Assessment of Clinicopathological Features in Infants and Children with Cow's Milk Protein Allergy

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The aim of our study was to evaluate the clinicopathological features in infants and young children with cow's milk protein allergy. Cow's milk protein allergy (CMPA) is one of the most common food allergy in children. Thus, we conducted a descriptive observational study, which was carried out in the First Pediatric Clinic of the Craiova County Emergency Clinical Hospital, in the period 2015-2017, which included 138 infants and young children diagnosed with cow's milk protein allergy. An improvement in digestive symptomatology during the status period of the disease was observed, especially in what diarrheal stools are concerned as their incidence has decreased. In fact, gastroesophageal reflux is the most common manifestation in infants and children with CMPA, while mean acute otitis is present only in a small number of patients. In conclusion we can say that a good knowledge of the clinicopathological features in children with allergy to cow's milk proteins allows a superior therapeutic attitude and ensures a normal life for children and infants suffering from this type of allergy.

Key words: cow's milk protein allergy, infants and children

Cow's milk protein allergy (CMPA) is one of the most common food allergies in children and it has a prevalence of about 1.9 - 4.9% in infants and children under 3 years old [1-3]. It should be specified that allergy is a hypersensitivity reaction initiated by specific immunological mechanisms [1]. In accordance with the National Institute of Allergy and Infectious Disease (NIAID), food allergies are classified in immunoglobulin E (IgE) mediated allergies, non-IgE-mediated and also in mixed IgE and non-IgE-mediated [4].

In the majority of infants and children with CMPA the immunologic mechanisms produce IgE in response to the ingestion of cow's milk protein and this is considered an atopy manifestation with or in the absence of other signs such as astma, allergic rhinitis and eczema [1].

IgE-mediated CMPA defense symptom during the first two hours after the ingestion of cow's milk and may affect the gastrointestinal system, the respiratory system and the skin, potentially life-threatening anaphylaxis reactions may occur [2, 4]. Also, although rarer than IgE-mediated CMPA, in non-IgE-mediated CMPA, symptomatology occurs later, at about 72 h after the ingestion of cow's milk, and most often includes gastrointestinal events such as gastroesophageal reflux, diarrhea, blood stools or constipation [1].

In E-immunoglobulin-mediated allergy, certain antibody-dependent protein structures recognize certain molecular regions of other interacting structures (epitopes). Because it is not secreted in human milk, beta-lactoglobulin (BLG) has long been considered the most allergenic component of cow's milk, but at present many proteins appear to be involved in this immunological response [1].

The CMPA diagnosis is based primarily on identifying symptoms and on linking them to possible foods suspected of being responsible for immunological mechanisms adjacent to allergy [5]. The skin prick test or specific IgE blood test are useful for the diagnosis of IgE-mediated CMPA while for non-IgE-mediated CMPA are limited [5,6]. However, the oral challenge test remains the gold standard for the two types of allergies [5,6].

Progressive administration in small and repetitive amounts of cow's milk proteins allows better immunity tolerance than with massive ingestion, most children regaining tolerance to cow's milk around the age of 3-4 years [1].

Experimental part

The aim of the study

The aim of our study was to evaluate the clinicopathological features in infants and young children with cow's milk protein allergy.

Material and methods

Thus, we conducted a descriptive observational study, which was carried out in the First Pediatric Clinic of the Clinical Emergency County Hospital of Craiova, between 2015-2017, the study included 138 infants and young children diagnosed with cow's milk protein allergy.

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Our study was conducted in accordance with the principles of the Ethics Committee of the University of Medicine and Pharmacy of Craiova and the Ethics Committee of the Clinical Emergency County Hospital of Craiova, approved by them and complied with all the provisions of the international forums regulating the scientific research (both with the provisions of the Helsinki Declaration and with the Code of Good Medical Practice).

It must be specified that each parent or legal guardian of the children and adolescents enrolled in the study agreed, by signing the informed consent and acceptance form with the use of clinical and laboratory data from the Medical Observatory Sheet.

We evaluated the following parameters: origin, age, gender, presence of family atopic terrain, digestive, respiratory, cutaneous symptoms, refusal to eat, growth retardation, and paraclinical explorations.

All data was collected and analyzed using Microsoft Office Excel 2013 software (Microsoft Corporation, Redmond, Washington, USA). Initially the mean and standard deviation for each group were calculated, then the statistical analysis continued. We used the Student t test to assess the statistical differences between the averages of two data groups, the Z-test for proportions and the Pearson correlation test. In all cases where we had $p < 0.05$, we considered that there was a statistically significant difference between the averaged groups.

Results and discussions

In this study, 138 infants and young children diagnosed with CMPA were followed consecutively (to avoid bias), monitored at the First Pediatric Clinic of the Craiova County Emergency Clinical Hospital from October 2015 to June 2017.

The onset was more likely to occur in March, April, September, October. The highest incidence was recorded in September 2016 (11.67% of patients), and in January 2017 there were no patients with CMPA, as shown in figure 1.

Of the 138 infants and young children included in the study, 87 were males (63.05%) and 51 were females (36.95%), with a higher incidence in male patients, in fig. 2.

Analyzing the origin of the patients, 52.90 % of the patients (N = 73 cases) came from the urban area and 47.10% of the patients (N = 65 cases) belonged to the rural area with a higher incidence in urban areas (fig. 3).

Taking into account both the patient's area of origin and their gender, a higher incidence was observed in urban areas than in rural areas. Male gender recorded a higher incidence both in urban areas (32.84%) and in rural areas (28.38%) than female gender (Urban = 22.38%, Rural = 16.40%) (fig. 4).

Taking into account the birth weight, we found that patients who weighted less than 2500 g recorded the highest incidence (65.94%, N = 91 cases) while those who weighted 2500-3000 represented 11.60 % of patients (N = 16 cases) and finally those with a weight between 3000 - 4000 g represented 22.46 % of patients (N = 31 cases) (fig. 5).

Depending on the duration of natural nutrition in infants and young children with CMPA, we observed that those who were breastfed less than 3 months had the highest incidence of CMPA (44.92%, N = 62 cases) compared to those who were breastfed over 6 months where an incidence of CMPA of 13.06% (N = 18 cases) was recorded.

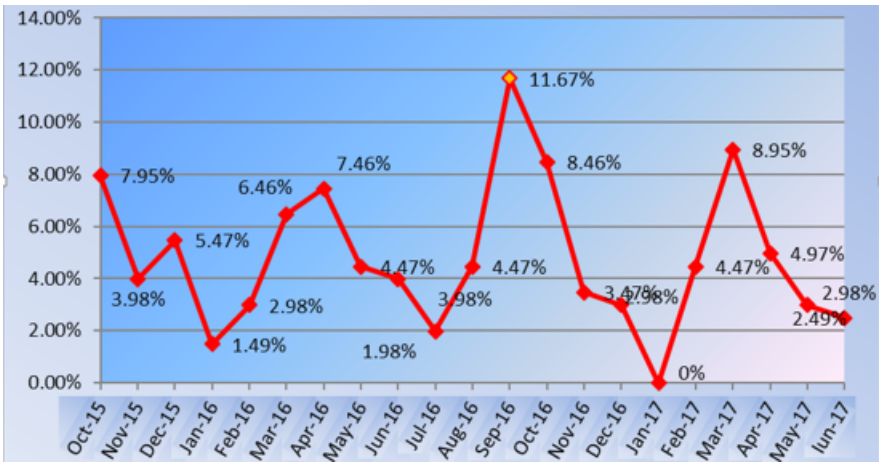

Fig. 1. The incidence of CMPA patients included in our study.

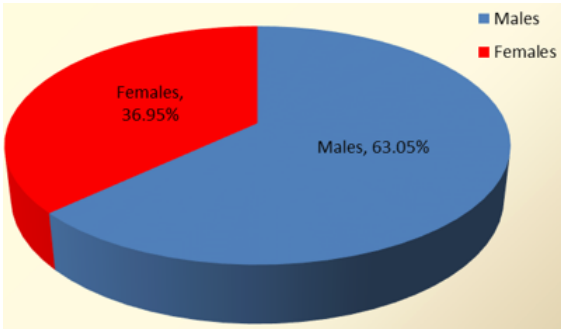

Fig. 2. Gender distribution.

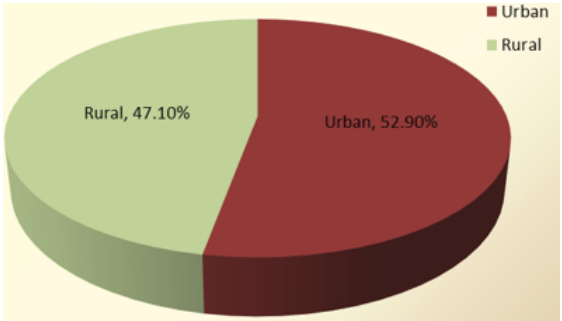

Fig. 3. Distribution of cases by area of origin

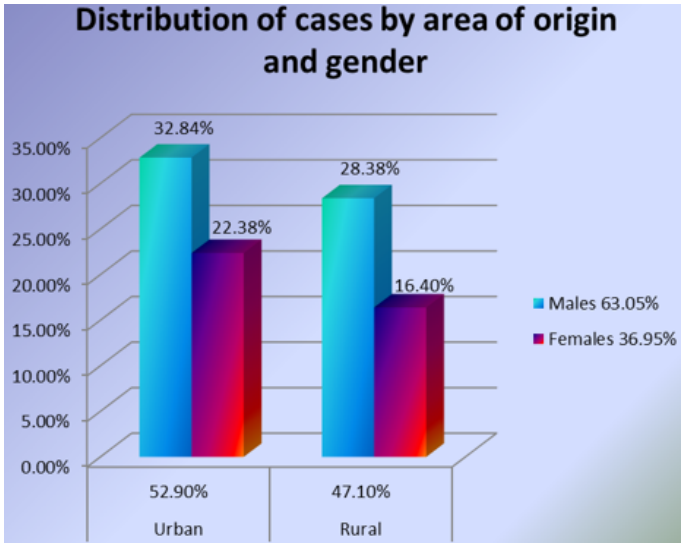

Fig. 4. Rural and urban prevalence

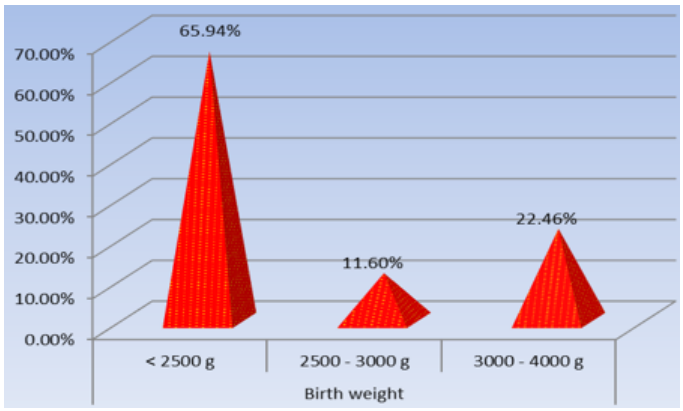

Fig. 5. Distribution of cases with CMPA depending on birth weight

Those who were breastfed between 3 and 6 months had an incidence of CMPA of 42.02% (N = 58 cases). Thus, the CMPA incidence is inversely proportional to the duration of natural nutrition (fig. 6).

The main digestive and extradigestive manifestations present at the onset and during the evolution of the disease were summarized in figure 7. An improvement in digestive symptomatology during the status period of the disease was observed, especially in what diarrheal stools are

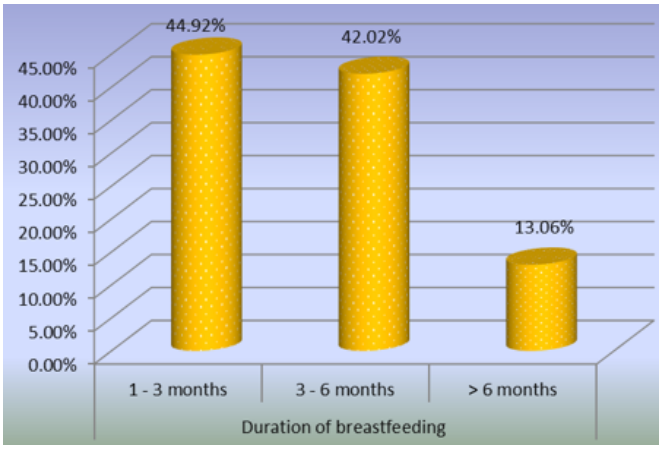

Fig. 6 Distribution of cases depending on the duration of breastfeeding

concerned their incidence decreased from a percentage of 79.10 % to a percentage of 28.36%. In fact, gastroesophageal reflux is the most common manifestation in infants and children with CMPA (80.60% of patients), while mean acute otitis media is present in only 2.98% of patients.

Allergy to cow's milk protein (CMPA) is among the first food allergies that occur in infants and children [7-22]. Although CMPA is common, affecting 2-4% of the population, it is often not properly recognized [23].

In the case of CMPA it is necessary to remove the allergenic proteins from the diet, thus removing the cow's milk. In addition it should be noted that it is necessary to eliminate them from all dairy products and also from the nutrition of the nursing mother [23].

The majority of the artificially fed infants respond well to hydrolyzed formulas, amino acid formulas are reserved for severe cases of CMPA unresponsive to hydrolyzed formulas [23, 24]. Most children with CMPA begin to tolerate cow's milk protein after a 6-month period.

With regard to nutrition replacement, it should be specified that soy is not recommended before 6 months because about 60% of those with CMPA also have cross-allergy in soybeans [23, 24]. Also, rice milk is not recommended for children under the age of 4 years because it contains arsenic [23]. Last but not least, it should be specified that goat milk, and its products are not recommended to be substitutes for CMPA children [24].

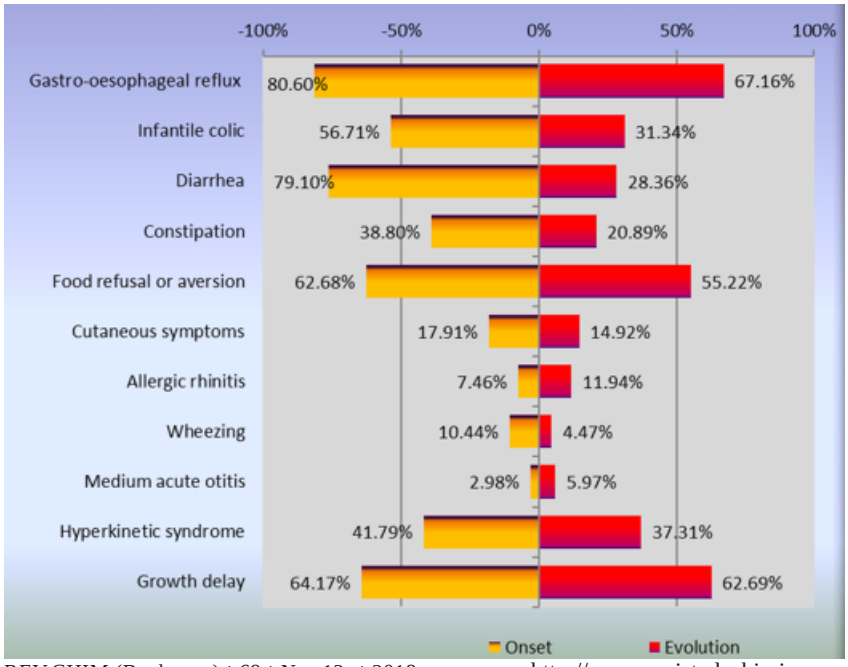

Fig. 7. Symptomathology in CMPA children at onset and in evolution

Conclusions

As a final conclusion we can say that a good knowledge of the clinicopathological features in children and infants with cow's milk protein allergy allows a superior therapeutic attitude and ensures a normal life for children and infants with this type of allergy.

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