

THE EFFECT OF SOY PROTEIN ON TUBULOINTERSTITIAL FIBROSIS DEVELOPMENT

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OBJECTIVES

Tubulointerstitial fibrosis (TF) has the leading role in the progression of chronic nephropathy (NF). It has been shown that the inclusion of soy proteins (SP) in the diet of patients with NF can clearly slow the progression of renal dysfunction. However, it is not known to what extent the nephroprotective effect of SP is associated with retard development of TF and their interference in TGF- β /Smad and NF κ B signaling pathways. We attempted to study the effect of diets with different content of SP on the expression of NF κ B gene and TGF- β protein in kidney tissue in rats with unilateral ureteral obstruction (UO) induced by inter ligature transection of the ureter.

METHODS

Male Wistar rats were used. In the first group (n=6) - rats were treated with standard diet (20% of the animal protein). In the second (n=7) - immediately after surgery the animals began to received a diet with high soy protein content (50% - soy isolate SUPRO 760, Solae Europe SA, Switzerland; 50% - pearl barley). In the third (n=8) - low protein diet supplemented with SP (10% - soy isolate; 90% - pearl barley). The duration of observation in all cases was 14 days after the UO. Immunohistochemical (IHC) reaction was carried out using primary rabbit polyclonal antibodies to TGF β 1 (Santa-Cruz, USA) and polymer detection system (DAKO, Denmark). Analysis of inflammatory/sclerotic process (ISP, %) and IHC activity (%) were evaluated by 20 not overlapped fields of view in the cortex, under the magnification $\times 40$ using a 100 point grid, with the exception of the account the glomeruli and arteries. Evaluation of the mRNA NF κ B gene expression was performed using RT-PCR in the presence of EvaGreen. GAPDH was used as the reference gene. The relative gene expression (RGE) values for NF κ Bp65 were calculated by 2-delta Ct protocol. RGE in kidneys with UO was compared with contralateral organs.

RESULTS

The spreading of TGF β 1 deposits in kidneys with UO (76.6 ± 4.09 ; mean \pm SE) in the tubular cells of the first group was significantly higher than in others (second - 65.3 ± 2.22 , $p < 0.05$, third - 43.4 ± 2.05 , $p < 0.005$). IHC activity of TGF β 1 into the second group was greater than the third ($p < 0.001$). ISP in the first and the second group did not differ significantly (34.7 ± 3.56 vs 28.4 ± 2.05 , respectively; $p = \text{NS}$), and were significantly higher in compare with the third (20.3 ± 0.84 , $p = 0.002$ and $p < 0.005$; respectively). Expression of NF κ B gene in the first group was highest and exceed ones contralateral organs in 1.5 times. There were no differences in RGE NF κ B in second and third groups between experimental and contralateral kidneys.

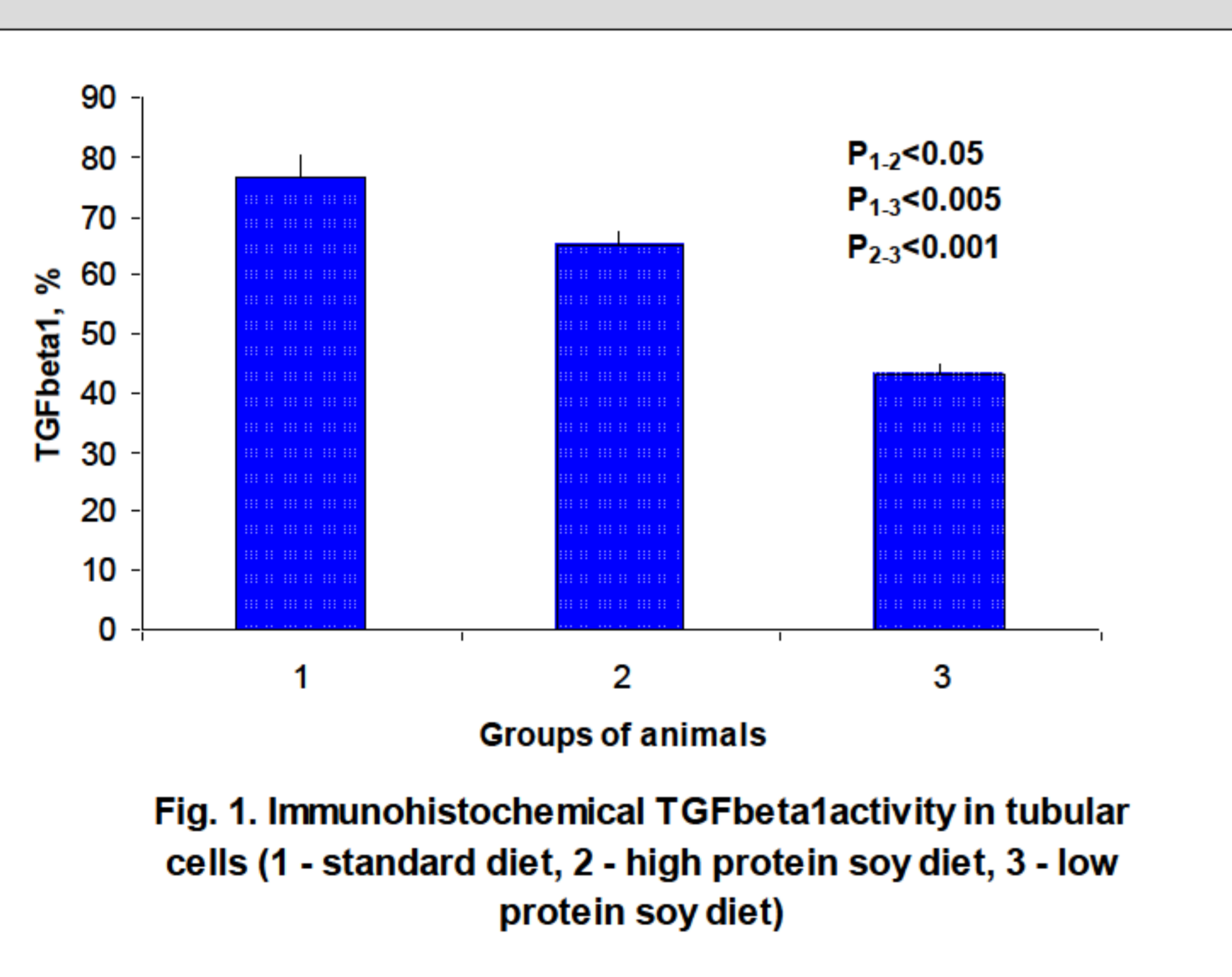


Fig. 1. Immunohistochemical TGFbeta1 activity in tubular cells (1 - standard diet, 2 - high protein soy diet, 3 - low protein soy diet)

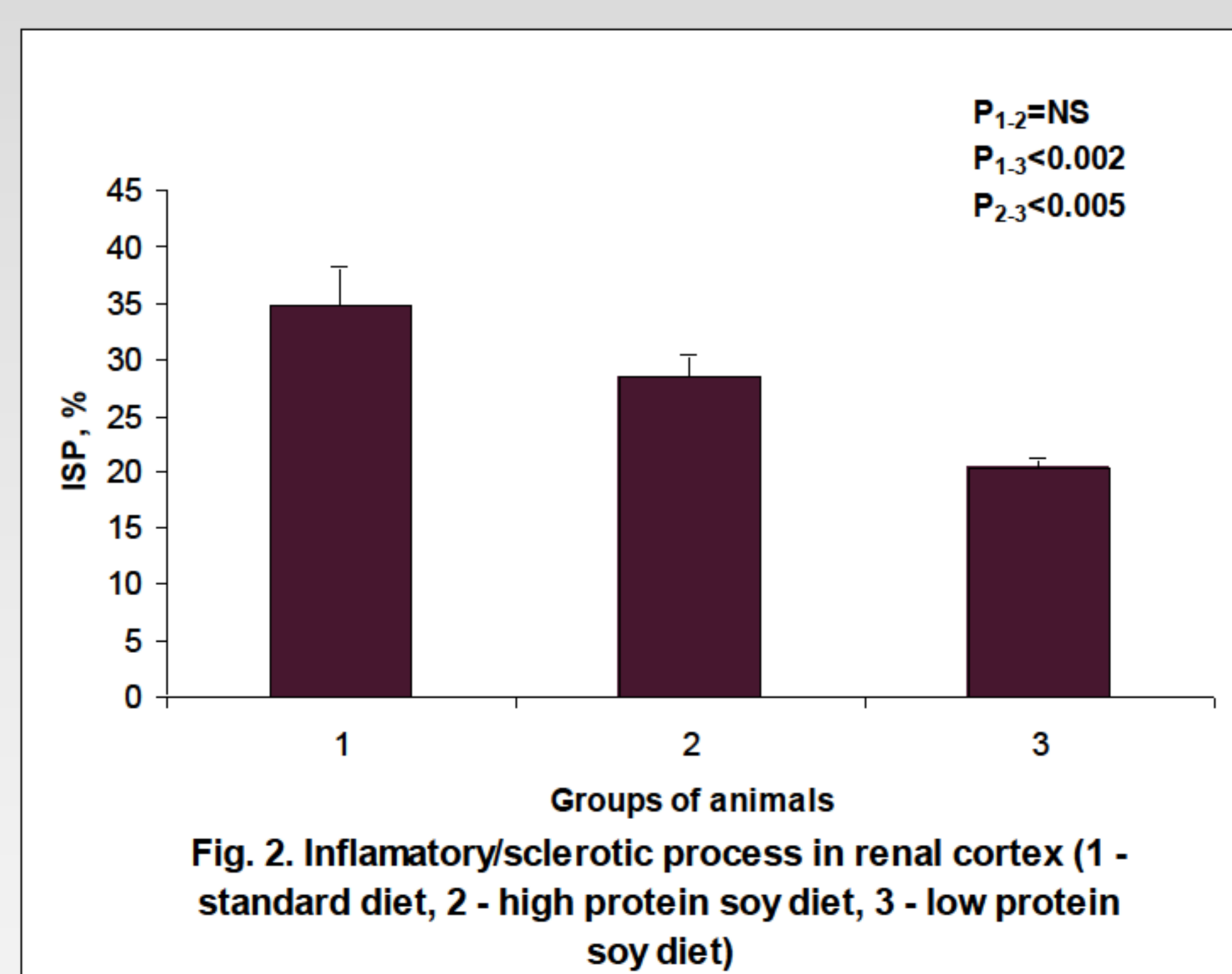


Fig. 2. Inflammatory/sclerotic process in renal cortex (1 - standard diet, 2 - high protein soy diet, 3 - low protein soy diet)

CONCLUSIONS

Diets, supplemented with SP, reduce the severity of inflammatory and sclerotic changes in the renal parenchyma of rats with UO. Such an effect of SP may have realized through their intervention in the TGF β 1/Smad and partially in NF κ B signaling pathways. At the same time low-protein diet included SP has a more pronounced nephroprotective effect.

