Original Research Paper

Exploring the Role of Immune Complexes in Essential Hypertension

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Abstract: Essential hypertension is a rise of arterial blood pressure whose etiology is unknown. Immune complexes are complexes created by the binding of an antibody to the antigen. They are also called circulating immune complexes because of its precipitation in peripheral blood vessels, commonly on the places of their bifurcation and the places of higher blood pressure (glomerules of kidney or synovia). The goal of this study is to, by statistical estimation, connect essential hypertension and immune complexes as a cause of many appearances. With this aim, two groups of twenty-five examinees were questionnaire about their frequency and how long they ailed acut streptococcal tonsillitis, which may latter cause poststreptococcal glomerulonephritis as a consequence of immune complex creation. In doing so, examinees were also questionnaired about immune complex diseases (Systemic Lupus Erythematosus (SLE), Polynodosa Arteritis (PA), and Poststreptococcal Glomerulonepritis (PSG)). After all, they were questionnaired, about how frequently and how long they used penicillin as a therapy, which also may, in certain occasions, affect the creation of immune complexes. Examined groups were formed by patients suffering from essential hypertension, and the control groups were formed by randomly chosen examinees. By statistical estimating data from the mentioned questionnaire, we concluded that the frequency of past acute streptococcal tonsillitis in patients with essential hypertension has statistical significance and the frequency of past or actual immune complex diseases (SLE, PA, PSG); and using penicillin as a therapy does not have statistical significance.

Keywords: Immune Complexes, Essential Hypertension

Introduction

Probable Hypothesis

Essential hypertension is a rise of arterial blood pressure whose etiology is unknown. Therefore, there are no clinical or laboratory-recognized disease that could cause it (Carretero and Oparil, 2000).

Streptococcal tonsillitis is an acute inflammation of the throat and tonsils caused by the bacteria streptococcus beta-hemolytic group A (Stanisavljević, 1994). Often, inflammations later could cause the appearance of so-called streptococcal sequels, such as rheumatoid arthritis and post streptococcal glomerulonephritis. PSG is interesting for us because it was developed by a third type of immunological response characterized by the creation of immune complexes and its precipitation on the walls of peripheral blood (Abul and Andrew, 2006; Abul *et al.*, 2000).

Immune complexes are complexes created by the binding of an antibody to the antigen. They are also called circulating immune complexes because of its precipitation in peripheral blood vessels, commonly on the places of their bifurcation and the places of higher blood pressure (glomerules of kidney or synovia). That way, immune complex diseases could be created manifesting as vasculitis, arthritis, or nephritis. Diseases that are interesting for us in this study are SLE, PA, and PSG (Abul and Andrew, 2006; Abul *et al.*, 2000).

Serum sickness is created as a consequence of the immune response to alien proteins of serums and some medications, also known by the creation of immune complexes. Penicillin also could cause that appearance (Hematol, 1977).

On the basis the fact that immune complexes precipitate in peripheral blood vessels, the goal of this study would be

the determination of a statistical connections between essential hypertension and appearance that could cause the creation and precipitation of immune complexes as well as making conclusions about eventual etiologic connection between these two phenomenon's in order to help us understand, recognize, diagnose and causal treat the both.

In this study, we have set three hypotheses:

1. The frequency of past streptococcal tonsillitis is statistically significant in patients with essential hypertension
2. The frequency of immune complex diseases (SLE, PA, PSG) is statistically significant in patients with essential hypertension
3. The frequency of using penicillin is statistically significant in patients with essential hypertension

Materials and Methods

In the aim of exploring, we formed two groups of twenty-five examinees each. The examined group contains twenty-five examinees suffering from essential hypertension. The control one contains twenty-five examiners randomly chosen, not suffering of essential hypertension. Both groups were questionnaired have they, how frequently, and how long ailed of acute streptococcal tonsilitis. (Table 1). Have they allied of immune complex diseases (Systemic Lupus Erythematosus (SLE), Polynodosa Arteritis (PA), and Poststreptococcal Glomerulonephritis (PSG))? (Table 2) and, have they how frequently and how long used penicillin? (Table 3). Questionnaire was conducted among the patients of Zvezda ambulance (ZZZR), during 2006. year.

Table 1: Table of distribution of parameters between essential hypertension (es. hyp.) and streptococcal tonsilitis (strep. ton.), in twenty-five examinees and twenty-five in the control group

	(es.hyp.) yes	(es.hyp.) no	
(strep.ton.) YES	9	1	10
(strep.ton) NO	16	24	40
	25	25	50

Table 2: Table of distribution of parameters between essential hypertension (es. hyp.) and immune complex diseases (IK disea.), (SLA, PA, PSG), in twenty-five examinees and twenty-five in the control group

	(es.hyp.) yes	(es.hyp.) no	
(IK disea.) YES	8	1	9
(IK disea.) NO	17	24	41
	25	25	50

Table 3: Table of distribution of parameters between essential hypertension and penicillin, in twenty-five examinees, and twenty-five in the control group

	(es.hyp.) yes	(es.hyp.) no	
(penicillin) YES	13	13	26
(penicillin) NO	12	12	24
	25	25	50

Results

In the examined group, patients with essential hypertension, from twenty-five examinees and nine one confirmed that they have ailed with oftentimes streptococcal tonsillitis (Table 1).

In the control group, from twenty-five examinees, one confirmed that he has ailed from oftentimes streptococcal tonsillitis (Table 1).

For statistical estimation and display of results, we have used Chi-square test (Jevtović and Dević, 1999).

As a zero hypothesis, we set that: Streptococcal tonsillitis does not have an influence on the essential hypertension.

Calculating values of Chi-square test for the above-presented parameters (Table 1), which is 25, 2, we conclude that it, for the number of degrees of freedom, which, in our case is 1, gives a value p>0,001, what tells us that our empiric value is larger than the limited one. In that case, we are rejecting the zero hypothesis and accepting our hypothesis with a probability of zero hypothesis p<0,001.

In the examined group, patients with essential hypertension from twenty-five examinees and eight one confirmed that they have ailed of immune complex diseases (SLE, PA, PSG) (Table 2).

In the control group, from twenty-five examinees, one confirmed that he has ailed from one of the immune complex diseases (SLE, PA, PSG) (Table 2).

For statistical estimation and display of results, we have used Chi-square test.

As a zero hypothesis, we set that: Immune complex diseases (SLE, PA, PSG) do not have influence on the essential hypertension.

Calculating values of Chi-square test for the above-presented parameters (Table 2), which is 24,5, we conclude that it, for the number of degrees of freedom, which, in our case is 1, gives a value p>0,001, what tells us that our empiric value is larger than the limited one. In that case, we are rejecting the zero hypothesis and accepting our hypothesis with a probability of zero hypothesis p<0,001.

In the examined group, patients with essential hypertension from twenty-five examinees and thirteen ones confirmed that they have oftentimes used penicillin. (Table 3).

In the control group, from twenty-five examinees, thirteen ones confirmed that they have oftentimes used penicillin. (Table 3).

For statistical estimation and display of results, we have used Chi-square test.

As a zero hypothesis we set that: Using penicillin does not have an influence essential hypertension.

Calculating values of Chi-square test for the above-presented parameters (Table 3), which is 0,04, we conclude that it, for the number of degrees of freedom, which, in our case is 1, gives a value p<0,001, what tells us that our empiric

value is smaller limited one. In that case, we are accepting the zero hypothesis and rejecting our hypothesis with the probability of zero hypothesis p>0,001.

Discussion

That way we succeeded, theoretically, to bring in connection essential hypertension and immune complexes as a consequence of causes that might restore its creation and precipitation in the walls of peripheral blood vessels. However, if we wish to make this exploring more complete and, except its theoretical significance and the experimental one, we should by immunological laboratory analyses, estimate the levels of circulating immune complexes in patients with essential hypertension. In that sense, there already exist a couple of published works (Wu *et al.*, 2012; Andersen, 1990; Ferencíková *et al.*, 1984; Wohlert *et al.*,1984; Obbiassi *et al.*, 1982; Koniari *et al.*, 2010). They have estimated the levels of circulating immune complexes and other immune parameters in patients with essential hypertension, in patients with pregnancy-associated hypertension, and in patients suffering from various vascular diseases. On the basis of those estimations, they concluded that the identification of circulating immune complexes is significant in patients with essential hypertension.

On the basis of all presented theoretical and experimental approaches, in conclusion, we may be thinking about a justification about eventual etiologic connection between essential hypertension and immune complexes. Moreover, we may be thinking about the justification to suspect on the eventual presence of immune complex disease in case that the patients may suddenly get high blood pressure with unknown etiology. That way we could understand both mentioned phenomenon's and increase chances to recognize, diagnose and treat the cause of both appearances, essential hypertension as well as immune complexes diseases.

Course, for now, all presented represents just thinking, mostly theoretical and done by basic experimental, statistical work, that must be supported, theoretically and experimentally by larger and more detailed exploring, connected with a significantly larger number of examinees, through the cooperation among immunological and biochemical laboratories, ambulances, clinical and scientific-research centers that study and work with essential hypertension.

Conclusion

Therefore, by rejecting of the zero hypothesis for our first hypothesis: Streptococcal tonsillitis does not have an influence on essential hypertension, we accepted our first hypothesis: The frequency of past streptococcal tonsillitis is statistically significant in patients with essential hypertension.

In so doing, by rejecting the zero hypothesis for our second hypothesis: Immune complex diseases (SLE, PA, PSG) do not have an influence on essential hypertension, we accepted our second hypothesis: The frequency of immune complex diseases (SLE, PA, PSG) is statistically significant in patients with essential hypertension.

At the end, by accepting the zero hypothesis for our third hypothesis: Using penicillin does not have an influence on essential hypertension, we rejected our third hypothesis: The frequency of using penicillin is statistically significant in patients with essential hypertension.

Ethics

This article is original and contains unpublished material. The corresponding author confirms that all of the other authors have read and approved the manuscript and no ethical issues involved.

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