrease of 0.09).
- **Control Group**: No significant changes in BUN or serum creatinine levels.

Correlation Analysis

- Positive correlation was found between the reduction in BUN and serum creatinine levels and the improvement in ACT scores ($r = 0.6$, $p < 0.01$).
- Reduction in BUN and serum creatinine also correlated with improvements in spirometry parameters ($r = 0.5$, $p < 0.05$).

Discussion

Interpretation of Results

The findings indicate that a structured yoga program can significantly improve asthma control, as evidenced by enhanced ACT scores and spirometry measures. Additionally, the reduction in BUN and serum creatinine levels suggests a potential systemic benefit of yoga practice, extending beyond respiratory function to possibly reducing overall metabolic stress and improving kidney function.

Potential Mechanisms

Yoga's impact on asthma may be attributed to several factors:

- **Respiratory Muscle Strengthening**: Through specific asanas and pranayama, yoga may enhance the strength and efficiency of respiratory muscles.
- **Stress Reduction**: Yoga's emphasis on mindfulness and relaxation may lower stress levels, which are known to exacerbate asthma symptoms.

- **Systemic Health Benefits**: The observed reductions in BUN and serum creatinine may reflect decreased metabolic load and improved renal function, possibly due to better oxygenation and circulation from regular yoga practice.

Limitations

This study has several limitations:

- **Sample Size**: A larger sample size could provide more robust results and enable subgroup analyses.
- **Duration**: The 12-week intervention period may not capture long-term effects of yoga on asthma and systemic biomarkers.
- **Adherence**: Variability in participant adherence to the yoga program may influence the outcomes.

Future Directions

Future research should explore the long-term effects of yoga on asthma and other systemic health markers. Additionally, studies could investigate the specific components of yoga (e.g., breathing exercises versus physical postures) that contribute most significantly to the observed benefits.

Conclusion

The results of this study suggest that yoga can be an effective complementary therapy for improving asthma control. The reductions in blood urea nitrogen and serum creatinine levels further indicate that yoga may positively affect overall systemic health. These findings support the integration of yoga into asthma management protocols, providing a holistic approach to patient care.

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