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# Evaluation of Levels of Serum IgE and Rectal Mucosal Eosinophilia in Irritable Bowel Syndrome

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## ABSTRACT

**Objectives:** Irritable bowel syndrome (IBS) and food allergic reactions are common in the community and can cause symptoms similar to each other. In this study, it is aimed to evaluate serum immunglobulin E (IgE) and rectum mucosal eosinophilia levels in IBS.

**Methods:** Record of patients who applied between April 2013 and April 2014 were retrospectively screened and patients who were 18–70 years old and previously performed rectal biopsy by colonoscopy and diagnosed with IBS according to Rome III criteria were included in the study. All patients were grouped as diarrheal dominant IBS (IBS-D), constipation dominant IBS (IBS-C), mix type IBS (IBS-M) and unclassified IBS (IBS-U) according to their symptoms. In addition, serum IgE levels and rectal mucosal eosinophilia levels were evaluated from all patients' records.

**Results:** 39 (56.52%) of total 69 patients with IBS were in the IBS-C group, 19 (27.54%) of them were in the IBS-D, 9 (13.04%) of them were in the IBS-M and 2 (2.90%) of them were in the IBS-U. There were not any significant differences between IBS subgroups in terms of presence of allergic disease and presence of food allergy (p=0.519 and p=0.849, respectively). The median level of rectal eosinophilia in IBS subgroups was found to be 2.00 (0.00 to 88.00) in IBS-C subgroup, 5.00 (0.00–100.00) in IBS-D subgroup and 2.00 (0.00 to 11.00) in IBS-M subgroup. In addition, IgE levels were found high in 7 (19.45%) of IBS-C subgroup, 7 (36.84%) of IBS-D subgroup and 3 (33.33%) of IBS-M group (p=0.348).

**Conclusion:** In this study, relation between serum IgE and rectal eosinophilia levels with IBS subgroups could not not found.

**Keywords:** Abdominal pain, defecation, diarrhea, irritable bowel syndrome

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## INTRODUCTION

Irritable Bowel Syndrome (IBS) is a functional bowel disease that causes complaints such as chronic recurrent abdominal pain, diarrhea, constipation and swelling in the abdomen and separated into 4 groups as diarrhea dominant IBS (IBS-D), constipation dominant IBS (IBS-C), mix type IBS (IBS-M) and unclassified IBS (IBS-U).[1,2] In the etiopathogenesis of IBS, there are many factors such as damaged gastrointestinal motility, visceral hypersensitivity, inflammation, infections, stress and allergy.[2] Food reactions are common in the community and often

overlap with each other due to they cause similar clinical symptoms with IBS.[3–5] A true food allergy is a recurrent, immunologic condition that develops after the eating of certain foods by people sensitive to food allergy.[3,5] Although allergic states diagnosed other than food allergies by well-defined criteria, there are difficulties in diagnosis of food allergies.[3] Euthinophilia and serum IgE level increase, gaita pH, skin tests, basophil histamine release test, intestinal mast cell histamine release test and intestinal biopsy can be used in the diagnosis of food allergy.[5–7] In addition, eosinophil and mast cell reactions may occur in the biopsies taken from the injection site after the injection into the colon mucosa, however this shows poor correlation with skin prick test, serum IgE and IgG4 levels.[8,9] In this study, it is aimed to evaluate serum total IgE level and mucosal eosinophilia levels in rectal biopsies in patients with IBS.

## METHOD

### The Universe of the Research

In the study, record of patients who applied to Kartal Dr Lütfi Kırdar Training and Research Hospital between April 2013 and April 2014 were retrospectively screened and patients who were 18–70 years old and previously performed rectal biopsy by colonoscopy and diagnosed with IBS according to Rome III criteria were included in the study. All patients were classified as IBS-C, IBS-D, IBS-M and IBS-U according to their symptoms. Then, the patients who were included in the study were called by phone and their food allergies was questioned. This study has been approved by Kartal Dr Lütfi Kırdar Training and Research Hospital Ethics Committee (89513307/1009/265).

### Measurements of the Study

Demographic characteristics such as age, gender, body weight, height and smoking conditions of the patients included in the study were questioned and then body mass index (BMI) were calculated. In addition, all patients were called by phone to ask, "Do you think your complaints about your bowel incontinence are related to the foods you eat?", "Are there any foods that increase your complaints about the bowels", "What kinds of foods are discomforting you and cause your complaints" and nutritional allergies were questioned. The biopsy specimens taken during colonoscopic evaluation in our hospital were sent to the pathology laboratory in 10% formaldehyde solution and the tissue sections taken for follow up after one day fixation were stained by Leica ST5010 Autostainer AXL (Leica Microsystems. Wetzlar, Germany) brand automatic staining device by hemotoxilen-eosine stain and evaluated by Olympus BX53 brand microscope (Olympus, Japan) and then, the eosinophil number were counted in the sections in mucosa in 400 enlargement and number in 1 big enlargement section that has most eosinophils was recorded as score number. Serum total IgE levels of the patients were also measured by the two-step enzymeiinked immunosorbent assay in Beckman Coulter DXI 800 (Beckman Coulter, California, USA) and above of 165.3 IU/ml. were accepted as high.

### Exclusion Criteria

Patients with the history of immune system disorder, parasitary bowel infection, inflammatory bowel disease, coeliac disease, bone marrow transplantation, vasculitis or any kind of cancer and usage of nonsteroidal antiinflammatory, clozapine, rifampicin, carbamazepine, tacrolimus and gold medicine were not included to study.

### Statistical Analysis

SPSS 17.0 statistical software program was used for the statistical evaluation of the data of the study. Frequency, percentage, mean, standard deviation, median, minimum and maximum value were used as descriptive statistical analysis. Continuous variables that not proper to normal variability was assessed by using Mann Whitney U test and Kruskall Wallis test. In the analysis of the categorical variables in the study, chi-square test was used. The $p<0.05$ was considered significant when all data in the study were evaluated.

## RESULTS

39 (56.52%) of the 69 İBS patients who were included into the study were women, when patients separated into groups, 39 (56.52%) of them were in IBS-C group, 19 (27.54%) of them were in IBS-D and 9 (13.04%) of them were in IBS-M and 2 (2.90%) of them were in İBS-U. The mean age of the patients was 40.42±11.93 years and the mean of BMI was 27.18±4.66 kg/m$^2$ respectively. Smoking was determined in 21 (30.43%) of the patients and was detected as 11 (28.21%) in the IBS-C subgroup, 7 (36.84%) in the IBS-D subgroup and 3 (33.33%) in the IBS-M group).

When allergic diseases of the patients who participated into study were questioned, a total of 15 (21.74%) allergic disease history were detected in 6 (8.70%) allergic rhinitis, 6 (8.70%) asthma and 3 (4.34%) urticaria. It was also found that 34 (49.28%) of the patients thought that their complaints were related to food intake. The allergic status of patients according to IBS subgroups were summarized in Table 1.

Median level of rectal eosinophilia was found to be 3.00 (0.00 to 100.00) and, the high serum total IgE level was detected in 17 (24.64%) of all patients in the study. Serum total IgE levels and rectal eosinophilia according to IBS subgroups were summarized in Table 2. Rectal eosinophilia

**Table 1.** Allergy cases according to IBS subgroups

| | IBS-C (n=39) | IBS-D (n=19) | IBS-M (n=9) | IBS-U (n=2) | p* |
|---|---|---|---|---|---|
| Allergic disease | | | | | |
| Yes | 8 (20.51) | 6 (31.58) | 1 (11.11) | 0 (0.00) | 0.519 |
| No | 31 (79.49) | 13 (68.42) | 8 (88.89) | 2 (100.00) | |
| Food allergy | | | | | |
| Yes | 18 (46.15) | 11 (57.89) | 4 (44.44) | 1 (50.00) | 0.849 |
| No | 21 (53.85) | 8 (42.11) | 5 (55.56) | 1 (50.00) | |

*Pearson Chi-Kare test. IBS-C: Constipation dominant irritable bowel syndrome; IBS-D: Diarrhea dominant irritable bowel syndrome; IBS-M: Mix Type irritable bowel syndrome; IBS-U: Unclassifiable irritable bowel syndrome. The data were presented as n (%).

**Table 2.** Serum total IgE levels and rectal eosinophilia according to IBS subgroups

| | IBS-C (n=39) | IBS-D (n=19) | IBS-M (n=9) | p |
|---|---|---|---|---|
| Rectal eosinophilia | 2.00 (0.00–88.00) | 5.00 (0.00–100.00) | 2.00 (0.00–11.00) | 0.241* |
| IgE level, n (%) | | | | |
| Normal | 32 (80.55) | 12 (63.16) | 6 (66.67) | 0.348† |
| High | 7 (19.45) | 7 (36.84) | 3 (33.33) | |

*Kruskal-Wallis test; †Pearson Chi-Kare test. IBS-C: Constipation dominant irritable bowel syndrome; IBS-D: Diarrhea dominant irritable bowel syndrome; IBS-M: Mix Type irritable bowel syndrome. The data were presented as n (%) and median (minimum-maximum), where appropriate.

levels of patients with allergic disease were found as 2.00 (0.00–88.00) and 3.00 (0.00–100) for patients without allergic disease (p=0.808). Median levels of rectal eosinophilia of patients with have complaints about foods were detected as 3.00 (0.00–100.00) and 2.00 (0.00888.00) for patients without complaints (p=0.841). While the IgE median value was 71.00 (5.00–524.00) IU/ml in patients with allergic disease, it was 30.50 (1.00–406.00) IU/ml in patients without allergic disease (p=0.156). The median IgE median value for patients with food-related complaints was as 39.00 (1.00–524.00) and the median IgE for patients without complaints was found as 33.00 (3.00–384.00) (p=0.312).

## DISCUSSION

In this study, relation between serum IgE and rectal eosinophilia levels with IBS subgroups could not not found. In addition, there were not significant differences in the presence of allergic disease and food allergy in IBS subgroups.

IBS is a functional bowel disease characterized by discomfort, swelling and pain in the abdomen which is most frequently encountered in primary health care services and can not be explained by an organic pathology.[1,10] Although the pathogenesis is not fully explained, it is known that in many patients there is a relationship between food intake and IBS symptoms.[6,11] Food allergy is frequently seen in children, in a study it was found to be 3.7% in adults.[12] There are studies showing that there is a relationship between IBS symptoms and consumption of certain foods.[5,6,11,13] However, it is contradictive that this relationship between symptoms and complaints is due to food allergy or food intolerance.[14] In this study, 21.74% of patients were found to have an allergic disease and 49.28% of these complaints were found to be related to food intake. There were not any significant differences between IBS subgroups in terms of presence of allergic disease and presence of food allergy.

IgE-mediated Type 1 hypersensitivity and cell-mediated Type 4 delayed hypersensitivity reactions to developed to certain foods in the development of food allergy play a role.[3,5,14] Despite the immunologic and nonimmunologic barriers of the gastrointestinal system, some food proteins with antigenic properties pass into the blood and interact with IgE antibodies on mast cells in the intestinal mucosa.[15] As a result, bowel permeability, mucus formation, peristaltism, inflammatory cell infiltration are increased and pain fibers are stimulated.[3,15] Clinical reflections of all these changes are seen as nausea, vomiting, abdominal distension, pain and diarrhea.[3,5,15] Although studies have shown that IgE-mediated food allergies play a causal role in patients with IBS and there was nor significant difference in serum total IgE levels in patients with IBS in our country.[5,7,8,14,16] In this study, 24.64% of patients with IBS had IgE were high and no

significant difference was found between IBS subgroups in terms of IgE levels.

Eosinophils are cells located along the gastrointestinal system except for the esophagus mucosa, and eosinophils found in the intestinal mucosa may play a key role in the immunological response in intestinal hypersensitivity.[5,17] Eosinophils are thought to be effective in IBS related to gastric motility and enteric nerves.[11,18] In a study conducted, although increase in the number of eosinophils in the colon and rectum biopsies of patients with IBS was not detected, in another study showed increased eosinophils in the terminal ileum mucosa.[19,20] In a study, it was also shown that the increase in duodenal eosinophilia may be a marker for atopy, allergy and possibly functional bowel disease, but this is not valid for IBS.[21] In a study conducted in our country, there was not significant difference in the peripheral and tissue eosinophil numbers in the patients with IBS when compared to the control group.[5] Studies have shown that patients with asthma and allergic rhinitis have increased inflammation in the airborne and increased eosinophilia in small bowel biopsies.[22] In addition, mast cells were increased in duodenum and jejunum mucosa in IBS, but there was no increase in eosinophil cells.[23,24] In this study, no significant difference was found between the IBS subgroups in terms of rectal eosinophilia levels.

One of the limitations of the study is the low number of patients and the other limitation is the nutritional allergies of the patients were verbally asked and there was no investigation about it. There are no proven tests that can be used to demonstrate food allergies but skin prick tests and RAST test can contribute to obtain more significant results to support food allergy diagnose in these patients.

In conclusion, there is no definite relationship between IBS and food allergies and allergic diseases, as well as there is a relationship between IBS symptoms and food intake. In this study, relation between serum IgE and rectal eosinophilia levels with IBS subgroups could not not found.

### Disclosures

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

**Ethics Committee Approval:** The study was approved by the Local Ethics Committee.

**Authorship Contributions:** Concept – E.E.A., S.T., M.R.D.; Design – S.T., M.R.D.; Supervision – M.R.D.; Materials – E.E.A., K.B., M.S.; Data collection &/or processing – E.E.A., M.S., K.B.; Analysis and/or interpretation – E.E.A, S.T., K.B., K.Ö.; Literature search – E.E.A., K.Ö.; Writing – S.T., E.E.A.; Critical review – E.E.A., S.T., M.R.D.

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