

# Osmotic Stress Resistance Potential of Active Constituent of *Ocimum sanctum*

## OBJECTIVE

To investigate the effect of triterpenic acid: ursolic acid (UA) on osmotic stress in *C. elegans* wildtype and *skn-1*- and *prdx2*-deficient strains

## MATERIALS AND METHODS

The *C. elegans* strains (N2 wildtype, QV225 *skn-1* deficient, and VC289 *prdx2* deficient) were used in this study. Resistance towards osmotic stress was measured by exposing L4 synchronized worms to standard nematode growth medium (NGM) plates containing 500 mM NaCl. Worms were treated for 24 h with 25  $\mu$ M, 50  $\mu$ M or 100  $\mu$ M UA, or 25  $\mu$ M, 50  $\mu$ M or 100  $\mu$ M fluoxetine or 0.1% DMSO (Control) on standard NGM plates and were placed on 500 mM NaCl osmotic stress plates after treatment. Animals were scored for survival measured every 2 min, until all did not respond anymore to a mechanic stimulus with a platinum wire. The previously reported results for the N2 wildtype were included here to allow a comparison to the other mutants QV225 and Vc289.

## RESULTS

Effect of Ursolic acid on osmotic stress assay

Treatment group	Mean life span in% (100 $\mu$ M) $\pm$ SD; <i>p</i> value	Mean life span in% (50 $\mu$ M) $\pm$ SD; <i>p</i> value	Mean life span in% (25 $\mu$ M) $\pm$ SD; <i>p</i> value
N2 Control	100 $\pm$ 11,5	100 $\pm$ 9.1	100 $\pm$ 6.4
N2 Fluoxetine	145.5 $\pm$ 10.4; ( <i>p</i> < 0.05)	117.4 $\pm$ 4.1 ( <i>p</i> < 0.05)	105.3 $\pm$ 7.5; n.s.
N2 Ursolic acid	166.7 $\pm$ 9.1; ( <i>p</i> < 0.001)	122.3 $\pm$ 5.8 ( <i>p</i> < 0.05)	116.0 $\pm$ 4.7 ( <i>p</i> < 0.05)
QV225 Control	100 $\pm$ 0.0	100 $\pm$ 1.2	100 $\pm$ 3.9
QV225 Fluoxetine	126.7 $\pm$ 10.5; ( <i>p</i> < 0.001)	113.4 $\pm$ 5.6 ( <i>p</i> < 0.05)	108.1 $\pm$ 2.7; ( <i>p</i> < 0.05)
QV225 Ursolic acid	134 $\pm$ 7.5; ( <i>p</i> < 0.001)	119.8 $\pm$ 8.1 ( <i>p</i> < 0.01)	112.1 $\pm$ 4.8 ( <i>p</i> < 0.51)
VC289 Control	100 $\pm$ 7.4	100 $\pm$ 4.3	100 $\pm$ 8.7
VC289 Fluoxetine	100.4 $\pm$ 7.1; n.s.	101.5 $\pm$ 5.8; n.s.	103.2 $\pm$ 6.2; n.s.
VC289 Ursolic acid	106.2 $\pm$ 6.9; n.s.	103.7 $\pm$ 11.7; n.s.	107.4 $\pm$ 5.1; n.s.

Values expressed mean  $\pm$  SD; n=3

*p* values < 0.05 were considered to be significant as compared to control

## CONCLUSIONS

- In N2 wildtype animals, ursolic acid treatment extended survival by 66% (*p*<0.001). Whereas, Fluoxetine extended survival by 45% (*p*<0.05).
- Ursolic acid and fluoxetine treatment had no effect on the survival of VC289 *prdx2* deficient animals (106.2% vs. 100.4%; not significant).

## OUTCOME

Best results were achieved for 100  $\mu$ M ursolic acid. Hence, these findings demonstrated that ursolic acid exhibited osmotic stress resistance potentials.

## Reference:

Naß J, Abdelfatah S, Efferth T. The triterpenoid ursolic acid ameliorates stress in *Caenorhabditis elegans* by affecting the depression-associated genes *skn-1* and *prdx2*. *Phytomedicine*. 2021;88:153598.