

# When it comes to back care, size really doesn't matter. In African safari elephants, does carrying a rider - or multiple riders - impact on musculoskeletal integrity?

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**OBJECTIVE:** To determine whether carrying riders results in a change in mid stance angles and range of motion in the limb segments and joints of ridden African elephants

**OUTCOME:** The presence of rider(s) influences limb kinematics in elephants indicating compensation for weight bearing and the potential for musculoskeletal compromise. The use of a saddle may modify this potential.

## INTRODUCTION

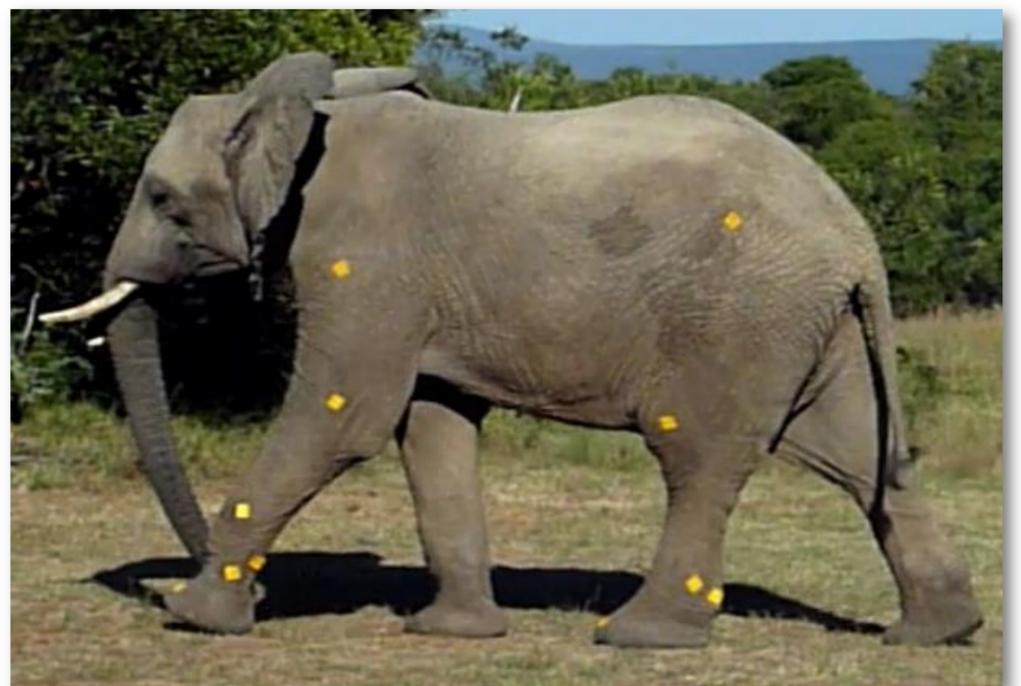
- Little or nothing known about musculoskeletal impact on elephants of bearing riders
- Combined weight and multi-directional forces of multiple riders, likely to increase potential for musculoskeletal impact

## METHODOLOGY

- Repeated measurement, crossover design.
- Five sound working safari elephants completed walking trials under eight different rider conditions; no rider, one, two and three riders, all with and without saddle.
- Self-adhesive retro-reflective markers were attached at ten anatomical locations; five on the left forelimb and five on the left hind limb.
- Digital video cameras recorded and data was analysed using 2D motion-analysis software.
- Forelimb and hind limb segment angles (relative to vertical) and joint angles (degrees) were measured at mid stance (MS); range of motion (ROM, degrees) from touch down to toe off was calculated for each valid (n=970) stride.
- Data was analysed by ANOVA and T-Test statistics.

## RESULTS:

- The presence of rider(s) significantly influenced ( $P < 0.01$ ) a greater number of limb segments and joint angles in MS than the presence of a saddle.
- Rider(s) or saddle had no significant effect ( $P > 0.05$ ) on MS angles of forefoot, wrist joint, hind foot or knee joint.
- At MS, upper arm angle of retraction increased with rider number; ankle joint angle reduced as rider number increased with no saddle; with saddle, there was no significant effect.
- Wrist joint ROM reductions were significant ( $p < 0.001$ ) for 3 riders with and without a saddle.



## CONCLUSIONS

- The presence of rider(s) influences MS angles/ROM in limb segments and joints of walking elephants
- The use of a saddle may modify the potential for musculoskeletal compromise.
- Further study is warranted and for owners/handlers to be made aware of the potential risks of carrying riders.

## LAYPERSONS MESSAGE

- Size does not render the ridden elephant free from musculoskeletal compensation and thus risk of compromise.
- Presence of riders influences limb kinematics in elephants.
- Use of a saddle may reduce the level of risk for musculoskeletal compromise .