

THE EFFECTS OF ALOE VERA ON BODY WEIGHT AND TIBIAL GROWTH OF RAT PUPS

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ABSTRACT

Aim and Objective: Widely and commonly grown plant, Aloe vera has numerous health benefits. The breast fed neonates of mothers consuming the plant as a dietary supplement are exposed to its effects. The project was formulated to assess the favorable effects of Aloe vera extract on the growth of rat pups.

Study design and place of study: It was an experimental study conducted at the Anatomy department, PGMI, Lahore.

Material and Method: One week old Wistar albino rats were fed with extracts of Aloe vera (a low dose 50mg/kg b.w. and a high dose 500mg/kg b.w.) for 2 weeks through oral gavage. The weight of the pups was recorded and after euthanasia the lower limbs were dissected and the tibia were removed. The length and weight of the bones were noted.

Results: Pups fed with a high dose of Aloe vera extract had a remarkable gain in their body mass ($p < 0.05$) and also demonstrated a considerable increase in the length of the tibia ($p < 0.001$).

Conclusion: The 500mg/kg b.w. of Aloe vera extract produced a remarkable increase in body mass and increased the tibial length.

Key words: Aloe vera, euthanasia, neonates, oral gavage, rat pups, tibia.

INTRODUCTION

Aloe vera is a green coloured xerophytic plant.^{1,2} The plant is widely cultivated for its benefits.³ The Greek regard it as the universal healer.⁴ The Chinese label it as the elixir of youth. It is also known as the silent healer, first aid plant, or miracle plant.⁵

The active ingredients of Aloe vera reside in the gel obtained from its leaves.⁶ These include vitamins, minerals, phenolic compounds, flavonoids, salicylates, saponins, and phytosterols.⁷ Mucopolysaccharides in the gel reach the blood circulation and exert their effects, including the regulation of immune system.⁸ Aloe vera products have long been used to treat different ailments and in health supplements.⁹

Dietary supplementations throughout the neonatal term exert enduring effects on the gut.¹⁰ Some plants and herbs promote the early maturity of the intestinal tract.¹¹ Aloe vera and its constituents exert enhancing effect and can modulate the performance of some tissues. Newborns are exposed to Aloe vera through breast milk and by various herbal medicines.¹²

Therefore, the present project was devised to observe the effects of Aloe vera on the growth of rat pups.

MATERIALS AND METHODS

Aloe vera plants were purchased from a local nursery. Ethanolic extracts were made from the plant leaves at PCSIR Lahore. The 10 Wistar female rats delivered their pups in the animal house of PGMI (Figure 1). Out of the pups that survived, 30 neonatal rat pups were used in the study. One week postpartum the weight of the pups was recorded and they were divided into three groups randomly. Group I was the control and was given distilled water. Group II was fed with a low dose (50 mg/kg b.w.) and group III was fed with a high dose (500 mg/kg b.w.) of Aloe vera gel extract daily, through oral gavage for 2 weeks (Figure 2). After the end of the experiment, the weight of the pups was noted and then they were euthanized with sodium pentobarbitone (150mg/kg) injected intraperitoneally. The pups were dissected and their tibia were removed. The length of the right tibia of all the pups was recorded using a thread and measuring its length by a ruler. The bones were left to dry for a week and then they were weighed. The numerical data was expressed as mean \pm SEM analyzed using SPSS version 20. One-way ANOVA was applied for comparison among the groups.

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Figure 1: Female Wistar albino rat with her freshly delivered pups.



Figure 2: Neonatal rat pup belonging to group III being fed with a high dose (500 mg/kg b.w.) of Aloe vera gel extract.

RESULTS

The initial weight of all the rat pups was not statistically significant. However, at the end of the experiment, the body weight of the pups was significantly increased. There was a remarkable increase in the final body weight of rat pups in group III ($p < 0.05$) (Figure 3) (Table1).



Figure 3: Rat pups belonging to group III at the end of the research

The rat pups fed with a high dose of Aloe vera extract displayed a considerable increase in the length of their tibial bone ($p < 0.001$). However, the weight of the tibial bone did not show any significant change (Table 2).

Table 1: Comparison of the body weight (b.w.) of rat pups

Body weight b.w	Group I (Control) n=10	Group II (Low dose 50mg/kg) n=10	Group III (High dose 500mg/kg) n=10
Initial b.w. (g)	14 ± 1.50	14.33 ± 1.19	14.46 ± 1.51
Final b.w. (g)	28.09 ± 2.30	28.75 ± 2.67	35.75 ± 3.71*

significant differences (* $p < 0.05$ and ** $p < 0.001$) are relative to the control group.

Table 2: Comparison of the length and mass of the tibia

Parameter of Tibia	Group I	Group II	Group III
Tibial length (mm)	12.00 ± 0.89	12.66 ± 1.07	12.91 ± 1.31**
Mass (mg)	2.10 ± 0.07	2.20 ± 0.07	2.60 ± 0.06

significant differences (* $p < 0.05$ and ** $p < 0.001$) are relative to the control group.

DISCUSSION

The increase in the final body weight of the rat pups coincides with the study conducted by Udo et al, in

2013. The increase in body weight was because the crude gel exerts its effect on body weight through a mechanism other than influencing food intake.

Phytochemical studies prove that the Aloe vera contains enzymes like amylase, cellulase, lipase, alkaline phosphatase, carboxypeptidase which are involved in the digestion of dietary carbohydrates and lipids. These enzymes positively affect the digestion of ingested food, thus making the substances readily available for absorption.¹³ Amaechi and Iheanetu in their research suggested that acemannan, a polysaccharide in the Aloe vera improves the body mass, enhances the immunity and upgrades the overall growth performance.¹⁴ Darabighane and his colleagues proved that Aloe vera gel fed to broilers during their neonatal period demonstrated a marked increase in feed intake and the height of intestinal villi.¹⁵ Nalge and his friends advocated that improvement in the body weight is attributed to the phenolic compounds present in Aloe vera. Phenolic substances are strong purgatives, but in small doses also assist absorption of nutrients and exert powerful antimicrobial effects.¹⁶ Plants and herbs stimulate appetite and enhance the overall performance of the body.¹⁷ In the present research, a significant increase in the body mass in group III may be because Aloe vera is rich in carbohydrates, organic compounds, vitamins and minerals. Measurement of the length of tibial bone is used as a scale for linear growth.¹⁸ Aloe is rich in calcium ions, which speeds up the growth process and this may be the reason for a significant increase in the length of tibia in the high dose Aloe vera treated group III.

The present research throws some light on the favourable effects of Aloe vera extract on the growth of rat pups. However, more studies can be conducted to inquire the depths of enhanced growth using Aloe vera.

CONCLUSION

500 mg/kg b.w. of Aloe vera extract administered to rat pups exerts beneficial effects on their body weight and length of tibial bone. Thus, Aloe vera could be used to enhance the growth of animals commercially and trials can be planned to evaluate its effects on humans

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