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Evaluation of Effectiveness of Moringa Concanensis Leaves Against Cisplatin induced Ototoxicity in Wistar Rats.

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ABSTRACT:

This study investigates the protective effects of Moringa concanensis ethanolic leaf extract (MCEE) against cisplatin-induced ototoxicity. Phytochemical screening of the extract revealed the presence of alkaloids, flavonoids, carbohydrates, tannins, and phenols. Distortion Product Otoacoustic Emissions (DPOAE) were measured pre- and post-treatment, with findings indicating a significant reduction in DPOAE values in cisplatin-treated groups. However, MCEE co-administration led to a marked recovery in DPOAE levels. The study provides evidence for the antioxidant potential of Moringa concanensis, suggesting its therapeutic potential for cisplatin-induced ototoxicity.

1. Introduction

Ototoxicity is a well-documented adverse effect of cisplatin, a potent chemotherapeutic agent widely used to treat various cancers. Cisplatin-induced ototoxicity primarily results from oxidative stress, leading to cochlear cell damage and subsequent hearing loss. Emerging evidence highlights the role of antioxidants in mitigating these effects, and plants such as Moringa concanensis, known for their high antioxidant activity, have gained attention in pharmacological research. This study evaluates the protective role of Moringa concanensis ethanolic leaf extract (MCEE) in a cisplatin-induced ototoxicity model.

2. Materials and Methods

2.1 Preparation of Moringa concanensis Ethanolic Extract

Leaves of Moringa concanensis were collected, air-dried, and finely ground. Ethanolic extraction was performed, yielding a semisolid dark greenish extract with a percentage yield of 8.89%.

2.2 Phytochemical Screening

The ethanolic extract was screened for major phytochemicals, revealing the presence of alkaloids, flavonoids, carbohydrates, tannins, and phenols, with saponins and steroids being absent.

2.3 Experimental Design

The experiment was conducted on [mention the animal model used, e.g., rats], divided into the following groups:

Control group: Received no treatment.

Positive Control (Cisplatin) group: Treated with cisplatin to induce ototoxicity.

LMCEE + Cisplatin group: Received a low dose (200 mg/kg) of MCEE alongside cisplatin.

HMCEE + Cisplatin group: Received a high dose (400 mg/kg) of MCEE alongside cisplatin.

2.4 Audiological Assessments (DPOAE Measurements)

DPOAE measurements were conducted on all groups before and after treatment at frequencies of 2000, 4000, 6000, and 8000 Hz. DPOAE thresholds were assessed using [specify equipment], and changes in otoacoustic emission were noted pre- and post-treatment.

2.5 Biochemical Analysis

Biochemical parameters were measured, including Total Antioxidant Status (TAS), Total Oxidant Status (TOS), and Oxidative Stress Index (OSI). Measurements were performed using spectrophotometric assays, and values were expressed as mean ± SD.

2.6 Statistical Analysis

Data were analyzed using paired t-tests for intragroup comparison, one-way ANOVA for intergroup comparison, and Games Howell post hoc test. A p-value < 0.05 was considered statistically significant.

3. Results

3.1 Phytochemical Composition of MCEE

Phytochemical screening of MCEE indicated the presence of key antioxidant constituents, including alkaloids, flavonoids, tannins, carbohydrates, and phenols. The absence of saponins and steroids in the extract was also noted.

3.2 Audiological Function Test Results (DPOAE)

DPOAE measurements (Table 4) showed a statistically significant reduction in otoacoustic emission thresholds in the cisplatin-treated group compared to the control. However, animals receiving MCEE alongside cisplatin exhibited improved DPOAE values post-treatment. Notably, the HMCEE + Cisplatin group demonstrated more significant recovery across all frequencies, suggesting a dose-dependent protective effect of MCEE against cisplatin-induced ototoxicity.

3.3 Biochemical Parameters

Biochemical analysis (Table 5) revealed a marked difference in TAS, TOS, and OSI values among the groups. The Cisplatin-only group exhibited higher TOS and OSI levels, reflecting increased oxidative stress, whereas both LMCEE and HMCEE co-administration led to a reduction in oxidative stress markers. The HMCEE + Cisplatin group showed a significant increase in TAS and a decrease in TOS and OSI, further supporting the antioxidant capacity of MCEE.

4. Discussion

The findings demonstrate that Moringa concanensis ethanolic extract possesses protective properties against cisplatin-induced ototoxicity. The presence of antioxidant compounds in the extract likely contributes to the observed protective effects. DPOAE measurement results indicated that MCEE mitigates cochlear damage by reducing oxidative stress, as evidenced by improved hearing thresholds in MCEE-treated groups. Biochemical parameters further support the role of MCEE in enhancing antioxidant status and reducing oxidative burden.

5. Conclusion

Moringa concanensis ethanolic leaf extract exhibits significant protective effects against cisplatin-induced ototoxicity, likely due to its rich antioxidant profile. This study suggests that MCEE could serve as an adjuvant therapy for patients undergoing cisplatin treatment to mitigate hearing loss. Future studies are recommended to further explore the molecular mechanisms underlying these protective effects.

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