Concentrations of Total Serum IgE in Parasitized Children and the Effects of the Antiparasitic Therapy on IgE Levels

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Concentrations of total serum IgE in 90 parasitized children and 24 healthy control children between 7 and 11 years old were measured using enzyme immunoassay. Of 90 children, 46 were infected with Giardia lamblia, 26 with Enterobius vermicularis, and 18 with both of these parasites. The overall mean value of IgE in parasitized children was 170.17 ± 27.76 IU/ml, almost 24 of children had an IgE value of more than 100 IU/ml, and 5 showed a value of more than 1000 IU/ml. The mean value of IgE in control children was 39.41 ±14.68 IU/ml. IgE levels showed a significant difference between those two groups (p< 0.01). Children infected with G.lamblia were treated with metronidazole (15-20 mg/kg/day for 10 days), while those with E.vermicularis were treated with single dose mebendazole (100 mg/day), and in children having mixed G.lamblia and E.vermicularis infection, combination of metronidazole with mebendazole was used in therapy. After 15 days of the onset therapy, 73 children were reexamined for parasites and IgE levels. No parasite was found in this group. The mean value of IgE was found to be 145.12±28.19 and 76.56 ±19.63 IU/ml before and after therapy, respectively. There was significant difference in IgE concentrations between before and after therapy (p< 0.001). [Journal of Turgut Özal Medical Center 1996;3(4):332-335]

Key Words: *Giardia lamblia, Enterobius vermicularis, IgE*

Parazit ile enfekte çocuklarda serum total IgE konsantrasyonları ve antiparazitik tedavinin IgE seviyelerine etkisi

Yaşları 7-11 arasında değişen, parazit ile enfekte 90 çocuk ve 24 sağlıklı çocukta serum IgE konsantrasyonları enzim immunoassay yöntemi ile ölçüldü. Parazit bulunan 90 çocuğun 46'sı Giardia lamblia, 26'sı Enterobius vermicularis ve 18'i de her iki parazit ile enfekte idi. Parazit ile enfekte çocuklarda ortalama IgE değeri 170.17±27.76 IU/ml idi; bu çocukların 24'ünde IgE değeri 100 IU/ml'nin, 5'inde de 1000 IU/ml'nin üzerinde saptandı. Kontrol grubundaki çocuklarda ortalama IgE değeri 39.41±14.68 IU/ml idi. Serum IgE seviyeleri yönünden bu iki grup arasındaki fark anlamlı idi (p<0.01). Tedavi olarak G.lamblia ile enfekte çocuklara metronidazol (15-20 mg/kg/gün 10 gün süreyle), E.vermicularis ile enfekte olanlara tek doz mebendazol (100 mg/gün) ve her iki parazit ile enfekte olanlara bu iki ilaç kombine verildi. Tedavi verildikten 15 gün sonra parazit aranması ve serum IgE seviyeleri yönünden kontrol edilen 73 çocukta parazit görülmedi. Bu 73 çocukta tedavi öncesi ortalama IgE değeri 145.12±28.19 IU/ml iken tedaviden sonra 76.56±19.63 IU/ml olarak saptandı.Tedaviden önce ve sonra saptanan IgE değerleri arasındaki fark anlamlı bulundu (p<0.001). [Turgut Özal Tıp Merkezi Dergisi 1996;3(4):332-335]

Anahtar Kelimeler*: Giardia lamblia, Enterobius vermicularis, IgE*

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Immunoglobulin E (IgE) is present in trace amount in normal serum and has very short half-life (2,5 days). Its serum concentration is typically increased during infection with certain parasites (1,2). Production of these antibodies is controlled by Interleukin-4 (IL-4) which is produced by CD_{4+} T cells (3,4). IL-4 is involved in switching immunoglobulin isotype production by B cells from IgM to IgE (4). The interaction between IgE and mast cells may participate in the protection against parasitic infection. It has been argued that IgE-dependent mast cell reaction has evolved primarily to localize eosinophils near the parasite and then enhance their anti-parasitic effects (2,3).

It is well known that worm infections can cause the polyclonal stimulation of the IgE synthesis and the production of high levels IgE is the common consequence of the helminthic infections (2,3,5,6). *Giardia lamblia* causes mucosal damages and these mucosal alterations permit a greater absorption of foreign substances including parasite antigens (6). However, increased IgE levels occasionally occur in giardiasis (6,7).

The objectives of the present study are to compare total serum IgE levels among the children infected either with *Enterobius vermicularis*, or *G.lamblia*, or both of these parasites, and also evaluate the effects of treatment on the IgE levels.

MATERIALS AND METHODS

Study groups: Concentrations of total serum IgE were measured in a group of 90 parasitised children (49 boys, 41 girls) between 7 and 11 years old, and 24 healthy control (14 boys, 10 girls) in the same age group. Study groups were determined by examination of feces sample and cellophane tape slides. Parasitized children were divided in three subgroups: children with *G.lamblia* (Subgroup 1, n=46), children with *E.vermicularis* (Subgroup 2, n=26) and children with both of these parasites (Subgroup 3, n=18). For excluding of atopic subjects a careful history of allergy was taken and physical examination for allergic symptoms was done.

IgE measurement: Total IgE serum levels in the groups were detected with enzyme immunoassay (Clone System, Biochem Pharma Inc. Italy) and results expressed in IU/ml.

Serum IgE levels were evaluated before and after treatment of parasitic infections. Children in subgroup 1 were treated with metronidazole (15-20 mg/kg/day for 10 days), those in subgroup 2 were treated with a single dose mebendasole (100 mg/kg/day) and a combination of metronidazole with mebendazole was used for treatment of children suffering from the mixed infection (subgroup 3).

Statistical analysis: The mean IgE levels in parasitized children according to sex and parasitized and control children were compared by Mann-Whitney U test. The same test was applied for comparison of the mean IgE levels in parasitized and nonparasitized children. The differences of IgE levels among parasitized subgroups and control group were evaluated using by the Kruskal-Wallis one-way analysis. The paired comparisons test was used to compare the mean IgE levels in children having parasitized before and after the treatment.

RESULTS

Total serum IgE levels in children who belong to subgroup 1, subgroup 2, and subgroup 3 were found to be 157.59 ± 37.42, 203.70 ± 65.76, and 146.80 ± 38.16 IU/ml, respectively. No significant differences between these groups were observed ($p > 0.05$). The overall mean concentration of IgE in parasitized children was 170.17± 27.76 IU/ml, almost 24 of these had an IgE value of more than 100 IU/ml, and five showed a value of more than 1000 IU/ml. The mean IgE level was 39.41 ± 14.68 IU/ml in control group, and the differences between the levels of children with parasites compared to controls were significant ($p<0.002$, Table 1).

After 15 days of the onset of therapy, 73 of 90

Table 1. The mean serum IgE levels in the parasitized and control children

Groups	n	Mean IgE values (IU/ml), ±Sx
I-Parasitized children		
Subgroup 1	46	157.59 ± 37.42
Subgroup 2	26	203.70 ± 65.76
Subgroup 3	18	146.80 ± 38.16
Total	90	170.17 ± 27.76
II-Non parasitized children	24	39.41 ± 14.68

Differences between IgE levels among parasitized subgroups were not significant ($p>0.05$), while IgE levels in parasitized group were significantly higher than those of non parasitized subjects.

parasitized children were reexamined for parasites and IgE levels. No parasites were found. The mean IgE values were found to be 145.12 ± 28.19 and 76.56 ± 19.63 IU/ml before and after therapy, respectively. The differences of IgE levels between pre- and post-treatment were highly significant (t: 3.99, p<0.0001, Table 2).

Table 2. Comparison of IgE levels in parasitized children before and after treatment.

	No. of samples	Mean (IU/ml),±Sx*
Before treatment	73	145.12±28.19
After treatment	73	76.56±19.63

*p<0.0001, t:3.99

DISCUSSION

Total serum IgE levels can increase in atopic diseases, neoplasms, immunodeficiencies and viral and parasitic infections (8,9). Moreover, its concentration is also effected by age, sex, race, smoking habits and socioeconomic conditions (3,8,10,11,12) and may also vary from country to country (9). Therefore, our study groups were selected among the children having the same demographic and socioeconomic conditions, and they did not have any major factors with effect on IgE levels, except parasitic infection. We could not find significant differences in IgE levels between boys and girls (data was not shown in the results).

Several studies have been published on serum IgE levels in subjects with helminthic and/or protozoan infections (3,4,6,7,13,14). Many investigators observed the increased IgE concentration in patients with parasitic infections, although IgE elevation is higher in worm infection than those of protozoan (3,6). In the current study we also found significantly elevated IgE levels in all parasitized children compare to nonparasitized ones. Children with *E.vermicularis* had higher mean IgE levels than those with *G.lamblia* . However, the differences between these two groups were not significant. There is a contradictory between the results of previous study (6) and our results from the children infected with both parasites. Since this subgroup did not have higher mean IgE concentrations than those infected with only one of these parasite.

We observed that the IgE levels decreased significantly after treatment. Similar results were noted in the literature. Hagel et al. (15) found decreased IgE levels in patients with ascariasis after treatment by oxantel/pyrantel. Perez et al. (7) observed significantly increased IgE levels in patients with giardiasis and they also indicated that IgE levels decreased by treatment. Essawy et al. (16) showed that the IgE levels decreased significantly after specific treatment in *Entemoeba histolytica*, *Hymenolepis nana*, and Ascaris groups, but insignificant in oxyuris and mixed infection groups. Instead of treatment, the high level IgE in some patients can result from many factors such as follows: First, reinfection may be occurred; second, medicine used in therapy may not be effective; third, another factor (i.e., atopic allergy) may be present in addition to parasitic infection. Our results indicate that chemotherapeutics used in this study were suitable for elimination of parasitic infection.

In conclusion, increased IgE levels were observed in children with helminthic and/or protozoan infection, and elevated IgE concentration decreased significantly after effective therapy.

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