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THE EFFECTS OF STRONTIUM CHLORIDE ON EXPERIMENTAL BLADDER INFLAMMATION IN RAT

Hypothesis / aims of study
Strontium salts are effective and selective anti-irritants for chemically induced sensory irritation associated with stinging, burning, or itching especially on the skin. Interstitial cystitis is a painful bladder disease characterized by urgency, frequency and variable inflammation but there is no curative therapy.
The aim of the present study was to determine whether strontium has a preventive or treatment effect in bladder with lipopolysaccharide (LPS) induced experimental interstitial cystitis model.

Study design, materials and methods
Five different procedures administered to 8 rats in each group are as follows : Rats' bladder in control group were instilled with %0.9 NaCl after urethral catheterization, the second group was LPS group in which bladders were instilled with E. coli LPS, the third group was strontium group in which bladders instilled with %1 strontium chloride hexahydrate solution, the fourth group was preventive group in which bladders initially instilled with %1 strontium chloride then E. coli LPS, the fifth group was treatment group in which bladders instilled with LPS initially then %1 strontium chloride solution.
All rats' urine samples were collected at the beginning and at the end of the study. Histamine and TNF-α levels were measured by ELISA from urine samples. Rats' bladder were removed at the end of the study and examined histopathologically for inflammation and mast cell count with hematoxylin eosin and toluidine blue staining.
Results were presented as the mean ± standard deviation (SD) and various comparisons of mean difference among groups were evaluated with Tukey test. Significance was considered at $p<0,05$.

Results
In the LPS group; mean±SD of total urine histamine level increased from 9,85±3,58 ng to 34,14±3,02 ng and the TNF-α level increased from 69,54±8,96 pg/mL to 119,18±13,48 pg/mL after LPS instillation. The changes in histamine and TNF-α value of LPS group were statistically significant. (p=0,000 both).

	mean±SD (at the beginning)	***mean±SD (at the end)***	*p*
LPS group histamine	9,85±3,58 ng	34,14±3,02 ng	0,000
LPS group TNF-α	69,54±8,96 pg/mL	119,18±13,48 pg/mL	0,000

In the strontium group; mean±SD of total urine histamine level changed from 9,76±3,61 ng to 11,33±2,57 ng and the TNF-α level changed from 4,3±2,09 pg/mL to 27,8±14,07 pg/mL after strontium instillation. The changes in histamine and TNF-α value of strontium group were not statistically significant. (p= 0.995, p=0,102).

	mean±SD (at the beginning)	***mean±SD (at the end)***	*p*
Strontium group histamine	9,76±3,61 ng	11,33±2,57 ng	0.995
Strontium group TNF-α	4,3±2,09 pg/mL	27,8±14,07 pg/mL	0,102

In the preventive group; mean±SD of total urine histamine level was 31,88±2,58 ng at the end of the study. In the treatment group; mean±SD of total urine histamine level was 37,28±4,16 ng at the end of the study. When these values were compared to LPS group's (34,14±3,02 ng) the differences were not statistically significant. (p= 0.942, p=0,702).

	Preventive group end of study histamine	*p*
LPS group end of study histamine (34,14±3,02 ng)	31,88±2,58 ng	0.942
	Treatment group end of study histamine	*p*
	37,28±4,16 ng	0,702

In the preventive group; mean±SD of total urine TNF-α level was 27,95±15,14 pg/mL at the end of the study. In the treatment group; mean ± SD of total urine TNF-α level was 24,98±14,63 pg/mL at the end of the study. When these values were compared to LPS group's (119,18±13,48 pg/mL) the differences were not statistically significant. (p=0,000 both).

	Preventive group end of study TNF-α	*p*
LPS group end of study TNF-α	27,95±15,14 pg/mL	0.000

(119,18±13,48 pg/mL)	***Treatment group end of study TNF-α***	*p*
	24,98±14,63 pg/mL	0.000

Regarding histopathological evaluation there was no significant difference between all groups.

Interpretation of results

The significant changes of urine TNF-α and histamine levels in LPS group showed that the validity of our interstitial cystitis model. Strontium chloride alone did not make histopathological changes or did not make significant changes in TNF-α or histamine levels of urine.

Concluding message

In our interstitial cystitis model created with lipopolysaccharide, strontium chloride did not make any significant changes in histopathology of the bladders and the levels of histamine; however, it significantly reduced the levels of TNF-α. Given that the role of TNF-α in the physiopathology of interstitial cystitis, these results suggested that further studies are still required to evaluate the potential use of strontium in the management of interstitial cystitis.

Disclosures

Funding: Cumhuriyet University conducted the study in accordance with the guidelines for the care and use of laboratory animals. **Clinical Trial:** No **Subjects:** ANIMAL **Species:** Rat **Ethics Committee:** Animal ethics committee of Cumhuriyet University