AMELIORATIVE EFFECTS OF TRECULIA AFRICANA AQUEOUS SEED EXTRACT ON HYPERGLYCAEMIA AND TESTICULAR HISTOPATHOLOGICAL ALTERATIONS IN ALLOXAN-DIABETIC RATS

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OBJECTIVES

1. To determine the effects of *Treculia africana* aqueous seed extract (TASE) on blood glucose concentration and body weight of alloxan-diabetic rats;
2. determine the differential effects of TASE on the seminal parameters and histology of the testes of experimental rats.

METHODS

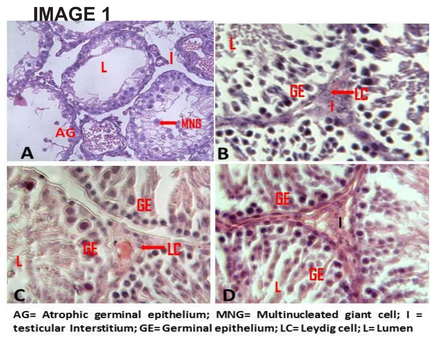
Adult male normoglycaemic Sprague-Dawley rats (160 – 220g) were randomly divided into four groups. Diabetes was induced in the groups A, B and C rats with alloxan. Alloxan powder (BDH Chemicals limited, Poole, England) was dissolved in normal saline and injected intraperitoneally using a single dose of 50 mg/kg once daily for 3 consecutive days. Only rats with blood glucose concentration ≥200 mg/dl were used. After four (4) weeks of being hyperglycaemic, groups A,B and C rats were treated with TASE (200 mg/kg b.w), glibenclamide, GC (10 mg/ kg b.w) and distilled water respectively for a period of four (4) weeks. Glucometer (Acu-Chek ®) and compatible strips were used to measure blood glucose. Body weight and blood glucose concentrations were evaluated. Animals were sacrificed at the end of the 8th week. Semen analysis was done on the caudal epididymal fluid while the testes were processed for light microscopy. The caudal epididymides of the rats wer incised and 5µL of epididymal fluid delivered onto a glass slide, covered with 22x22 mm cover slip (WHO,1992) and examined under light microscope at a magnification of x 400. Sperm motility and concentration estimation were done as described previously (WHO,1992).

TABLES AND IMAGES

BLOOD GLUCOSE CONCENTRATIONS (MG/DL)			
GROUPS	INITIAL	WEEK 1 POST-INDUCTION	WEEK 8 POST-INDUCTION
A (Alloxan only)	110 ± 7.5	363.8 ± 33.2	396.5 ± 34.9
B (Alloxan ± TASE)	90 ± 4.3	328.6 ± 29.7	137.9 ± 17.6*
C (Alloxan ± GC)	106 ± 5.3	293.4 ± 25.8	103.2 ± 6.1*
D (Normal Control)	102 ± 4.1	103.1 ± 4.8	93.3 ±10.4

Table 1. Values are mean ± SD; n=5 in each group. **Significantly different from A at P≥ 0.05*

IMAGE 1



AG= Atrophic germinal epithelium; MNG= Multinucleated giant cell; I = testicular Interstitium; GE= Germinal epithelium; LC= Leydig cell; L= Lumen

BODY WEIGHT (G)			
GROUPS	INITIAL	FINAL	% MEAN WEIGHT DIFF
A (Alloxan only)	180.6 ± 3.6	165.6 ± 3.4	8.3
B (Alloxan ± TASE)	184.0 ± 13.1	179.2 ± 11.7	2.6
C (Alloxan ± GC)	203.2 ± 12.4	217.6 ± 16.8	7.1
D (Normal Control)	208.3 ± 18.2	255.2 ± 18.7	22.5

Table2. Values are mean ± SD; n=5 in each group. *Significantly different from A at P≥ 0.05*

GROUPS	TESTICULAR WEIGHT	SPERM COUNT (X 10^6/ ml)	SPERM MOTILITY (%)	% SPERM ABNOMALITY
A (Alloxan only)	0.7 ± 0.1^{d}	0.0	0.0	0.0
B(Alloxan + TASE)	1.3 ± 0.3^{ab}	33.6 ± 8.9^{ab}	30.6 ± 11.3^{ac}	14.1 ± 2.5^{a}
C(Alloxan + GC)	1.7 ± 0.1^{ac}	63.1 ± 10.8^{ac}	74.3 ± 15.5^{a}	4.23 ± 1.7^{a}
D(Control)	2.3 ± 0.8	85.5 ± 10.9	82.6 ± 17.7	0.6 ± 0.3

Values are mean ± SD; *n* = 5 in each group. a: Significantly different from A at 0.001. b: Significantly different from D at 0.025. c: Significantly different from A at 0.05. d: Significantly different from D at 0.001

TABLE 3

RESULTS

TASE treated group showed a significant ($p<0.001$) blood glucose concentration reduction (58%) compared to the diabetic control while GC-treated group recorded 64.8% reduction. After 8 weeks of alloxan-induced diabetes the mean body weights of the untreated diabetic group dropped from 180.6 ± 3.6 g to 165.6 ± 3.4 g

The weight of the testes and seminal parameters of TASE-treated rats showed significant increase compared with the untreated diabetic group.. Eight weeks after the onset of hyperglycaemia, untreated diabetic rats became azoospermic, while those treated with TASE for 4 weeks had a sperm count of 33.6 ± 8.9($x10^6$/ml).

Histological examination of the testes of normal control, TASE and GC-treated rats showed oval seminiferous tubules with regular configuration. They were lined with a complex stratified epithelium consisting of Sertoli cells and abundant spermatogenic cells series. The seminiferous tubules of untreated hyperglycaemic rats were irregular in outline and presented with a thickened basal lamina and congested blood vessels . The connective tissue was distorted with widened interstitial spaces containing scattered few Leydig cells. Sertoli cells were absent from many of the tubules. The tubules showed major reduction in the thickness of the spermatogenic cells and did not show any ordered progression of spermatogenic cells.

CONCLUSIONS

The results of the experiment showed that TASE has the capability of lowering blood glucose concentration in alloxan-induced diabetic rats. TASE also reversed the harmful effects of hyperglycaemia on testicular morphology and spermatogenesis. In addition, TASE showed potential of reversing the deleterious effects of hyperglycaemia on body weight, the testicular morphology and semen parameters and would be a good adjunct in the treatment of diabetes mellitus.

References

World Health Organisation. Laboratory manual for the examination Of human semsen and sperm cervical mucus interaction. Cambridge University Press, 1999

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