CHIA ANTIOXIDANT CAPACITY DURING THE PREPARATION OF A PROTEIN ISOLATE

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Introduction. Chia (*Salvia hispanica L.*) is an annual herbaceous plant of the Lamiaceae family. Chia seeds are an important source of phenolic compounds known for their antioxidant activity [1]. Chia seeds also are rich in proteins that also may show antioxidant activity.
The aim of this study was to evaluate the antioxidant activity of chia fractions obtained during the preparation of a protein isolate of chia seeds.

Methods. The chia fractions were obtained according to the method proposed by Vioque with some modifications, the fractions obtained from whole chia flour (C) were defatted flour (DF), protein concentrate (Cn), precipitate (P) this fraction is a pellet resulting of centrifugation of Cn in alkaline solution pH9, protein isolate (I), hexane-ethanolic extract (HE) and hydroalcoholic extract (HA), the antioxidant activity was evaluated using DPPH and TEAC colorimetric techniques, SDS-PAGE was performed with the technique proposed by Laemmli and quantification of proteins was conducted by the microkjeldahl method. We evaluated the antioxidant capacity of each fraction obtained during the preparation of a protein isolate (20mg/ml).

Results. Table 1 shows the antioxidant activity of each fraction, the whole flour present a DPPH radical scavenging capacity of 36.65% greater than defatted meal this due to lose of the chia seed coat that is rich in antioxidants, such activity is restored when was get the concentrate; The HE extract showed the most radical scavenging capacity.

Table 1. Antioxidant Capacity and Protein Concentrations of chia Fractions

Fraction	DPPH %in	TEAC eq mMol Trolox	% Proteins
C	36.65 ± .002	0.09 ± .004	21.2
DF	11.64 ± .024	ND	52.3
Cn	38.1 ± .007	0.25 ± .007	63.6
P	46.56 ± .016	0.14 ± .003	61.8
I	32.32 ± .006	0.71 ± .028	96.9
HE	85.65 ± .002	0.25 ± .021	ND
HA	24.77 ± .038	1.24 ±.002	ND

ND Not detected

The TEAC technique confirmed that the degreasing of the flour diminishes the antioxidant activity and unlike the DPPH test, the antioxidant activity was higher in Cn, P and I than the whole flour. There is a notable increment in the protein concentration and antioxidant activity in the isolate whose activity is greater than the concentrate, Orsini in 2011 found that the IC50 of amaranth protein isolate obtained by the same technique was 10.8 mg protein per ml [2], Segura-Campos et. al obtained 0.53 and 17.52 TEAC (mmolL-mg protein) in hydrolysates of chia protein isolates added to white bread and carrot cream respectively[3].

Figure 1 shows the electrophoretic pattern of chia during the preparation of the protein isolated, it is clear that the pattern is repeated in all fractions except in lanes correspond to I where the two bands of 30 and 28 kDa are missing, these bands are similar to those shown by Sandoval-Oliveros 2012 [4] these bands belong to the prolamin fraction of chia, also is observed an intense band around 50 kDa, this same band seen in the aforementioned work, more trials are needed to confirm these hypotheses.

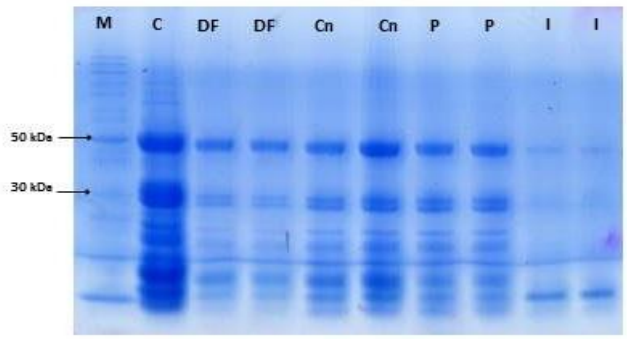

Fig.1 Electrophoretic pattern of chia, Lane 1 Marker, Lane 2 chia flour, Lanes 3 and4 defatted flour, Lanes 5 and 6 Concentrate, Lanes 7 and8 Precipitate and Lanes 9 and 10 Isolate.

Conclusions. Antioxidant activity increases while increasing the protein concentration of the seed, other compounds with antioxidant activity are recovered in the extracts HA and HE. The antioxidant capacity in vitro of chia seed makes it an important source of these compounds. As perspective of this work is to hydrolyze the concentrated and isolated to obtain major activity by bioactive peptides.

References.

1. Reyes A., Tecante A., Valdivia M.A. (2008), *Food Chem.* 107. (2): 656-663
2. Orsini M., Tironi V., Añón M. (2011), Food Sci. Tech. 44. (8): 1752-1760.
3. Segura M., Salazar I., Chel L., Betancur D. (2013), Food Sci. Tech. 50. (2): 723-731
4. Sandoval M., Paredes O. (2013), J. Agric. Food Chem. 61. (1): 193-201