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Czech J. Food Sci.

Capouchová I., Petr J., Tlaskalová-Hogenová

H., Michalík I., Faměra O., Urminská D., Tučková L., Knoblochová H.,Borovská D.

Protein fractions of oats and possibilities of oat utilisation for patients with coeliac disease

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The applicability was evaluated of 16 different oats species and varieties of different provenance in the coeliac diet in view of the composition of the protein complex and immunological testing during two-year experiments (2001 and 2002). Determination was carried out of total nitrogen content (average of evaluated oats collection in 2001 was 2.21%, in 2002 2.78%), protein nitrogen content (average 2001 1.94%, 2002 2.28%), and crude protein (N × 6.25)

content (average 2001 13.80%, 2002 17.37%). The proportions of different protein fractions play a decisive role for the aims of this study because, based on the existing knowledge, coeliacally active protein components are present particularly in the prolamin fraction. The percentage of prolamins (determined by discontinual fractionation after Osborne) in the author ' s evaluated collection of oats species and varieties under the conditions of Central Bohemia reached on average 17.68% of the total protein in 2001, and 15.36% in 2002. The average percentage of albumins and globulins of the total protein reached 36.97% in 2001 and 41.04% in 2002, the average percentage of glutelins of the total proteins was 37.61% in 2001 and 34.10% in 2002, and residual was on average 7.55% in 2001 and 8.70% in 2002, respectively, of the total protein. Electrophoretic analysis of reserve (gluten) proteins (SDS-PAGE ISTA) showed in the oats collection evaluated the percentage of LMW + prolamins in the range 56 – 77% of the total reserve proteins in 2001, and 52 – 73% in 2002. The results of A-PAGE electrophoretic

analysis of prolamin proteins confirmed the presence of α-prolamins, that ranged in the total content of prolamins from 50 to 88% in 2001, and from 77 to 100% in 2002, while β- + γ-prolamins ranged in 2001 from 11 to 49%, and in 2002 from 0 to 22%. These values do not give serious guarantees for the possible utilisation of oats in the gluten-free diet. The results of the immunological evaluation of the amount of prolamins in oats grains using ELISA showed great differences between different varieties and the experimental years. In 2001, 7 oats samples out of 13 evaluated, and in 2002 10 samples out of 12 evaluated were below the limit for the gluten-free diet (10 mg prolamins (gliadins)/100 g of sample dry matter), but the other varieties exceeded the limit, particularly in 2001, very significantly. The results obtained in the evaluated collection of species and varieties of oats revealed a great variability in the structure of the protein complex and in the immunological testing. In addition a significant effect of the year on the results of all analyses was evident. Based on our results, the use of oats in the diet for coeliac disease can be very risky for these reasons.

Keywords:

oats; species; varieties; protein fractions; immunological testing; coeliac disease; gluten-free diet

[fulltext]