Nephroprotective potential of *Phyllanthus emblica*, *Tinospora cordifolia*, and *Aerva lanata* polyherbal formula: *In vivo* evidence for kidney disease management

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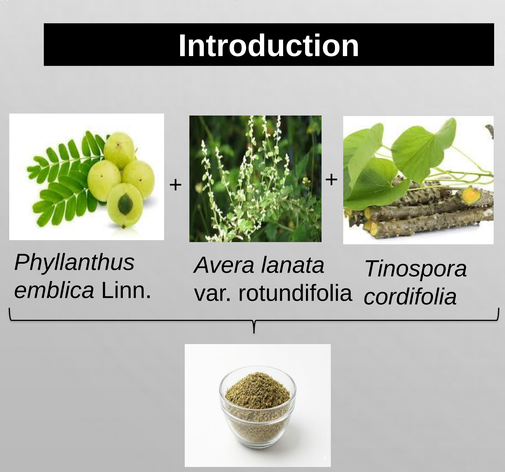
Research Problem

Chronic kidney disease (CKD) is a major public health problem that is increasing worldwide and mainly impacts developing nations. Due to the diverse aetiology of CKD, including oxidative stress, metabolic imbalance, and impairment in renal function, a comprehensive treatment approach is required. Traditional polyherbal medicines are effective against CKD, although pharmacological studies involving animal models have not been adequately done. This investigation focused on the evaluation of the nephroprotective potential of methanolic (ME) and aqueous (WE) extracts of THF (traditional herbal formula), which included *Phyllanthus emblica* L., *Tinospora cordifolia* (Willd.) Hook. f. & Thomson, and *Aerva lanata* (L.) Juss. as capsules and tea bags, respectively, through the gentamicin-induced nephrotoxicity model.

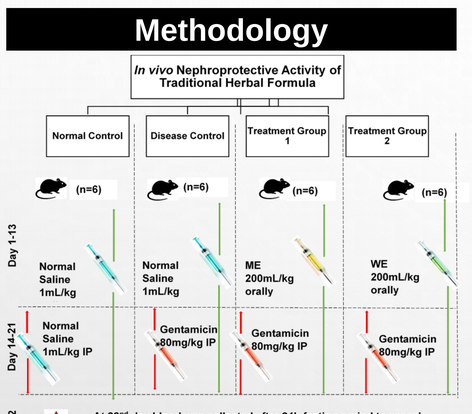
Introduction



Main Objective

To evaluate the *in vivo* nephroprotective efficacy of the Traditional herbal formula using the gentamicin-induced nephrotoxicity model.

Methodology



Results

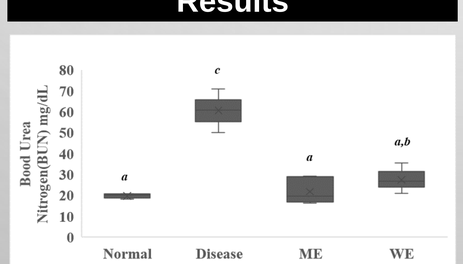


Figure 1: The blood urea nitrogen (BUN) levels (mg/dL) in normal, disease, ME-, and WE-treated groups

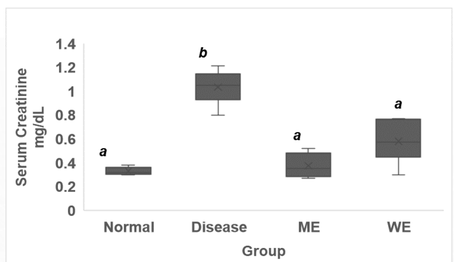


Figure 2: The serum creatinine levels (mg/dL) in normal, disease, ME-, and WE-treated groups

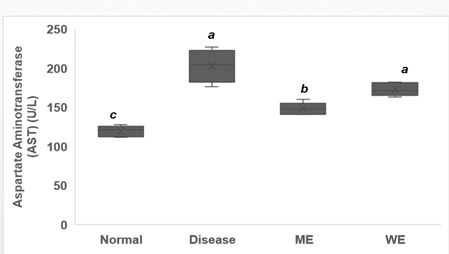


Figure 3: Effect of methanol extract (ME) and water extract (WE) of the traditional herbal formulation on serum aspartate aminotransferase (AST) levels

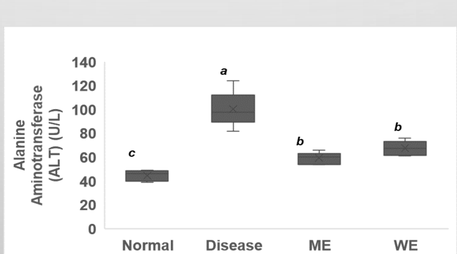


Figure 4: Effect of methanol extract (ME) and water extract (WE) of the traditional herbal formulation on serum alanine aminotransferase (ALT) levels

Parameter	Normal Control	Disease control	ME	WE
Serum Urea mg/dL	42.2 ± 2.17 [a]	101.67 ± 24.89 [b]	44.33 ± 5.81 [a]	48.83 ± 6.95 [a]
Serum Uric Acid mg/dL	1.5 ± 0.52 [a]	3.05 ± 0.45 [b]	1.5 ± 0.78 [a]	1.15 ± 0.21 [a]
Serum Sodium mmol/L	143.2 ± 1.3 [a]	134.67 ± 2.12 [b]	143.5 ± 0.71 [a]	141.17 ± 1.67 [a]
Serum Potassium mmol/L	4.88 ± 0.24 [a]	6.08 ± 0.15 [b]	4.38 ± 0.39 [a]	4.37 ± 0.27 [c]
Serum Chloride mmol/L	100.4 ± 1.14 [a]	90 ± 0.89 [c]	99.17 ± 2.30 [a]	98 ± 0.89 [b]
Serum Total Protiens g/dL	6.28 0.24 [a]	6 ± 0.08 [b]	6.3 ± 0.18 [a]	6.45 ± 0.36 [a,b]
Serum Albumin g/dL	4.28 ± 0.08 [a]	4 ± 0.07 [b]	4.3 ± 0.16 [a]	4.1 ± 0.15 [a,b]
Serum Globulin g/dL	2 ± 0.19 [a]	1.98 ± 0.04 [a]	2 ± 0.05 [a]	2.35 ± 0.36 [a]

Table 1. Serum biochemical parameters of experimental groups. Data are expressed as mean ± SD. Different superscript letters (a–c) indicate significant differences among groups ($p < 0.05$).

Increased Reduced Glutathione, Ferric reducing power (FRAP) activity, and Total proteins

Decreased NO radicals, malondialdehyde (MDA) levels

In the kidney tissue homogenates of treatment groups (ME & WE), compared to the disease group, the increased antioxidant capacity of kidney tissues was also confirmed due to the treatments

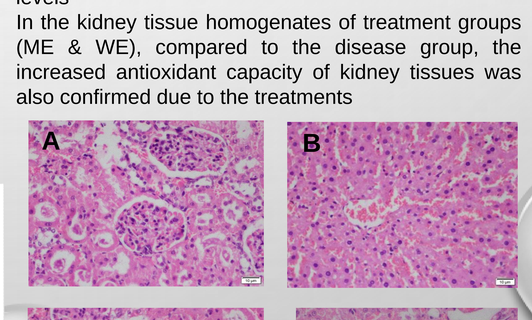


Figure 5: Kidney tissue sections of different groups: A- Normal control, B- Disease control, C- ME and D- WE

Conclusion

The Traditional Herbal formula demonstrated significant nephroprotective activity against gentamicin-induced nephrotoxicity by improving renal function, restoring biochemical and antioxidant parameters, and mitigating oxidative stress, supporting its potential as a complementary CKD therapy.

References

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