Frequency of fecal Secretory IgA deficiency in patients with cow milk induced enteropathy

Mostafaabdel-Aziz El Hodod[1], Yosra M. Mohsen[1], Nagwa M. Abo El Magd[2], Mohamed Salaheldin Abo El Wafa[1]

[1]Department of Pediatrics, Faculty of Medicine, Ain Shams University, Cairo, Egypt
[2]Department of Clinical Pathology, Faculty of Medicine, Ain Shams University, Cairo, Egypt
Kenedy1327@gmail.com

Abstract: Background: An important activity of the mucosal surface is the production of secretory IgA that serve as 1st line of defense to repel pathogenic organisms. IgA deficiency is linked to the development of GIT food hypersensitivity and increased susceptibility to food allergy. IgA also prevent the development of allergic inflammatory reactions to environmental allergens. Objectives: to find a correlation between secretory IgA deficiency and food allergy which aids in understanding the pathogenesis of food allergy. Subjects and methods: a randomized cross sectional case control study that was carried out on 90 children in the pediatric hospital Ain Shams University. Cases enrolled in our study were children of age group from 1 month up to 3 years old who were already diagnosed with food allergy following in the GIT clinic. Fecal secretory IgA was measured for both groups. Results: Results reveals highly significant difference regarding level of secretory IgA being lower in cases with 24% than controls 6.7%. The frequency of recurrent chest infections and hospital admissions were much higher (64%) in the secretory IgA deficient group in comparison to the non-deficient group (25%) and (15%) respectively while the figures of recurrent GE was even higher (92%) among those with SIgA deficiency. Conclusion: secretory IgA deficiency was more frequent among CMPA patient suggesting it has a role in the development of food allergy which should be studied further.

[Mostafaabdel-Aziz El Hodod, Yosra M. Mohsen, Nagwa M. Abo El Magd, Mohamed Salaheldin Abo El Waf. **Frequency of fecal Secretory IgA deficiency in patients with cow milk induced enteropathy.** *Nat Sci* 2019;17(7):1-3]. ISSN 1545-0740 (print); ISSN 2375-7167 (online). http://www.sciencepub.net/nature. 1. doi:10.7537/marsnsj170719.01.

Key words: SIgA, food allergy, immunodeficiency

1. Introduction

Secretory IgA is the principal immunoglobulin on mucosal surface of humans and mammals. globally more IgA is produced than all other Ig isotypes, relaying on particular biosynthetic pathway by plasma cells and poly Ig receptor mediated secretion from the epithelial cells overlying mucosal surface. (1)

SIgA displays a very different molecular form from the IgA present in the circulation. Operating in a mechanism separating the inside of the body which needs to remain sterile from the outside world rich in antigenic stimuli. (2)

Immune exclusion is the main primary mechanism by which SIgA blocks microorganisms and toxins from attaching to mucosal target epithelial cells. in the context of the GIT, immune exclusion is defined as the ability of the secretory IgA through its recognition of multiple antigenic epitopes on the surface of viruses and bacteria as well as proteins to cross link these various antigen in the intestinal lumen and consequently delay their intrinsic potential to adhere to or penetrate the epithelium. (3)

excretory function of secretory IgA appears as another mechanism that contributes to microbial elimination at mucosal surface (4).

IgA deficiency is considered the most common type of immunodeficiency, recurrent sin pulmonary infections is the most common illness associated with IgA deficiency. Most of them are upper and lower respiratory tract infections caused by bacterial and viral pathogens. Atopics may have insufficient amounts of IgA and so may be prone to development of allergic diseases. (5)

Cow's milk protein (CMP) is usually one of the first complementary foods to be introduced into the infant's diet and is commonly consumed throughout childhood as part of a balanced diet. CMP is capable of inducing a multitude of adverse reactions in children, which may involve organs like the skin, gastrointestinal (GI) tract or respiratory system. (6)

There is evidence that IgA deficiency is linked to the development of food hypersensitivity and increased susceptibility to food allergy. (7)

2. Subjects and methods

A randomized cross sectional case control study was carried out on 90 pediatric subjects in the pediatric hospital Ain Shams University, Cairo, Egypt. Patients were enrolled in the study after consideration of inclusion and exclusion criteria and obtaining an informed consent from the parents or care-givers. Cases are young children of age group from 1 month up to 3 years old who are already diagnosed with food allergy following in the GIT clinic. While Controls are

age matched siblings of patients presenting to the outpatient clinic.

Methods:

All included infants were subjected to detailed history about: gastrointestinal symptoms, recurrent chest infections, gastroenteritis and hospital admissions then stool Secretory IgA assessment was done using enzyme-linked immune-sorbent assay (ELISA) kit (human secretory immunoglobulin ELISA kit by bioassay technology laboratory. according to the lab reference, <50μg/ml was considered low, and we considered from 50 to 100μg/ml as low normal.

3. Results

Table 1: Comparison between cases and controls regarding level of secretory IgA:

		Control group	Patients group	Test value	P-value	Sig.
		No. = 45	No. = 45			
SIgA	Median (IQR) Range	100 (75 - 125) 30 – 275	70 (56 - 100) 10 – 260	-2.800ǂ	0.005	HS
Level	Normal Low Low normal	25 (55.6%) 3 (6.7%) 17 (37.8%)	13 (28.9%) 11 (24.4%) 21 (46.7%)	8.782*	0.012	S

P-value >0.05: Non significant (NS); P-value <0.05: Significant (S); P-value< 0.01: highly significant (HS)
*: Chi-square test; ‡: Mann Whitney test

Table 1 reveals highly significant difference regarding level of SIgA being lower in cases (24%) than controls (6.7%.)

Table 2: Comparison between deficient group in SIgA and non-deficient regarding FH of allergy, recurrent chest and GE infections, hospital admissions:

		No deficiency		Deficiency		Test value*	P-value	Sig.
		No.	%	No.	%			
FH of allergy	No Yes	60 16	78.9% 21.1%	10 4	71.4% 28.6%	0.387	0.534	NS
Recurrent chest infection	No Yes	57 19	75.0% 25.0%	5 9	35.7% 64.3%	8.513	0.004	HS
Recurrent GE	No Yes	40 36	52.6% 47.4%	1 13	7.1% 92.9%	9.863	0.002	HS
Hospital admission	Normal < 3 > 3	45 19 12	59.2% 25.0% 15.8%	2 3 9	14.3% 21.4% 64.3%	16.547	0.000	HS

P-value >0.05: Non significant (NS); P-value <0.05: Significant (S); P-value< 0.01: highly significant (HS)
*:Chi-square test

Table 2 revels highly significant difference between deficient group as regarding recurrent chest infection with 64%, recurrent GE with 92% and hospital admission with 64%. unlike non deficient group with recurrent chest infection of 25%, recurrent GE 47% and hospital admission 15%.

4. Discussion

Our study is the 1st to measure secretory IgA among patients with CMPA, whereas other studies worked on measuring total serum IgA levels.

In a recent prospective Swedish study in children, IgA-deficient patients were found to have an increased risk of pseudo croup at year 1 and parentally reported food hypersensitivity at year 4, both of which were possibly not IgE-mediated, as compared to children with normal serum levels of IgA. (8)

In a more recent report conducted in Europe in which allergy status was determined more reliably by clinical presentation and skin prick testing using 14 common standard allergens, allergic manifestations including asthma, atopic dermatitis, allergic rhinitis/conjunctivitis, urticaria, drug allergy, and food allergy were noted in 84% of patients (age range 4–32 years) with selective IgA deficiency In 40.5% of the patients, allergic manifestations were the presenting symptoms. (9)

Along with our study another study conducted in Germany reveals that IgA-deficient individuals have a tendency to develop infections and disorders of the gastrointestinal tract, Giardiasis, malabsorption,

lactose intolerance, celiac disease, ulcerative colitis, nodular lymphoid hyperplasia, and malignant proliferation are among the associated diseases. (10)

In another study conducted in Huston USA people with deficiency in IgA was found to have more recurrent gastroenteritis than non-deficient group suggesting role of secretory IgA in the protection of viral gastroenteritis. (11)

Conclusion

Secretory IgA deficiency was more frequent among CMPA patient suggesting it has a role in the development of food allergy which should be studied further. Also secretory IgA deficient patients develop more episodes of gastroenteritis and chest infections in comparison to the non-deficient group.

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3/27/2019