ANTIHYPERTENSIVE EFFECT OF SULPHUR YELLOW BEANS PEPTIDES IN SPONTANEOUSLY HYPERTENSIVE RATS

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Introduction. Hypertension is one of the major risk factors for the development of cardiovascular diseases, stroke and the end stage of renal disease, which affects 15-20% of all adults (Zhang et al., 2006). Therefore, inhibition of ACE (angiotensin-converting enzyme) is considered to be an important therapeutic approach for controlling hypertension. Many studies have attempted to synthesize natural and better ACE inhibitors.
The Azufrado (sulfhur yelow) bean (Phaseolus vulgaris) is a common legume, whose grain is an important source of protein from the Northwestern of Mexico. Previously, Valdez-Ortiz (2012) demostrated that three types of Azufrado beans hydrolysates exhibited ACE- inhibitor property, however their in vivo activity has not been evaluated yet. This study was designed to investigate the hypotensive and physiological effects of ACE inhibitor peptides derived from azufrado beans peptides on SHR.

Methods. The protein isolation of the beans was processed by alkaline solubility and acid precipitation of proteins. Protein hydrolysis was carried out according to Humiski and Aluko (2007). Antihypertensive potential of each protein hydrolysate was determined by their ACE-inhibitor (ACE-I) activity according to Miguel *et al.* (2006) with modifications. For this study, twenty-three male spontaneously hypertensive rats (SHR) (10-16 weeks-old,) were used. The rats were purchased from Harlan and reproduced in the animal facility of Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán) The rats were divided into three groups of SHR rats: a control group without treatment, a group treated with 50 mg/kg of captopril and a group treated with 500 mg/kg of BP3 (Bean Peptides 3 kDa). The mean arterial pressure (MAP) was monitored with a pressure transducer (model p23 db, Gould) and recorded on a polygraph (Grass Instruments, Quincy, MA). After 30 to 60 minutes of equilibration, MAP value was taken as an average of a 30 recording for 5 hours.

Results. BP3 was analyzed in vitro for its inhibitory activity of ACE (iACE), the results were very encouraging as it showed excellent activity (IC_{50} = 0.00459 mg / mL) and it was observed that BP3 showed better activity that others bean hidrolysates (Valdéz-Ortíz *et al*., 2012 and Torruco *et al*., 2009). A dose of 500 mg/kg of BP3 was administrated via intragastric gavage to a group of 9 rats SHR. Immediately after the corresponding treatments administration to each group of rats, the MAP was monitored and averaged every 0.5 h, (Figure 1). After 3 h of oral administration of 500 mg of BP3/kg of body weight a significant decrease in mean arterial pressure (MAP) expressed as change regarding baseline MAP was observed (-42 ± 5 mmHg). Similar effect was obtained with captopril, a potent antihypertensive drug (50 mg/kg of body weight).

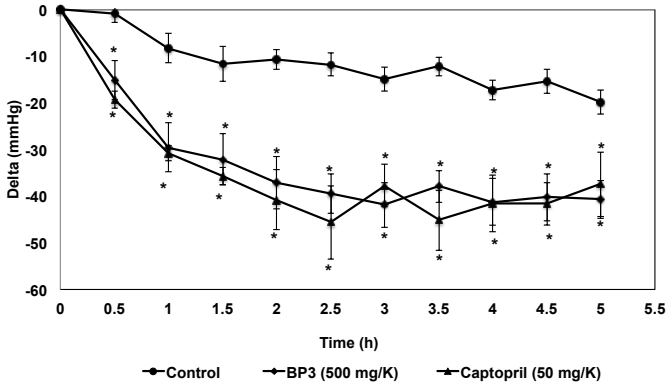

Figure 1. Changes of ΔmmHg decreased after treatments, data are expressed means ± S.E.M (n= 5-9). The significance levels contrasting with captopril group rats were analyzed using Student's *t*-test with $p < 0.05$.

Conclusions. This study suggests that Azufrado´s bean peptides compete with drugs such as captopril in the reduction of blood pressure, indicating that beans can have added value and can be exploited in the pharmaceutical industry.

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