

The effect of intravenous iron on bacterial infection in hemodialysis patients

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Abstract: The aim of the present research was to study the effect of iron infusion in different dosages on these two factors and to determine the prevalence and type of bacterial infections in dialysis patients. In a clinical trial that was conducted in the internal diseases department of Tabriz Medical Sciences University on hemodialysis patients, the effect of iron infusion on hemodialysis patients. The effect of iron infusion in different dosages on the two factors was also examined and the prevalence and type of bacterial infections in dialysis patients were also investigated. In this study 60 hemodialysis patients were classified in to two groups (an experimental and a control group) and the effects of iron injection on the infection and oxidative stress of the two groups was studied. During this period, 3 patients received renal transplant and were excluded from the study. One patient also passed away. Therefore, infections of the 26 patients in the experimental group and 30 patients in the control group were compared. A total of 70 instances of were observed in the experimental group. Of the 70 instances of infection, 26 (37%) were associated with pneumonia. Moreover, 26 (37%), 16 (22.8%), 1 and another one of the infections were upper respiratory tract infection, UTI, tooth infection, and foot infection, respectively. Among the patients in the control group 5 patients demonstrated no signs of infection within 150 days while 5 patients (16.6%) experienced infections more than two times. A total of 47 instances of infection were seen in the control group. Of the 47 infections, 27 (57.4%), 8 (17%), 8 (17%), 3 (6.3%) and 1 were pneumonia, upper respiratory tract infection, UTI, pyelonephritis, and abdominal infection, respectively. Analysis of infections in patients showed that the average incidence of infections in the experimental group was significantly higher than the control group. However, no relationship was observed between the infection type and iron intake. In this study 60 hemodialysis patients, who received dialysis three times a week, were included in the research. 30 patients were classified into the experimental group and 30 were put into the control group. Patients aged between 30 and 60 years and the age and gender of the patients in the control and experimental groups were matching. Each group included 14 female and 16 male patients. [Abedi Azar S, Jafari Nakhjavani MR. **The effect of intravenous iron on bacterial infection in hemodialysis patients.** *Life Sci J* 2015;12(3s):40-42]. (ISSN:1097-8135). <http://www.lifesciencesite.com>. 7

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1. Introduction

Some research results indicated that intravenous iron injection may be accompanied by an increase in the risk of infections in patients. On the other hand, it is widely known that free iron leads to an increase in oxidant stress and bacterial infection (Brenner Robert, 2005; Poorhasan, 2010).

The balance of fluids in the body is mainly resulted from cellular processes and healthy performance of kidneys. Disturbance of the natural function of these cells leads to disorders that threaten the survival of patients.

The dysfunction of cells causes renal syndromes which finally lead to ARF or CRF. Kidney syndromes can be the result of systemic diseases or primary diseases of the kidneys (Pourhassan, 2007; Skorecki, 2009).

CRF is a pathophysiology process with various causes and leads to an inevitable decrease in the number and performance of nephrons. It usually

results in ESRD which irreversibly destroys the endogenous function of kidneys to the extent that the patient has to rely on alternative renal treatments (i.e. dialysis and renal transplant) to prevent the development of lethal uremia (Skorecki, 2009). Iron deficiency is one of the problems of CRF patients and one of the causes of intensification of anemia in such patients. In order to solve this problem patients either receive intravenous iron infusion during or after the dialysis or receive oral iron.

Results of some studies suggest that intravenous iron therapy may increase the risk of infection in patients (Singh Ajay, 2005; Rajaii, 2008; Cavdar, 2005). On the other hand, it is widely known that free iron increases oxidative stress. The increase in oxidative stress and inflammation also results in an increase in the prevalence and severity of atherosclerosis, infections, amyloidosis beta 2-microglobulin, and finally a reduction in the life time and quality of life of dialysis patients. However, the

number of studies on this topic is limited (Camerson, 1999; Herbert, 1997).

The aim of the present research was to study the effect of iron infusion in different dosages on these two factors and to determine the prevalence and type of bacterial infections in dialysis patients.

2. Material and Methods

In a clinical trial that was conducted in the internal diseases department of Tabriz Medical Sciences University on hemodialysis patients, the effect of iron infusion on hemodialysis patients. The effect of iron infusion in different dosages on the two factors was also examined and the prevalence and type of bacterial infections in dialysis patients were also investigated.

In order to study the effect of intravenous Venofer (iron sucrose) on hemodialysis patients, 100 mg of intravenous iron was infused to 30 patients in the experimental group after dialysis through 30 minutes of gradual intravenous infusion.

Patients were studied within 150 days for the outbreak of infections, the number and frequency of infections and the areas of infection. A comparison was also drawn between the infections in the two groups.

Exclusion criteria were as follows:

- 1- Patients with certain infectious diseases at the beginning of the research
- 2- Patients with certain inflammatory diseases at the beginning of the research
- 3- Patients receiving Lovastatin
- 4- Patients who received renal transplant in the course of the research

At the beginning of the study patients had no infection.

Statistical Analysis:

The collected data were analyzed by SPSS-17 statistical software. The collected data were expressed as percentage and mean \pm SD. Continuous (quantitative) variables were compared by Independent samples and Paired t test. Categorical (qualitative) variables were compared by contingency tables and Chi-square test or Fisher's exact test. P-value ≤ 0.05 was considered statistically significant.

3. Results

In this study 60 hemodialysis patients were classified in to two groups (an experimental and a control group) and the effects of iron injection on the infection and oxidative stress of the two groups was studied.

Each group consisted of 46.6% female and 5.53% female participants. The average age of patients was also 52.3 years.

In the experimental group 2 were anti-Hbs positive. Moreover, in the experimental and control groups 4 and 10 patients were anti-HCV positive, respectively.

Patients in the control and experimental groups were studied for 150 days for the incidence of any infection and its type.

During this period, 3 patients received renal transplant and were excluded from the study. One patient also passed away. Therefore, infections of the 26 patients in the experimental group and 30 patients in the control group were compared.

The average frequency of infections in the experimental group and control group was 2.6 and 1.5, respectively. The average incidence of infection in the experimental group was significantly higher than the control group ($P=0.001$).

Among the patients in the experimental group only one patient demonstrated no signs of infection within 150 days and 14 patients (53%) experienced infections more than two times.

A total of 70 instances of were observed in the experimental group. Of the 70 instances of infection, 26 (37%) were associated with pneumonia. Moreover, 26 (37%), 16 (22.8%), 1 and another one of the infections were upper respiratory tract infection, UTI, tooth infection, and foot infection, respectively.

Among the patients in the control group 5 patients demonstrated no signs of infection within 150 days while 5 patients (16.6%) experienced infections more than two times.

A total of 47 instances of infection were seen in the control group. Of the 47 infections, 27 (57.4%), 8 (17%), 8 (17%), 3 (6.3%) and 1 were pneumonia, upper respiratory tract infection, UTI, pyelonephritis, and abdominal infection, respectively.

4. Discussions

It is known that iron overload and an increase in free radicals are accompanied by the dysfunction of WBCs and PMNs, which play the main role in protecting the body against pathogenic bacteria. These two factors also lead to an increase in the outbreak of infections in patients (Camerson, 1999).

Patients in the experimental and control groups matched in terms of age and gender. Moreover, no significant difference existed between the levels of lipid, renal enzymes, calcium, phosphorous, urea, albumin, alkaline phosphates, hemoglobin, iron, TIBC, CRP, KT/V and ESR in patients of the two groups at the beginning of the research. Consequently, the confounding factor for the aforementioned parameters was at its lowest value for the two groups. Therefore, results of the comparison

between the infections of the two groups were reliable.

In a study that was carried out by Canziani et al. (2001) in Sao Paolo different dosages of iron were administered on different groups of hemodialysis patients at various times and then the incidence and type of infections were studied for 150 days (Canziani, 2001).

Results of this research revealed that the risk of incidence of infections not only grows with the consumption of iron, but also is associated with the dosage of iron that is consumed. Moreover, pulmonary infections were also more common in all of the groups that received iron (Canziani, 2001). Results of this study complied with the results of our study.

Conclusion

Analysis of infections in patients showed that the average incidence of infections in the experimental group was significantly higher than the control group. However, no relationship was observed between the infection type and iron intake.

In this study 60 hemodialysis patients, who received dialysis three times a week, were included in the research. 30 patients were classified into the experimental group and 30 were put into the control group.

Patients aged between 30 and 60 years and the age and gender of the patients in the control and experimental groups were matching. Each group included 14 female and 16 male patients.

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References

- Brenner Robert M, Brenner Barry M(2005). Adaptation to renal injury. In: Kasper DL, Fauci AS, Longo DL, Braunwald E, Hauser SL, Jameson JL: Harrison's principles of Internal Medicine, Vol. 2, 16th ed. Mc Graw-Hill, United state of America, 1639-1641.
- Poorhasan A, Haghdoost M, Mashrabi O. Comparison of Tuberculin Skin Test and Interferon Gamma Assay for the Diagnosis Latent Tuberculosis. American Journal of Infectious Diseases 6 (2): 50-53, 2010.
- Pourhassan A. Clinical and laboratory findings in neurobrucellosis: A study of 43 cases. Iranian Journal of Clinical Infectious Diseases 2007;2(2):71-76.
- Skorecki Karl, Green Jacob, Brenner Barry M(2009). Chronic renal failure. In: Kasper DL, Fauci AS, Longo DL, Braunwald E, Hauser SL, Jameson JL: Harrison's principles of Internal Medicine, Vol. 2, 17 th ed. Mc Graw-Hill, Philadelphia. United state of America, 1653-1654.
- Singh Ajay K, Brenner Barry M (2005). Dialysis in the treatment of renal failure. In: Kasper DL, Fauci AS, Longo DL, Braunwald E, Hauser SL, Jameson JL: Harrison's principles of Internal Medicine, Vol. 2, 16th ed. Mc Graw-Hill, United state of America, 1663-1667.
- Rajaii M, Pourhassan A. Evaluation of immunity against CMV in Azarbaijan female population. Iranian Journal of Clinical Infectious Diseases 2008;3(3):143-148.
- Cavdar C, Temiz A, Yenicierogh Y, Caliskan S, Celic A, et al. (2005). The effects of intravenous Iron treatment on oxidant stress and erythrocyte deformability in hemodialysis patients. Scand J Urol Nephrol, 37(1), 77-82.
- Camerson JS, Eknayan G, Danielsen BG, et al. (1999). Appendix III: Use of intravenous iron in patients receiving epoetin. Nephrology Dialysis Transplantation, 14(5), 35-36. ,L1 ,Jil: 1rvo.
- Herbert V, Jayatilleke E, Shaw S, et al.(1997). Serum Ferritin Iron, a New Test, Measures Human Body Iron Stores Unconfounded by Inflammation. Stem Cells, 4(12), 291-296.
- C, Yumiya ST, Rangel EB, Manfredi SR, Neto MC, Draibe SA. Risk of bacterial infection in patients under intravenous iron therapy: dose versus length of treatment. Artif Organs. 2001 Nov;25(11):866-9.

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