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Serum Uric Acid Level in Patients with Parkinson Disease

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Abstract

***Background*:** Parkinson disease is one of the most prevalent degenerative nervous system diseases. Some recent studies show the possible effects of uric acid on this disorder. The aim of this study was to evaluate serum level of uric acid in patients with Parkinson disease.

***Material & Methods*:** Serum uric acid were determined in 50 patients with Parkinson's disease and compared with 50 healthy persons, which were matched with age and sex. Data were analyzed with software SPSS-16 and statistical descriptive methods (mean-percentage, SD) and *t*-test.

***Results*:** In this study, 26 men (52%) and 24 women (48%) were evaluated. The mean serum uric acid in patients was 4.79±1.21 and in the control group was 5.85 ±1.41. This difference was statistically significant ($p \leq 0.001$). Also, the mean serum uric acid in both men (4.87±1.20) and women (4.7±1.23) in patients group was statistically lower than both men (5.42±1.25) and women (5.91±1.62) in control group ($p \leq 0.001$).

***Conclusion*:** The findings of this study show that low serum uric acid increase the risk of Parkinson's disease.

Introduction

Parkinson's disease isone of the most common brain degenerative disorders, and includes several symptoms such as gait disorders, impaired balance, bradykinesia, hypokinesia, rigidity and tremors at rest [1]. Along with several physical and mental restrictions, this illness reduces the quality of life of the patients, and also indirectly affects the life of the patient's family [2]. Many researchers have been carried out about the cause(s) of the disease, but no specific factor is yet determined as the main cause of the disease. Some recent studies reveal that there might be a relationship between Parkinson and the serum uric acid levels. For example, some studies in Finland revealed that the serum uric acid levels in the patients group show a significant decrease, compared with the control group [3]. In another research in Boston, people who had higher serum uric acid levels were less infected with Parkinson; Also the Parkinson's disease progress was more slowly in the patients with higher serum uric acid levels than others [4]. Some studies show that uric acid can decrease the onset of the disease or its intensity, because of having the antioxidant effects and this effect must be considered in the therapeutic process of the disease. Some other studies indicate that high uric acid levels lead to the decrease of the free radicals and subsequently the onset of the disease [5, 6]. Another 14-year-period research in America revealed that the risk of onset of the disease in people with higher dietary intake of uric acid index was much lower than others; instead, the onset of Gout and Kidney stones was higher than other people [7, 8]. Even some studies show that the risk of Parkinson's disease is much lower in patients suffering from Gout [9, 10]. Despite the above researches, yet there are many studies indicating the need for more examinations, and that the resultsof the recent researches are not yet adequate for a general conclusion [10-14]. Here, with considering the above cited instances, we embark on measuring the serum uric acid levels in Parkinson's patients, hoping that the acquired results will help the treatment of these patients.

Materials and Methods

This is a descriptive case - control study, carried out on Parkinson patients in the city of Rafsanjan in 2010. Being infected with the disease was confirmed through clinical examinations by a neurologist and the Para clinical measures. The easy probability sampling was carried out through the patients, referring to the Ali - Ebne - Abitaleb hospital. All of the patients suffering from Gout, blood diseases and vasculitis, those who hada history of using the drugs effective on the uric acid levels (Corticosteroids, Colchicine Alluporinol), and also the patients taking medications other than the anti - Parkinson drugs were excluded from the study. Then, 50 patients were included in the research. Meanwhile, 50 people referring to the emergency for the closed limb trauma, who had the age, gender and economic similarities with those patients and yet had taken no specific medications

were selected as the control group. The ethics committee of the Rafsanjan University had confirmed the research. The serum uric acid levels were measured by milligram per deciliter, and the results were evaluated with 95% confidential interval. The values were registered with the demographic information of the questionnaire and were statistically analyzed by the use of the SPSS-16 software, the descriptive statistics methods (the number of percentage and average) and the analytic statistics (comparing the mean and the *t*-test and ANOVA).

Results

In this research, 52% (26 persons) of the people in both groups of case and control were males and 48% (24 persons) were females. The mean age of male patients of the control group of the year was 64.7+6.4, and the mean age of the female patients of the control group of the year was 63.2+5.6. There were no statistical differences between the mean ages of the estimated groups. Four percent (2 persons) of the people possessed a familial history of Parkinson. Twenty percent of those people were under 60, 18% between 61-65, 28% were between 66-70 and 34% were more than 70 years old.

Also, 26% were under 5, 52% were between 5-10, and 22% were more than 10 years old. The mean uric acid levels were 4.79 with the standard deviation of 1.21 in the patients group, and it was 5.85 with the standard deviation of 1.14 in the control group. The serum uric acid levels in the patients group was significantly lower than the control group ($p \leq 0.001$). Thus, the serum uric acid levels in both male and female patients were lower than that of the males and females in the control group ($p \leq 0.001$) (Table 1). There was no relationship between factors as the familial history, age, years of illness, and the serum uric acid levels (Table 2).

Discussion

The serum uric acid levelsin Parkinson's patients were evaluated in this study. According to the findings, the serum uric acid levels of these patients were lower than the healthy people. The results of some examinations were similar to the findings of this research and indicated the inverse relationship between the serum uric acid levels and the onset of Parkinson's disease.

De lau and colleagues, through a 9-year-period research on 4695 men over 50, found out that the incidence of the Parkinson's disease in people with lower serum uric acid levelswas significantly higher than others, and this is in line with the results of the research [15].

Weisskopf et al. also, in a two-year-period study gathered the same deductions; but the remarkable point in this study was the fact that the Parkinson's patients possessed a lower level of uric acid even years before the onset if the illness [4]. Chen et al., as well, in a cohort study on 15,792 men and women recognized that the onset of the Parkinson's disease has an inverse relationship with the uric acid levels [16]. In another research, accomplished on 47,406 people for 14 years, they realized that the dietary urate index in those affected with Parkinson is lower than others; and the low level of uric acid is the risk factor of the disease [8].

Alonso et al. indicated that the onset of the Parkinson's disease is less observed in people suffering from Gout [17]. Evaluation of the cerebrospinal fluid also revealed the decrease of the uric acid level in the patients group comparing to the control group [18].

Pathologic evaluations showed the decrease of the urate levels in the autopsy of the Parkinson's patients, even though the cases of this examination were limited [4, 19]. Facheris et al., in their genetic evaluation of the patients, observed that some special genotypes are associated with the increase of the serum uric acid levels;

Table1. The abundance distribution of the uric acid status according to gender in both studied groups

Group	Gender	Abundance Number (%)	Uric acid Mean±SD	*p*-Value
Case	Male	26(52)	4.87 ±1.2	0.001
	Female	24(48)	4.70 ± 1.23	
	Sum	50(100)		
Control	Male	26(52)	5.42 ±1.25	0.001
	Female	24(48)	5.91 ± 1.62	
	Sum	50(100)		

Table 2. The abundance distribution of the uric acid status according to age, the affliction duration, and the familial history in both studied groups

Variable		Number	Mean±SD	*p*-Value
Patient's age	< 60 years old	10	4.4±0.64	0.009
	61-65 years old	9	4.63±0.98	
	66-70 years old	14	5.46±1.49	
	> 70 years old	17	4.55±1.77	
Affliction duration	> 70 years old	13	5.077±1.287	0.145
	< 5 years old	26	4.907±1.15	
	5-10 years old	11	4.18±1.14	
Family history	> 10 years old	48	4.8±1.2	0.486
		2	4.2±1.55	

specific genotypes in which the early onset of the disease is more recognized [20]. Also, Wang et al. in their evaluations about non-motor disorders of Parkinson's patients deducted that such disorders are of higher abundance in patients with lower uric acid levels [21]. Some researchers by examining the reports about uric acid in Parkinson's patients concluded that uric acid can be used as a biomarker of the disease [19, 22]. Even some scholars mention it as a factor of determining the Parkinson's prognosis [19]. Some studies do not show such a relationship. For example, Ahlskog et al., in a case-control study, found no difference between the serum uric acid levels in the studied groups [23]. O'Reilly et al., as well, in a case–control study on 504 female nurses in a year revealed that the onset of the Parkinson's disease is not correlated with the serum uric acid levels [24]. This finding was independent of the female factors such as female hormones or the body mass index. Andreadou and colleagues in another case-control study recognized no significant difference [5]. Some studies indicate that this relationship is weaker in women, but Winquist et al. in a research have shown the equal effect of uric acid in both men and women [5, 16, 24]. These finding have similarities with the findings of this research (Table 1). In general, our studies and many other studies indicate the inverse relationship between the uric acid levels and the onset of this disease; and the importance of this finding will be so valuable to its prevention and treatment. Yet, there is no consensus about the beneficial effects of high uric acid levels in the decrease of the onset of the disease in the mentioned studies. According to the presented viewpoints, oxidative stress in the dark matter is one of the main loops of the disease onset, and it seems that uric acid prevents the onset of the disease by its antioxidant property [4, 26, 27]. Another theory about the effectiveness of uric acid is the reduction of the free radicals in terms of increased uric acid [7]. Some studies indicate that the high consumption of meat and milk, because of having high uric acid levels, prevents the onset of the disease [4, 10, 28]. Considering the existing evidences, about the effectiveness of uric acid on Parkinson's patients, it seems that a part of the therapeutic measures must be directed this way [21-30]. In osine is one of the suggested drugs, yet the uric acid increase complications have to be considered. No relationship was detected between the uric acid and the duration of illness (Table 2), and this was in line with other studies. More researches still deem necessary in this area [3, 10, 29]. The main limitation of the research was the lack of comparison between the serum uric acid levels and the severity of illness which has to be considered in future studies [4, 16, 25].

Generally, this study revealed that the uric acid levels in the Parkinson's patients were lower than healthy people. This means that the decrease of the uric acid levels lead to more outbreak of Parkinson both in men and women.

This finding confirms the previous studies, emphasizes on the role of uric acid levels on the Parkinson's disease, and also indicates the necessity of more studies specially the cohort studies to achieve a final result and to clarify a part of the treatment process.

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Authors' Contributions

All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest

The authors declare no conflict of interest.

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