Comparison of Antibody Against *Chlamydomphila* *Pneumoniae* in Patients with Brain Ischemic Stroke

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Abstract

According to recent studies, *Chlamydomphila pneumoniae* has been associated with atherosclerosis and ischemic stroke. Proper treatment of *C. pneumoniae* can cause great improvement in public health. This study aimed to detect antibodies against

C. Pneumoniae by ELISA in patients with ischemic stroke who were admitted to Rajaei and Imam - Sajad hospitals during 2012.

In this case-control study, we compared the serum samples of 30 patients with ischemic stroke, confirmed with physical examination and brain computed tomography, as case group, with 30 age- and sex-matched patients of surgery ward as control group. Then serologic test was performed by ELISA. After admission of suspicious cases, we had 23 males (44.2%) and 29 females (55.8%) with 27 individuals in case and 23 in control groups. We found association between positive titers of IgG and IgA antibody against *C. pneumoniae* and ischemic stroke. There was just a positive association between IgG antibody titer and age in case group. Although we could not find any association between positive titers of IgG and IgA against *C. pneumoniae* and ischemic stroke, a significant association between IgG antibody titer and ages was confirmed ($p < 0.029$).

Keywords: *Chlamydophila pneumonia*, cerebral stroke, ELISA, Immunoglobulin A, Immunoglobulin G

Introduction

Stroke is the most prevalent neurologic and life-threatening disease and, is responsible for 10% of the mortalities, especially in those older than 65 years old (1). Stroke is the third leading cause of death worldwide as well as one of the reasons for disability in the adults. It has been estimated that 30% and 20% of patients who survive the stroke require help for daily activities and movement, respectively. Moreover, 16% of them require attention for their execution and that is why the economic stroke burden requires more attention in effective health care planning and resources allocation (1). The stroke prevalence is 6.03 per 1000 males and 4.53 per 1000 females. Moreover, the prevalence becomes higher by aging as the risk doubles every 10 years after 55 years of age. With regard to high mortality rate of stroke, the public health authorities must consider the cost of diagnosis and treatment, associated risk factors, and needed cares for patients with disabilities (1).

The stroke's risk factors are non - modifiable, eg, age, sex, ethnicity and genetic predisposition, and modifiable such as hypertension, obesity, smoking, dyslipidemia, diabetes mellitus, low socioeconomic status, and high alcohol consumption (2). In addition, inflammatory parameters and chronic as well as acute infectious diseases have been considered as modifiable independent stroke risk factors (3). *Chlamydophila pneumonia* is an intracellular bacterium (figure 2) with seropositive prevalence of more than 40% in adults of different populations, which suggests the high frequency of its infection. It appears that its second episodes occur more frequently in older individuals.

Although there is little information regarding the pathogenesis of this infection, it

usually begins in the upper respiratory tract and spread to articular and synovial membrane by macrophages. Clinical spectrum of infection with *C. Pneumoniae* includes acute pharyngitis, sinusitis, bronchitis, and pneumonia.

Although epidemiologic and histopathologic studies have reported an association between arthrosclerosis and *C. pneumoniae*, there is no sufficient information regarding association of chronic infection with *C. pneumoniae* and stroke. Nevertheless, seropositive results of *C. pneumoniae* antibodies in some studies set forth *C. pneumoniae* as risk factor for stroke. With regard to the high prevalence of the stroke and spending of exorbitant human and financial cost, the high prevalence of this disease can be prevented by recognizing the risk factors (2).

Methods and Materials

In this case-control study, we assessed the serum titers of IgA and IgG against the *C. pneumoniae* in 27 patients with ischemic stroke (case group) and 25 age- and sex- matched controls who were hospitalized in the surgery ward (control group). The diagnosis of ischemic stroke was confirmed by clinical examination and brain computed tomography. Patients with ≥ 55 years of age were enrolled to the study. Patients with any kind of cerebral hemorrhage, brain transient ischemic attack, evidence of previous acute infection, pulmonary infection, or febrile illness, and, the erythrocyte sedimentation rate $>50\text{mm/h}$ were excluded from the study.

In this study, ELISA (Enzyme - linked Immunosorbent assay) was used to evaluate the IgA and IgG titers against *C. pneumoniae*. By the means of standard ELISA kits (IBL, Germany), negative and positive controls were tested. Data were analyzed using the Fischer's exact test by employing SPSS 17 (SPSS Inc., Chicago, IL, USA).

Results

In this study, 23 males (44.2 %) and 29 females (55.8 %) were recruited. Thirteen patients (25%) were categorized in the age group of 55 to 65 years and 39 (75%) in the age group of 65 years with mean age 72.36 ± 10.44 years. In this study, 27 and 25 patients were enrolled in case and control groups, respectively.

Thirteen individuals of control group (25%) and 20 individuals of case group (74.1%) were seropositive for IgG antibody against *C. pneumoniae*. There were no significant association between IgG antibody seropositive results between two groups ($P = 0.15$). Five patients in control group (20%) and four in case group (14.8%) were seropositive for IgA antibody against *C. pneumoniae*; however, the association was insignificant ($P = 0.772$).

Positive results for IgG antibody was reported in 33.3% and 57.9% of controls with 55 to 65 years of age and those older than 65 years, respectively; however, the association between different age groups and IgG antibody status was not statistically significant ($P = 0.378$). In the case group, seropositive results for IgG

antibody were seen in 42.9% and 85% of those with 55 to 65 and > 65 years of age, respectively, with a statistical significant association between IgG antibody status and various age groups ($P = 0.029$).

Positive results for IgA antibody was reported in 33.3% and 15.8% of controls with 55 to 65 years of age and those older than 65 years, respectively ($P = 0.562$).

Among the individuals with cerebral stroke, 0% and 20% of patients in the age group of 55 to 65 years and > 65 years, respectively, had positive results for IgA ($P = 0.545$). In both group, there was no significant association between antibody status and age class.

In the control group, seven males (58.3%) and six females (46.2%) had positive IgG results ($P = 0.695$). In the case group, 10 males (90.9%) and 10 females (62.5%) had positive results for IgG ($P = 0.183$).

In the control group, three males (25%) and two females (15.4%) had positive results for IgA antibody ($P = 0.645$). In the case group, one male (9.1%) and three females (18.8%) had positive results for IgA ($P = 0.624$).

Using the Pearson correlation test, it was specified that there was no correlation between quantities of IgG and IgA in the control and case groups. The frequency of positive IgG was 74.1% and 52% in case and control groups, respectively (Figure 1- A). The frequency of positive IgA was 14.8% and 20% in case and control groups, respectively (Figure 1- B).

Figure 1. Frequency of IgG (A) and IgA (B) Levels in the Case and Control Groups

Discussion

According to our results, there was no significant association between increased titers of IgG against *C. pneumoniae* and stroke, which was contradictory to the results of Wimmer et al. study (4).

Johnsen et al. reported that the association between *C. pneumoniae* and cerebral stroke depends on sex and cutoff points for antibody titer(5), which was contradictory to our results that showed no significant association between antibody titers and sex.

In the study of Sirmatel et al. in 2003, no significant association was found between antibody against *C.pneumoniae* and cerebral stroke, which was similar to our findings(6).

In a study in Cameroon, which assessed antibodies via with the aid of microimmunofluorescence assay, no association between IgG antibody and stroke was found; however, there was an association between IgA antibody and stroke. They found no relationship between IgG antibody and stroke. The result of the study in Cameroon was different from ours in detecting an association between IgA antibody and cerebral stroke, which might be due to different methods of assessing antibodies. Like our results.

Alamowitch et al. reported no association between seropositivity for *C. pneumoniae* antibody and atherosclerosis as well as cerebral stroke, which was a confirmatory to our results (7).

In a study by Grayston et al. in 1996, it was specified that *C. pneumoniae* is present in the atherosclerotic plaques, but its presence cannot be shown by available antibodies in serum (8). Results of this study were comparable with ours because we could not find any significant association between antibodies available in the patient's serum with stroke.

Conclusions

Considering the high rate of mortality and disabilities after the cerebral stroke, we can assist individuals who are exposed to risks through confirming the association between *C.pneumoniae* and stroke and hence, by prophylaxis against this infection. Considering the importance of this subject, conducting similar studies with larger sample size and assessing other associated factors indifferent geographic areas is recommended.

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