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Effect of Copaiba Oil on the Thoracic Aorta

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INTRODUCTION & AIM

Diabetes mellitus (DM) is a chronic metabolic disease characterized by persistent hyperglycemia that promotes endothelial dysfunction, oxidative stress, and vascular remodeling (WHO, 2024). These changes result in arterial stiffness and increased cardiovascular risk (Glovaci et al., 2019). Copaiba oil (Copaifera spp.) is known for its anti-inflammatory and antioxidant properties (Arruda et al., 2019) and may counteract oxidative vascular damage in diabetes. This study aimed to evaluate the effect of copaiba essential oil (OEC) on the thoracic aorta morphology of streptozotocin-induced diabetic rats.

METHOD

Animals: 40 male Rattus norvegicus (Wistar, 70 days) divided into 5 groups (n=8): CT (control), C200 (control+OEC200), DC (diabetic), D100 (diabetic+OEC100), D200 (diabetic+OEC200).

Diabetes induction: Streptozotocin 65 mg/kg (IV); glycemia > 150 mg/dL.

Treatment: Oral OEC (100 or 200 mg/kg) for 18 days.

Histology: Aortic segments fixed in 10% formalin; stained with Masson's Trichrome and Weigert-Van Gieson.

Morphometry: Measurement of intima-media thickness and volume density (Vv%) of collagen and smooth muscle.

Statistics: ANOVA + Tukey ($p < 0.05$).

Group	Body weight (g)	Glycemia (mg/dL)
CT	376 ± 24	89 ± 6
C200	383 ± 22	85 ± 3
D100	292 ± 19 *	381 ± 55 *
D200	303 ± 21 *	320 ± 155 *
DC	282 ± 22 *	299 ± 65 *

*$p < 0.05$ vs CT

RESULTS & DISCUSSION

Metabolic profile:
Diabetic groups showed marked weight loss (≈ −80 g) and hyperglycemia (≈ 320–380 mg/dL).
OEC (100–200 mg/kg) did not prevent weight loss or reduce glycemia within 20 days.

Histological findings:
Aortic wall architecture preserved in all groups.
Collagen and elastic fibers arranged concentrically with no structural disruption.

Morphometry:
No significant differences in intima-media thickness or Vv% for collagen and smooth muscle ($p > 0.05$).
DC group presented slight, non-significant thinning of the wall (−13%).
OEC groups (D100/D200) tended to maintain wall thickness, suggesting mild protective tendency.

Interpretation: Short-term exposure and sub-therapeutic dose likely limited the detection of vascular benefits. Longer treatment may reveal antioxidant vascular effects described in literature (Carvalho et al., 2018).

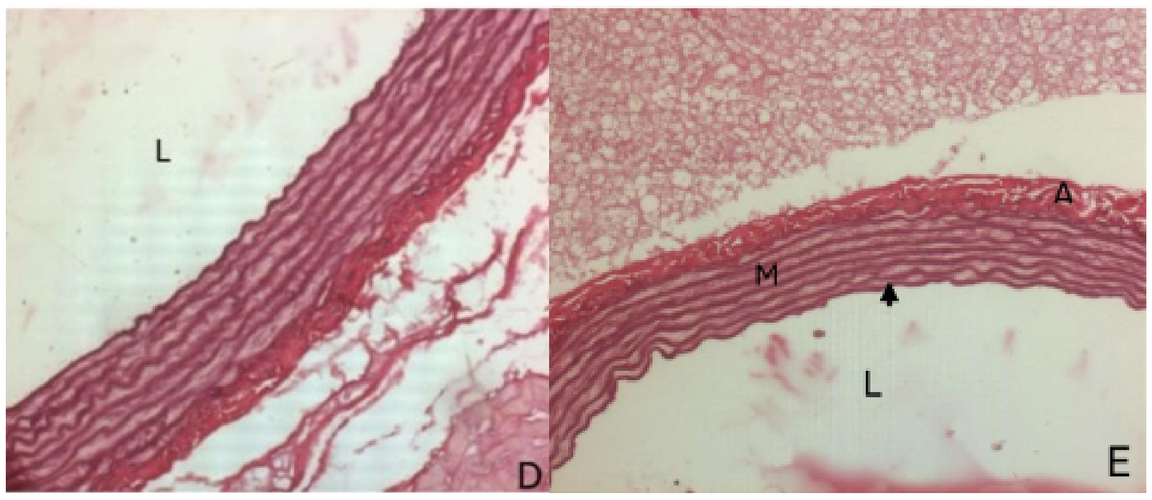

Figure 1. Histological sections of the thoracic aorta from diabetic rats.
(D) Diabetic group treated with copaiba essential oil (200 mg/kg) showing preserved elastic lamellae and regular vascular morphology.
(E) Diabetic control showing reduced intima–media thickness and mild disruption of elastic lamellae.
Weigert–Van Gieson stain, 640×.

CONCLUSION

- OEC (100–200 mg/kg, 20 days) did not modify glycemia, body weight, or aortic morphometry in diabetic rats.
- No toxic effects were observed in normoglycemic animals.
- Results suggest vascular safety and a potential trend of morphological preservation requiring confirmation in longer trials.

FUTURE WORK / REFERENCES

- Extend treatment period (> 8 weeks) and evaluate biochemical oxidative markers (MDA, SOD, CAT).
- Test higher doses (≥ 250 mg/kg) for pharmacological efficacy.
- Explore ultrastructural and molecular pathways of vascular remodeling.

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