

# Antifungal effect of silver nanoparticles versus miconazole oral gel/suspension in experimentally-induced oral candidiasis in rats

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## Aim of the work

the present study assessed the antifungal activity of silver nanoparticles against experimentally-induced oral candidiasis compared to miconazole oral gel/suspension. Main methods: Oral candidiasis was induced in male rats using *Candida albicans* (ATCC 90028).

## Methods

One hundred and ninety two rats were assigned into six groups; 32 rats each.

Group 1: rats without oral candidiasis (immunosuppressed/not infected).

Group 2: rats with oral candidiasis (immunosuppressed/infected).

Group 3: rats with oral candidiasis treated topically with 2% miconazole oral gel.

Group 4: rats with oral candidiasis and treated topically with 2% miconazole aqueous suspension.

Group 5: rats with oral candidiasis and treated topically with silver nanoparticle solution (50 µg/ml).

Group 6: rats with oral candidiasis and treated topically with silver nanoparticle solution (100 µg/ml).

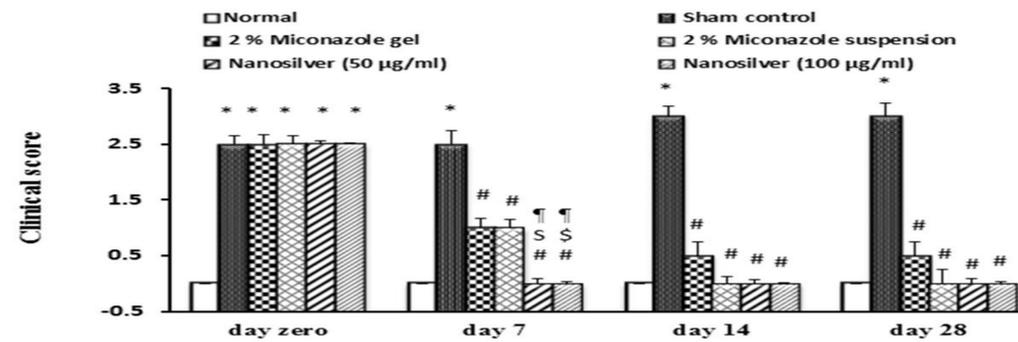
All treatments were applied topically every day for 2 weeks.

Microbial counts were expressed as log CFU/ml for the experimental groups (transformed into actual counts after multiplication by dilution factor) at day zero, 7, 14 and 28. CFU: colony forming units.

For microscopic examination, the fixed tissue samples were mounted in paraffin and sectioned at 4 µm and stained with and periodic acid-Schiff

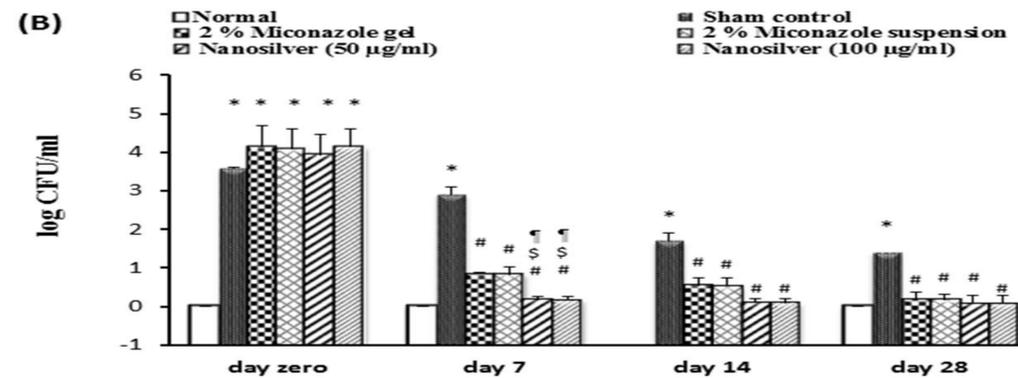
## Results

### 1-Effect of silver nanoparticles on clinical score



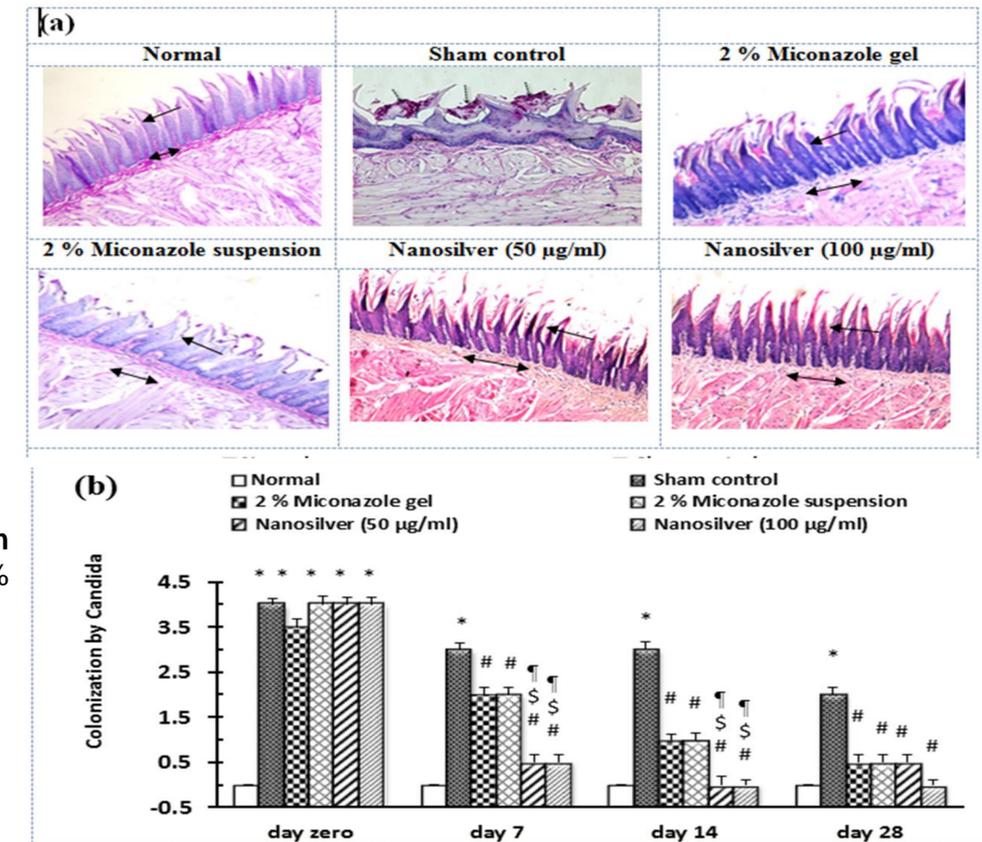
**Figure 1. effect of silver nanoparticles on the clinical score taken from rats.** \*versus normal group, #versus sham control group, \$versus 2% miconazole gel group, †versus 2% miconazole suspension group

### 2-Effect of silver nanoparticles on microbial count



**Figure 2. effect of silver nanoparticles on microbial count in specimens from the rat s' tongues.** \*versus normal group, #versus sham control group, \$versus 2% miconazole gel group, †versus 2% miconazole suspension group

## 3-histopathological changes



**Fig 3. Histological sections from tongues from the experimental groups stained with periodic acid-Schiff.** a) Photomicrographs showing tongue sections after inoculation with *C. albicans*. Treatment with miconazole or nanosilver (50 or 100 µg/ml) normalized the appearance of connective tissue (double arrow) [x 20]. b) Colonization by *Candida* in the experimental groups at day zero, 7, 14 and 28. Data are median±S.E. and analyzed using Kruskal–Wallis test and Dunn's multiple comparisons' test at P<0.05. \*versus normal group, #versus sham control group, \$versus 2% miconazole gel group, †versus 2% miconazole suspension group, n=8.

## Conclusions

*In vivo* experiment indicated that silver nanoparticles provided a quicker and effective onset of antifungal activity with greater efficacy on day 7 only regarding all measured parameters compared to miconazole. However, the effect was generally equivalent to that provided by miconazole after day 14 and day 28.

Therefore, silver nanoparticles may be considered as a promising candidate for treatment of oral *C. albicans* infections if clinical safety data are available.

## References

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- Kim, K.J., et al. (2008). Antifungal effect of silver nanoparticles on dermatophytes. *J Microbiol Biotech* 18, 1482–1484