RESEARCH PROTOCOL FOR EVALUATION OF VISHAGHNA EFFECT OF KATAKA (STRYCHNOS POTATORUM LINN.) IN GENTAMICIN-INDUCED NEPHROTOXICITY IN WISTER RATS

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ABSTRACT

Gentamicin is a widely used aminoglycoside antibiotic known for its nephrotoxic adverse effects, primarily affecting proximal tubular epithelial cells through oxidative stress and cellular degeneration. Ayurveda describes toxic manifestations under the concept of Gara Visha, and several drugs are mentioned with Vishaghna (anti-poisonous) properties. Kataka (Strychnos potatorum Linn.), included in Vishaghna Gana, is traditionally indicated in mutra vikaras and visha rogas. The present experimental study was designed to evaluate the nephroprotective and Vishaghna effect of Kataka Beeja Churna in gentamicin-induced nephrotoxicity in Wistar rats. Animals were divided into five groups including control, gentamicin-treated, Kataka-treated, prophylactic, and curative groups. Assessment was performed through serum biochemical parameters, oxidative stress markers (MDA, GSH), and histopathological examination of renal tissue. Statistical analysis was conducted using one-way ANOVA with significance set at $p<0.05$. The study aims to provide experimental validation for the classical claims of Kataka as a Vishaghna and nephroprotective drug.

Index Terms — Kataka, Strychnos potatorum, Gentamicin, Nephrotoxicity, Vishaghna, Ayurveda.

I. INTRODUCTION

Gentamicin is an aminoglycoside antibiotic extensively used in the treatment of severe gram- negative infections. Despite its efficacy, nephrotoxicity remains a major limitation, occurring in approximately 15–30% of treated patients [6]. The drug accumulates in proximal tubular epithelial cells, leading to lysosomal phospholipidosis, oxidative stress, and acute tubular necrosis [7].

Ayurveda classifies toxic manifestations under Sthavara, Jangama, and Kritrima Visha. Long- term exposure to artificial toxins is described as Gara Visha. Kataka (Strychnos potatorum Linn.), mentioned in Charaka Samhita under Vishaghna Dashemani, is indicated in visha rogas and mutradosha [9]. Classical texts including Sushruta Samhita and Ashtanga Hridaya also describe its mutradoshahara properties [10,11].

Based on classical references and experimental evidence suggesting antioxidant potential [4], Kataka may play a protective role against drug-induced nephrotoxicity.

II. NEED OF THE STUDY

Gentamicin-induced nephrotoxicity contributes significantly to acute renal failure worldwide [1]. Although several nephroprotective agents have been studied, limited research exists validating classical Ayurvedic Vishaghna drugs in modern toxicological models.

Kataka is described as Vishaghna, Shophahara, and Mutradoshahara in multiple Nighantus [12–16]. However, experimental validation in the context of gentamicin-induced renal injury remains insufficient. Therefore, this study was undertaken to scientifically evaluate its nephroprotective potential.

III. OBJECTIVES

Primary Objective

To evaluate the Vishaghna effect of Kataka Beeja Churna in gentamicin-induced nephrotoxicity.

Secondary Objectives

To assess nephroprotective activity using serum biochemical markers.

To evaluate oxidative stress parameters (MDA and GSH).

To study histopathological changes in renal tissue.

IV. MATERIALS AND METHODS

4.1 Study Design

Experimental animal study using Wistar rats (150–200 g).

4.2 Animal Grouping

Thirty rats were divided into five groups (n=6 each):

Group I: Control (Distilled water 2 ml/kg I.P.)

Group II: Kataka Beeja Churna (oral)

Group III: Gentamicin 100 mg/kg I.P.

Group IV: Gentamicin + Kataka (simultaneous administration)

Group V: Gentamicin (8 days) followed by Kataka (7 days)

4.3 Dose Calculation

Human dose of Kataka Beeja Churna = 5 g Conversion factor for rats = 0.018
Animal dose = 0.09 g (90 mg)

Gentamicin dose = 100 mg/kg/day I.P. [5]

4.4 Duration

Groups I–IV: 8 days

Group V (Curative): 15 days

4.5 Parameters Assessed

A. Physical Parameters

Body weight

Kidney weight

B. Biochemical Parameters

Serum creatinine
Blood urea

Uric acid

Serum albumin and globulin

C. Oxidative Stress Markers

Malondialdehyde (MDA)

Reduced Glutathione (GSH)

D. Histopathology

Kidney tissues fixed in 10% neutral formalin and examined microscopically for tubular necrosis, glomerular congestion, and inflammatory changes.

4.6 Statistical Analysis

Data expressed as Mean ± SEM.

One-way ANOVA used for intergroup comparison. Significance level set at $p<0.05$.

V. RESULTS AND DISCUSSION

Gentamicin-treated animals are expected to show significant elevation in serum creatinine and blood urea levels along with increased MDA and reduced GSH levels, indicating oxidative stress. Histopathological examination may reveal tubular necrosis and interstitial inflammation.

Prophylactic and curative groups receiving Kataka Beeja Churna are expected to demonstrate significant reduction in biochemical markers and improvement in histological architecture compared to the gentamicin-only group.

The nephroprotective effect may be attributed to antioxidant and Vishaghna properties described in classical texts and supported by experimental evidence [4].

VI. CONCLUSION

The study is designed to validate the classical Ayurvedic claim of Kataka as a Vishaghna drug. If findings demonstrate significant nephroprotection, Kataka may be considered a potential complementary therapeutic agent in drug-induced nephrotoxicity. Further clinical studies would be required to establish its applicability in human subjects.

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