Investigating genotoxicity of *Eleusine indica* by micronuclei assay in albino rats

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Introduction

- *Eleusine indica* (Nkim enang: Efik), is a widely used medicinal plant.
- *E. indica* invades disturbed habitats in natural areas and the margins of natural forests and grassland, marshes, stream, banks and coastal areas.
- The whole plant, especially the root is considered diaphoretic and antipiuretic.
- Decoction of plant is used for treating convulsion in children. It is much used in liver complaints (Yusuf *et al,* 2009).

Plate 1: *Eleusine indica*

Introduction

- Phytochemical studies of *Elusine indica* have indicated the presence of sterol glucoside forms and C-glycosylflavone.
- It also Contains cyanogenetic glucoside, triglochinin, ochratoxin A, a-amylase inhibitors, Albuminoids, starch and fatty oil.
- . Other components are phenolic compounds and flavonoids (Ghani, 2003).
- Apart from its medicinal properties and ethnobotany, *E. indica* is consumed as a vegetable.
- Hence the need to investigate the genotoxic effect (s) if any, of the herb on a mammalian model.

Objectives

- To determine the proximate composition of *E. indica* leaf extracts.
- To determine the phytochemical composition of *E. indica* leaf extracts.
- To investigate the genotoxicity of *E. indica* leaf extract on albino rats using micronuclei assay.

Methodology

- Nine (9) males and nine (9) female rats were randomly assigned to three (3) groups, of which two were exposed to the aqueous extract of the herb, *E.indica.*
- Group A (control-no extract)), Group B (50mg/kg BW of *E. indica*) and Group C (100mg/kg BW of *E.indica*).
- This aqueous extract of the test material was administered by oral gavage for 14 days.
- Peripheral blood from the rats tail tips were collected and assayed for the presence of micronuclei, following standard procedures (OECD 474 protocol, 1997)
- Both proximate analysis and phytochemical screening of the herb extract were carried out.

Experimental Setting

- The completely randomized design (CRD) was used as the experimental design for this study.
- The experimental animals were arranged into three groups viz A, B, and C with three (3) Male and three (3) female rats in each group.
- Analysis of the extract were carried out before feeding the rats commenced.
- The initial body weights of the animals were measured on commencement of the research and after administration of the test substance.

Results and Discussion

TABLE 1: Proximate Analysis of aqueous extract of *Eleusine indica*

Components	Value (%)
Moisture content	48
Ash content	10
Fibre	2
Fat	6
Protein	6.8
carbohydrate	76.17

✓The proximate analysis from this study showed that *E. indica* is rich in carbohydrates (76.17%), moisture content (48%)- Table 1

TABLE 2: Phytochemical Screening of aqueous extract of *Eleusine indica*

Phytochemicals	Values(%)
Alkaloids	1.8
Saponins	2.0
Flavonoids	6.0
Tannins	21.76

✓Tannins was the highest recorded phytochemical in the leaf extracts.The low value of the alkaloids confirms the selective antiviral activity reported by Abdul, et al, (1996). Saponnins, reported in this study, are known to be antifungal (Cowan, 1999)- Table 2.

TABLE 3: Mean ± SE of body weights of rats after administration of aqueous extract of *E. indica*

Parameter	N	Mean ±SE	SD	Sig.
Body weight : Male	9	234.89±14.269	42.794	0.003
Female	9	178.11±11.246	33.126	

✓The Levene's test for equality of variances and the independent t- test both confirmed that the extract did not have significant effect on the weight of both the male and female rats- Table 3

Results and Discussion

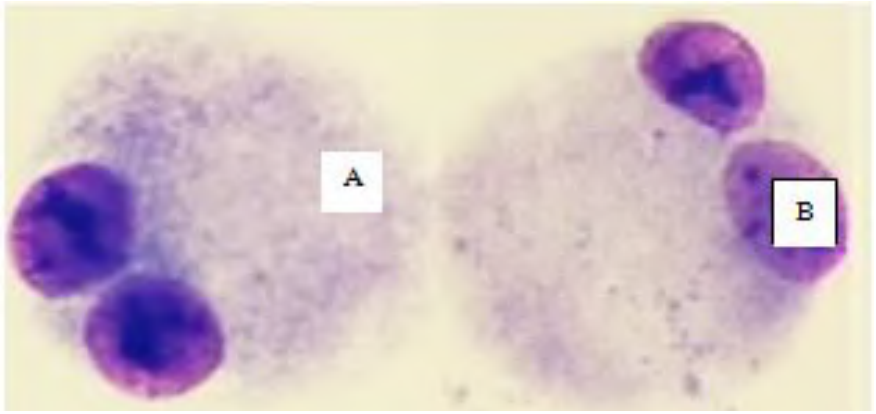

FIG. 1 CONTROL MALE (A) AND FEMALE (B) showing bi nucleated cells with no micronuclei.

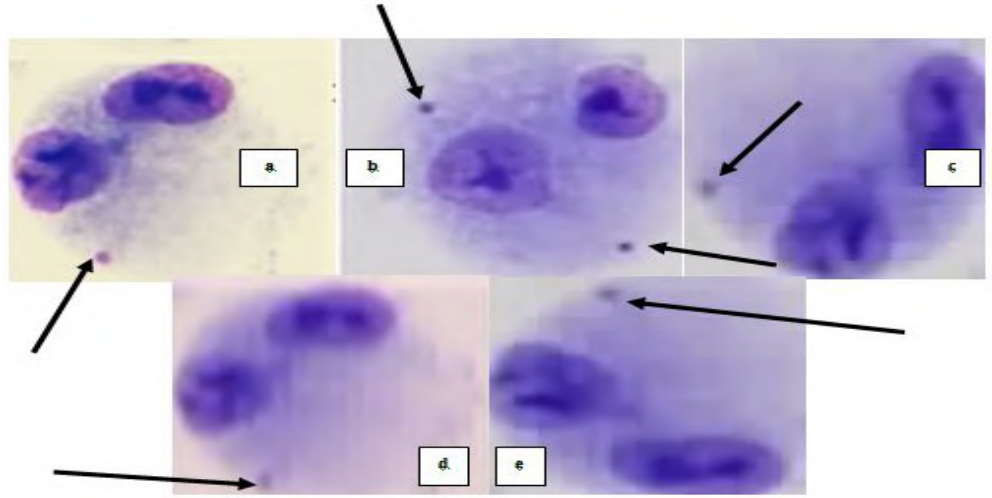

FIG. 2: Group B Males and Females- a – binucleated cell with one MN; b – binucleated cells with two MN and c- binucleated cell with one MN; d - binucleated cell with one MN and e - binucleated cell with one MN.

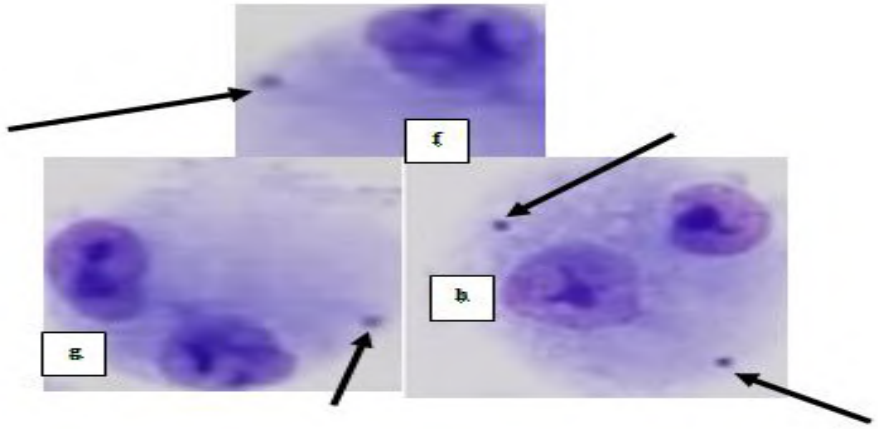

FIG. 3: Group C Males and Females- f – cell with one MN; g – binucleated cells with one MN and h - binucleated cell with two MN.

✓In this study, control animals had no micronuclei formed in their erythrocytes (Figure 1). On the other hand, treated rats had 1,000 or 2,000 micronuclei formed in their erythrocytes (Figure 2 and 3). However, Scoring of micronuclei damage is from 5,000 MNi/cell (OECD, 1997). Hence, there was no genotoxicity conferred on the treated animals by the aqueous extract of *E. indica*.

Results and Discussion

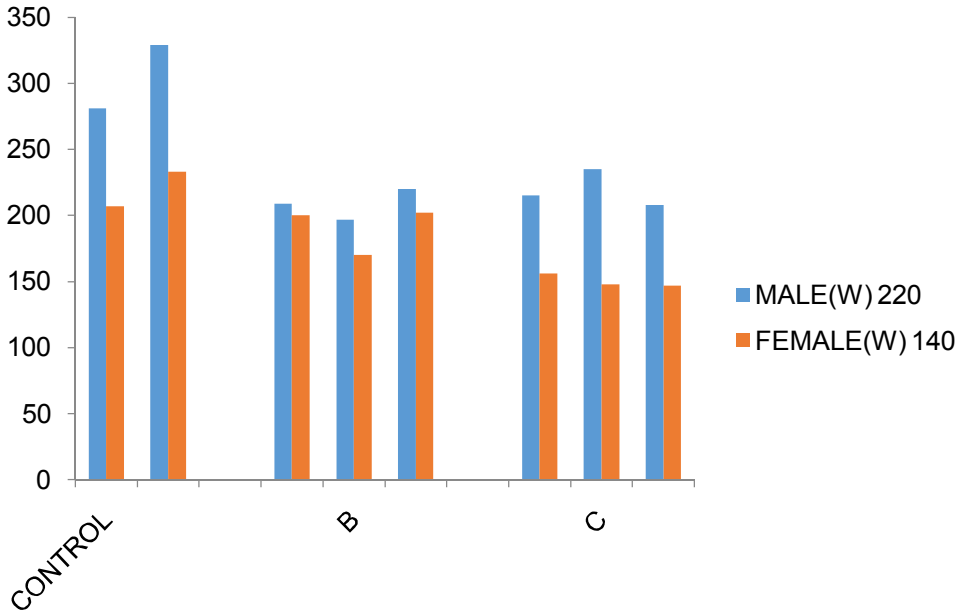

Fig 4: Bar cart for the distribution of male and female albino rats in the study area. Comparative binomial test for categories and Kolmogorov – smirnor test were carried out to compare the effect of the herb extract, if any, on the sexes and results are presented on Table 4.

Table 4 : Effect of extract on sexes

Sex	Test	Sig.	Decision
Male: Female	One sample Binomial	1.000	Sex does not affect the effect of the plant on the rats.
Male: Female	One sample Kolmogorov – smirnor	0.709	Sex does not affect the effect of the plant on the rats.

✓Independent sample median tests, to establish the effect of the extract on the sexes of treated animals yielded a non-significant (P>0.05) result, confirming that observed effect on the sexes was non-sex dependent- Table 4.

Conclusions & Recommendations

- In conclusion, this investigation revealed the safety of *E. indica* (L) as food for both human and animal consumption.

- The aqueous extract conferred no adverse effect on the body weight of treated animals and did not induce any genotoxic effects in the blood cells of treated animals. Hence, the herb is safe as either food or for medicinal purposes.

- However, its use as a medicinal plant should be with the usual caution accorded medicinal plants to avoid overdosing and the subsequent adverse effects.

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