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Correlation between Toxocariasis and Complement(C3and C4) in Asthmatic and Epileptic Patients

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Abstract

Objective: To study effect of *Toxocara* infection on level of complement proteins(C3 and C4) in serum of asthmatic and epileptic patients .

Subjects and Methods: 60 asthmatic patients(30 seropositive for *Toxocara* antibody and 30 seronegative) and 32 epileptic patients(16 seropositive for *Toxocara* antibody and 16 seronegative) in addition to 30 healthy individuals as a control were enrolled in this work which carried out at Basra Teaching Hospital in Iraq from Dec 2017 to Nov 2018 . C3 and C4 concentration were assessed by immunoturbidometric assay by using the Abbott Architect c System.

Results: The results were referred to elevation of C3 concentrations in seronegative and seropositive groups of either asthmatic or epileptic patients when they compared with control group with significant difference between patients and control group(p=0.0001) .Concerning C4,it's concentration level was convergent in patients groups (seropositive &seronegative) and control group for asthmatic or epileptic patients except seronegative asthmatic patients which had elevation level of C4 concentration in comparison to other groups. statistical analysis revealed no significant difference between all these tested groups.

Conclusion:It was difficult to determine the role of complements (C3 andC4) in toxocariasis of asthmatic or epileptic patients and it needs further studies.

Keywords—C3; C4; Toxocariasis; Asthmatic; Epileptic

INTRODUCTION

Human toxocariasis had been described since beginnings of last century when *Toxocara* larvae found out in ocular granulomata from preserved enucleated eyes for patients who had suspected retinoblastoma [1,2] . [3] detected a group of patients who complained from chronic,severe, multisystem impairment and presented with high circulating eosinophilia which refereed to symptoms and signs related to viseral larva migrans (VLM) .Toxocariasis can be considered as a major zoonotic infections in the world [4] which is a parasitic infection that caused by parasites that are classified under the super-family Ascaridoidea. which are nematodes (roundworm) belong to the genus *Toxocara*, which contain 4 species, namely *Toxocara canis*, *T. cati*, *T. vitulorum* and *T. malaysiensis*[5].

The protective immunity, in case of helminthic diseases, is often foreclosed by ability of infectious agents to block and avoid the immune system of infected host [6] like the complement system(C system) which represent the line number one in defense against parasitic infection by making the membrane attack complex (MAC) and form an reactionary inflammation on parasites surface but the invading parasites run away from complement system by developing sophisticated strategies which include; (1) inhibit C system activation by recruitment of regulatory proteins of the host complement on outer surface of the parasites; (2) inactivate C system function through expression of proteins that encoded by parasites which can target variety of components of C system; and (3) For suppress C system activation that demand expression of orthologs of host regulators of complement activation[7].

To the best of our knowledge there is no articles about correlation between complement fragments concentration and infection with *Toxocara spp* in asthmatic or epileptic patients. So we focused in this work on measurement the concentration of C3 and C4 in seropositive asthmatic or epileptic patients for *Toxocara* antibody in comparison with seronegative and control**.**

SUBJECTS AND METHODS

Population

Thirty two Epileptic patients (16 seropositive for *Toxocara* antibody and 16 seronegative) and 60 asthmatic patients(30 seropositive for *Toxocara* antibody and 30 seronegative) were enrolled in this study which carried out in Basra Teaching Hospital form Dec 2017 to Nov 2018. In addition to 30 healthy individuals as a control .

Samples and method

Three hundred micro litter, which was frozen at a-80◦C , for each seropositive patients , seronegative patients and control was used to measure C3 and C4 concentration through turbidimeteric assay.

The kit 9D96-21 (complement Reagent kit,Abbott Laboratories ,Abott Park,USA) was used to detect the C3

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quantization in serum while The kit 9D97-21 (Complement reagent, Abbott Laboratories ,Abott Park,USA) for detection C4 by using the Abbott Architect c System.

The method was automatically depending on standard protocol via using Architect c4000 system apparture (Japan).

Statistical analysis

Data were analyzed by (ANOVA) which supported by Turkey 's spost .The result were expressed numbers and mean±S.E(standard error).

RESULTS

1.Concentration level of complement C3

Based on results obtained from Architect c System , the concentrations of C3 in asthmatic patients were elevated in both Seronegative (Asth .T.negative) and seropositive(Asth.T. positive) with mean (161.7±4.777 ,152.1±5.609 mg/dl respectively) when they compared with control group(128.4±4.28 mg/dl) Fig.1 .Both patients groups revealed significant difference comparison with control group($p<0.0001$).

In epileptic patients, although the results were referred to increasing in concentration level of C3 in each patients groups (seropositive (Ep.T.positive) & seronegative (E.T. negative)) (143.3±4.442,141.8±8.907 mg/dl respectively) comparing with control group(128.4±4.28 mg/dl) Fig.1 but insignificant correlation between patients and healthy individuals (control) was noticed.

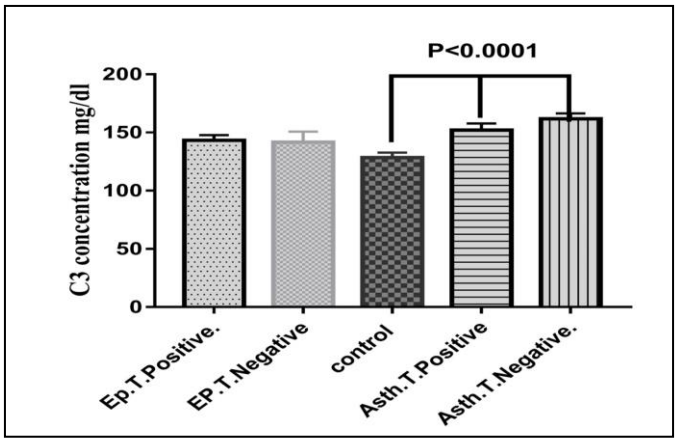

Fig.1.Concentrations levels of complement C3 in patients and control groups

2.Concentration level of complement C4

Based on results obtaining from Architect c System and statistic analysis , the concentrations of C4 in asthmatic patients was elevated in seronegative group(Asth.T.negative) with mean (47.97±13.32 mg/dl)in comparison with seropositive (Asth.T.positive) and control group(27.95±1.79,25±2.025 mg/dl respectively) Fig.2 .However significant differences don't appear between these groups.

In epileptic patients, the concentration level of C4 was convergent in patients groups (seropositive (Ep.T.positive) &Seronegative (Ep.Tok.neg)) and control with mean value (30.06±2.545,28.86±2.448,25±2.025 mg/dl respectively) Fig.2 but no significant correlation was noticed among groups.

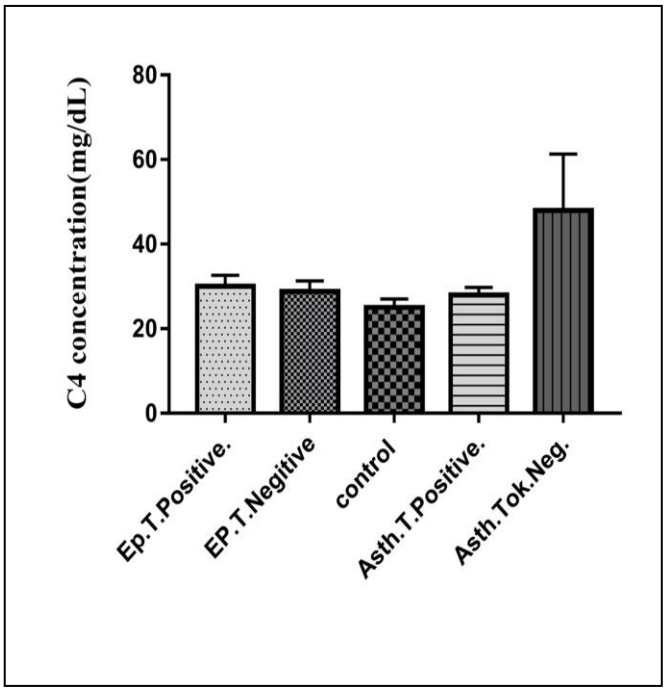

Fig.2.Concentrations levels of complement C4 in patients and control groups

DISCUSSION

Complement is a larger part of primary or innate immunity when it is activated several of invading pathogens will encounter lysis and opsonization. It's connection with adaptive immunity lead to proinflammatory molecules production that causing inflammatory responses [8]. Previously, there was studies on effect of complement on parasites and the later effect on concentration levels of complement fragments[9, 10, 11] but to the best of my knowledge there is no article on correlation between human toxocariasis and concentration levels of complement proteins in seropositive asthmatic and epileptic patients .

1-Asthmatic patients.

The result was refereed to increase concentration level of C3 in each seronegative and seropoasitive asthmatic patients compared with control group as shown in Fig. 1 .When these results are compared with previously studying on asthmatic patients that found also increasing in levels of C3 concentrations in serum of uninfected asthmatic patients [12,13, 14,15].In case of asthma ,the elevation of

total C3 belong to increase level of C3a in plasma during the complement system activation (C3a aid in asthma pathogenesis and mark effect of hyperreactivity and inflammation). So the elevation in C3 concentration level can be considered as a biomarker that use in diagnosis of asthma [15] .Other explanation for increasing C3 in asthma was role of cytokines which contribute in pathogenesis of asthma in addition to role of interleukin 4 and 10 that included in asthma ([16,17] which prompt RNA of epithelial cells to increase C3 expression [18] However, the infection with *Toxocara spp* also induce secretion of interleukins 4 and 13 [19].Thus according to present study results, the determination of reason of C3 elevation is difficult to explain in seropositive group.

C4 concentration level also is elevated in plasma of seronegative asthmatic patients Fig.2 as recorded previously and attribute the reason of elevation in C4a in plasma through complement activation which lead to increase total C4 concentration in plasma and can be used as biomarker for asthma [15] .This is also noticed in the present study but without significant difference as finding [14] who found that C4 level in asthmatic patients is not having significantly difference than control and there no significant association between severity of asthma and C4 level in serum Also accordance with study of [13]who proved that level of C4 was normal in their tested asthmatic group.In present study , the level of C4 in seropositive group was less than in seronegative but it is insignificant ,so this may belong to mild effect of *Toxocara* infection that may decrease C4 concentration level.

2-Epileptic patients.

The present work has shown that elevation in level of C3 for each seropositive and seronegative group accordance with results of [20]who found elevation of C3 in untreated epileptic patients .In contrast findings of [21] who recorded decreasing in concentration of C3 in serum of idiopathic generalized epileptic patients. According to present result ,I cannot exactly detect the effect of *Toxocara* infection in changing C3 concentration in epileptic patients because the changing in concentration of C3 , in serum may associated with complement cascade activation [22] . So in this case ,it can not determine the source of C3 level elevation whether it is associated with epilepsy or *Toxocara* infection.

The present results showed that there was no effect of epilepsy or *Toxocara* infection on C4 concentration level as shown in Fig.2. [23] found elevation of C4 concentration in uncontrolled seizures patients comparing with controlled seizures patients. While in case report of girls infected with *T canis* and underwent from systemic lupus erythematosus was found that the level of C3 and C4 were low [24].

CONCLUSIONS

At this work ,the relation between the complement C3 and *Toxocara* infection isn't clear because elevation of C3 level was noticed in both seronegative and seropositive asthmatic patients with significant difference with control group .Also the same results appear in groups of epileptic patient but without significant difference with control.

While decreasing in concentration C4 in seropositive asthmatic patients as compared with seronegative ,despite its non significant, may refer to role of *Toxocara spp* infection .But there was no role of infection on C4 level in epileptic patients.

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