

Use of mare milk in pediatric allergology

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ABSTRACT: Cow milk allergy (CMA) is a common disease of infancy and early childhood. The aim of this research concerns the study of protein profile in mare milk and its allergenicity in a population of selected children with proved Ig-E mediated cow milk allergy. 25 children, with a median age of 34 months, affected by CMA, were selected and underwent skin prick tests with cow and mare milk, double blind placebo controlled oral food challenge (DBPCOFC) with cow and mare milk and, as placebo, a soy formula. The results show that mare milk is tolerated by 96% of the children with cow milk allergy; in fact only 1 of 25 children had a positive challenge test to mare milk. This data suggest that this product, with appropriate modifications, could be regarded as a good substitute of cow milk in allergic children.

Key words: cow milk allergy, children, mare milk, mare milk allergy

INTRODUCTION: Some scientific works suppose mare milk potential utilization in pediatric dietetics, as a substitute of cow milk, and, generally, in human nutrition, moreover for its high digestibility, richness of essential nutrients, like polyunsaturated fatty acids and favourable serumproteins/caseins ratio (Csapò *et al.*, 1995; Doreau and Boulot, 1989; Doreau, 1994). At the moment there is not yet a global organized market for mare milk, and for the first time we consider the administration of this product in cow milk allergic children diets. Cow milk allergy (CMA) is in fact a common disease of infancy and early childhood and the incidence is approximately 2.5% during the first three years of life. If the baby is not breast-fed, a substitute for cow's milk (CM) formula to feed babies with CMA is necessary because in early life milk is the only source of nutrition. At the moment, the substitutes are soy formula and casein or whey extensively hydrolyzed formula (Businco *et al.*, 1993). The drawbacks of these products are potential allergenicity, unpleasant taste, high costs and nutritional deficiencies (A.A.P., 1998; Giovannini *et al.*, 1994). Goat's milk, sometimes prescribed as cow milk substitute, has induced allergic reaction in most children with CMA (Lucenti *et al.*, 1999). The aim of this study was to investigate, *in vivo*, the allergenicity of mare's milk (MM) in a population of selected children with proved Ig-E mediated CMA.

MATERIALS AND METHODS: 25 children (17 male and 8 female), aged between

19 and 72 months, with a median age of 34 months, with severe CMA, were selected for the present research. The diagnosis of CMA was performed on the basis of the personal history and physical examination and was confirmed by positive responses both to skin prick test (SPT) and to double-blind placebo-controlled oral food challenge (DBPCOFC). The symptoms reported by children after the ingestion of CM were atopic dermatitis (19 children), atopic dermatitis and asthma (4), asthma (1) and urticaria (1). All the children underwent SPT with CM and MM and DBPCOFC with CM and MM, and, as placebo, a soy formula (Isomil, Abbott, Italy). SPTs were done by the prick method on the volar surface of the forearm. The prick tests were read after 20 minutes and considered positive when the wheal was 3 mm greater than the negative control. Children were tested with a isotonic saline solution as a negative control, histamine (10 mg/mL) as a positive control (SARM, Italy), and undiluted pasteurized CM and MM. DBPCOFC tests were performed in a day-hospital setting, administering CM or MM or, as placebo, a soy formula (Isomil, Abbott, Italy), as follows: a drop was put on the inner side of the lower lip, 5 mL was ingested after 5 minutes and 25 mL after 30 minutes. If no symptoms appeared, 100 mL were given after 30 minutes. After the last administration children were kept under observation for at least 4 hours and then discharged. The next challenge test was done 1 week later.

RESULTS AND DISCUSSION: The results of SPT and DBPCOFC to CM and MM are reported in Table 1. All the children showed strong positive skin test responses to CM (mean diameters: wheal = 10 mm, erythema = 16 mm); 2 children had positive skin test responses to MM (wheal 3 and 2 mm, erythema 20 and 4 mm). All children had positive DBPCOFC to CM. 1 child had positive DBPCOFC to MM. This child also had positive SPT to MM and had urticaria after the administration of 60 mL of MM. In the CM challenge test the main symptoms were urticaria in 17 children, rhinitis and/or wheezing in 3, vomiting in 3, and angioedema in 2. All the positive responses to the challenge occurred within 1 hour (range: 2 minutes to 1 hour). The median dose of CM that gave a positive response to the challenge test was 20 mL (range: 1-100 mL). No children reacted to the placebo. This results indicate that MM is tolerated by 96% of the children with CMA. Only 1 of the 25 children had a positive test to MM. This data are interesting because the enrolled subjects formed a highly sensitized selected group of children, as shown by the following data: the median age of the children was 34 months and the majority of the children was more than 3 years old. It is well known that CMA usually disappears within the first 3 years of life and only extremely sensitized children continue to be allergic to CM after 3 years of age. The positive response in SPT to CM was very strong in all the children and a very small amount of CM was required to trigger a positive response to the challenge. It has been shown that the amino acid sequences of some MM proteins differ from those of CM proteins

(Godovac-Zimmermann *et al.*, 1987). The different kind of alpha-lactalbumin, designated A, B and C, have been isolated in MM. Comparison of the sequences of B and C with that of A indicates 3 and 4 amino acid exchanges, respectively. The primary structure of equine alpha-lactalbumin B and C have been determined. The phylogenetic difference of equine alpha-lactalbumin B and C from bovine alpha-lactalbumin B is indicated by 39 and 40 amino acid exchanges, respectively (Godovac-Zimmermann *et al.*, 1987). This structural differences of bovine and equine proteins could account for the different reaction obtained with these two kind of milk and justify immunoblotting and immunoblotting inhibition investigations turned to verify the presence of common epitopes between MM and CM. Our results suggested that mare milk, with appropriate modifications, could be regarded as a good substitute of cow milk in children with severe IgE-mediated CMA.

Table 1 – Skin test and challenge test responses to CM and MM in 25 children with CMA

	CM		MM	
	No.	%	No.	%
Positive skin tests	25/25	100	2/25	8
Positive DBPCOFC with 22,8 mL (mean) of CM (range 1-100 mL)	25/25	100	1/25	4

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