ISSN 2616-5791 Vol. 6, Issue 2: 16-20, DOI: 10.25236/AJMHS.2025.060203

Clinical efficacy of hyperbaric oxygen combined with idebenone in the treatment of elderly patients with Parkinson's disease

Jiang Dajing, Li Zhilian*

Jingzhou First People's Hospital, Jingzhou, 434020, Hubei, China
**Corresponding author*s

Abstract: *In this study, 100 elderly patients with Parkinson's disease treated in the Department of Neurology of our hospital from December 2022 to December 2024 were selected and divided into study group and control group according to their willingness to treat, with 50 patients in each group. The control group was treated with idebenone, and the study group was treated with hyperbaric oxygen combined with idebenone. The therapeutic effect, inflammatory response, neurological function, cognitive function, and UPDRS scores were compared between the two groups. The total effective rate of the study group was 90. 00%, which was significantly higher than that of the control group (72. 00%) ($P < 0.05$). Before treatment, the levels of OPN and YKL Y 40 in the two groups were similar ($P > 0.05$), but decreased after treatment, and the levels in the study group were lower than those in the control group ($P < 0.05$). Before treatment, the scores of MoCA in the two groups were similar ($P > 0.05$), and after treatment, the scores of MoCA in the study group were higher than those in the control group ($P < 0.05$). Before treatment, the UPDRS scores of different grades in the two groups were similar ($P > 0.05$), but decreased after treatment, and the scores in the study group were lower than those in the control group ($P < 0.05$). Hyperbaric oxygen combined with idebenone in the treatment of elderly patients with Parkinson's disease has a significant clinical effect, which can improve the inflammatory response and neurological function, and significantly enhance the cognitive ability of patients.*

Keywords: *Hyperbaric oxygen; Idebenone; Senile Parkinson's disease; Clinical efficacy; Observation*

1. Introduction

Parkinson's disease (PD) is one of the neurodegenerative diseases.The cause of the morbidity of PD is not clear.Related studies have shown that the disease is associated with human immune, mental status, living environment, genetic and other factors [1] . Parkinson's disease occurs very frequently in the elderly aged 60 years or older, the early symptoms are usually difficult to detect, and the course of the disease is relatively slow. Without early detection and effective treatment, it will seriously affect the life of patients and make the quality of life decline [2] . Idebenone is commonly use in current therapeutic work to treat Parkinson's disease [3] . Some studies have shown that combined use of hyperbaric oxygen can alleviate non-motor symptoms such as sleep quality in Parkinson's patients [4] . YKL-40 is a member of the chitinase-type protein family, which is closely related to the regulation of the body's immune and inflammatory responses. Studies have shown that [5] , the expression of YKL-40 is closely related to the severity of Parkinson's disease, and the increase of this index means that the patient's condition is getting worse. OPN is a bone protein that is associated with motor and non-motor symptoms of Parkinson's disease, and its expression depends on the severity of the patient's symptoms. The results of this study are reported as follows.

2. Data and Methods

2.1 General information

In this study, 100 elderly patients with Parkinson's disease who were treated in the Department of Neurology of our hospital from December 2022 to December 2024 were included in the study. The patients were divided into study group and control group according to their willingness to be treated, with 50 patients in each group. Inclusion criteria: All participants were diagnosed with Parkinson's disease through examination, and the Hoehn Yahr (H Y) grade was grade I to III; the minimum age of

ISSN 2616-5791 Vol. 6, Issue 2: 16-20, DOI: 10.25236/AJMHS.2025.060203

the patient was 60 years old, and the maximum age was not more than 80 years old. Before the study, all patients or their relatives were informed of the study content in detail and volunteered to participate in the study. Exclusion criteria: patients treated with surgery and biologic agents in the past 90 days; patients with allergic reactions to the drugs used; patients with multisystem, vascular atrophy, or supranuclear palsy; and patients with contraindications to hyperbaric oxygen therapy. By comparing the basic information of the two groups, it was found that there was no significant difference between the two groups (P > 0.05). See Table 1 for details.

Table 1: Basic information of comparison between study group and control group

Group	Number of cases	Sex (example)		Age (Years, X X ± s)	Course of disease (Year, X X ± s)	H _ Y classification (example)			Length of schooling (Year, X X ± s)
		Male	Female			I	II	III	
Study Group	50	27	23	69.33±7.21	2.87±4.34	11	23	16	8.37±4.28
Control group	50	28	22	69.46±7.47	2.89±5.34	12	25	13	8.35±6.61
Value of t/χ2		0.042		1.47	1.642	1.078			1.206
P value		0.838		0.142	0.104	0.483			0.271

2.2 Method

Patients in the control group were treated with idebenone. After the patient was admitted to the hospital, he received conventional disease treatment and took idebenone (manufacturer: Shenzhen Neptunus Pharmaceutical Co., Ltd., approval number: GYZZ H10970363). The drug was taken after meals, with a dose of 10 mg each time, three times a day, and the treatment lasted for one month.

Patients in the study group received a combination of hyperbaric oxygen and idebenone. The idebenone drug was the same as the control group, and hyperbaric oxygen was used as an adjuvant therapy. Use an air compression chamber (manufacturer: Guangzhou Jinzhixian Medical Equipment Co., Ltd., model: Φ3400/11000), increase the internal pressure to 0.22MPa through 20 minutes of compression, then wear a mask for 60 minutes of pure oxygen inhalation, and keep breathing air in the chamber at an interval of 10 minutes during the breathing process. Then the blood pressure was reduced for another 30 minutes until the normal pressure was restored, once a day, and the treatment time was 6 days a week for 1 month.

2.3 Observation index

(1) To compare the therapeutic effect, it is mainly divided into three different criteria: markedly effective, effective and ineffective. (2) The levels of inflammatory reaction and neurological function were compared, and the levels of OPN and YKL - 40 were analyzed by collecting 5ml of blood from vein in fasting state. (3) Compare the improvement of cognitive function. MoCA was used to evaluate the cognitive function. (4) Compare the evaluation scores of UPDRS indicators. The total settings were grade I to grade III, of which grade I included emotion, behavior and nerve, grade II included daily life, and grade III included motion detection.

2.4 Statistical treatment

In this study, SPSS 26.0 was used to process the collected data. The measurement information of the study was expressed in the form of (X ± s), and t was used to test between groups. Count information was expressed in the form of (%), and χ2 was used for the test between groups. In the case of P < 0.05, the difference was statistically significant.

3. Results

3.1 Comparison of the therapeutic effects of different treatment methods in the two groups

The total effective rate of the study group was 90.00%, which was significantly higher than 72.00% of the control group (P < 0.05), as shown in Table 2.

ISSN 2616-5791 Vol. 6, Issue 2: 16-20, DOI: 10.25236/AJMHS.2025.060203

Table 2: Comparison of therapeutic effects of different treatment methods in the two groups [cases (%)]

Group	Number of cases	Remarkable effect	Valid	Not valid	Total effective
Study Group	50	21(42.00)	24(48.00)	5(10.00)	45(90.00)
Control group	50	15(30.00)	21(42.00)	14(28.00)	36(72.00)
$\chi 2$					4.376
P					0.036

3.2 Compare the inflammatory reaction and nerve function level of the two groups

Before treatment, the levels of OPN and YKL - 40 in the two groups were similar ($P > 0.05$). After treatment, the levels of OPN and YKL - 40 in the two groups decreased, and the levels in the study group were lower than those in the control group ($P < 0.05$), as shown in Table 3.

Table 3: Comparison of inflammatory response and neurological function levels between the two groups ($X \pm s$)

Group	Number of cases	OPN(ng/ml)		YKL-40(mg/ml)	
		Before treatment	After treatment	Before treatment	After treatment
Study Group	50	6.72±1.02	4.03±0.94	4.12±1.13	2.86±0.85
Control group	50	6.59±1.17	5.32±1.03	4.09±0.94	3.25±0.63
T-value		0.581	6.409	0.141	3.554
P value		0.563	<0.05	0.888	<0.05

3.3 Compare the improvement of cognitive function between the two groups

Before the treatment, the MoCA scores of the two groups of patients were similar ($P > 0.05$). After the treatment, the MoCA scores of the two groups of patients were improved, and the MoCA scores of the study group were higher than those of the control group ($P < 0.05$), as shown in Table 4.

Table 4: Comparison of the improvement of cognitive function between the two groups (points, $X \pm s$)

Group	Number of cases	Before treatment	After treatment
Study Group	50	15.94±4.92	26.03±4.97
Control group	50	16.03±4.28	23.29±4.27
T-value		0.096	3.897
P value		0.924	<0.01

3.4 Compare the evaluation scores of UPDRS indicators between the two groups

Before the treatment, the scores of UPDRS indexes of different grades of patients in the two groups were similar ($P > 0.05$), but after the treatment, the scores of UPDRS indexes of different grades of patients in the two groups decreased, and the scores in the study group were lower than those in the control group ($P < 0.05$), as shown in Table 5.

Table 5: Comparison of evaluation scores of UPDRS indicators between the two groups (scores, $X \pm s$)

Group	Number of cases	UPDRS Level I		UPDRS Level II		UPDRS Level III	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Study Group	50	9.54±2.08	5.11±1.49	30.48±2.94	22.06±2.75	34.92±3.29	29.01±2.94
Control group	50	9.49±2.14	7.09±1.42	29.99±2.08	25.42±2.38	34.79±3.42	31.05±2.17
T-value		0.116	6.665	0.943	6.401	0.191	3.868
P value		0.908	<0.01	0.349	<0.01	0.851	<0.01

ISSN 2616-5791 Vol. 6, Issue 2: 16-20, DOI: 10.25236/AJMHS.2025.060203

4. Discussion

Parkinson's disease is a common Parkinson's disease, and its morbidity is mainly caused by the death or degeneration of neurons in the substantia nigra of the brain, which leads to the reduction of dopamine production, thus causing nervous system confusion, enhancing the excitability of acetylcholine, and then causing muscle stiffness, tremor and dullness [6] . Idebenone is a drug used to treat cerebrovascular diseases. It can increase the absorption of glucose in the brain, stimulate mitochondrial activity, and has free radical scavenging and antioxidant functions, which can significantly alleviate brain function problems and improve brain metabolism. Studies have shown that idebenone can improve some non-motor and motor symptoms of Parkinson's disease, alleviate the deterioration of the disease, and maintain the nervous system function of patients to some extent [7] . The application of hyperbaric oxygen can significantly enhance the cognitive ability of Parkinson's disease model rats, reverse the abnormal state of dopamine and its metabolites, optimize the blood flow of brain tissue, and promote the recovery of neurological function. Hyperbaric oxygen therapy can relieve sleep problems in patients with Parkinson's disease, improve their motor and balance abilities, and significantly improve non-motor disorders [8] . In this study, the total effective rate of the study group was 90.00%, which was significantly higher than that of the control group (72.00%) ($P < 0.05$); the MoCA index score of the study group was higher than that of the control group ($P < 0.05$); The scores of UPDRS indexes of different grades in the study group were lower than those in the control group ($P < 0.05$). These results confirm that the combination of hyperbaric oxygen and idebenone can effectively alleviate the clinical signs and symptoms of elderly patients with Parkinson's disease.

YKL-40 is a protein encoding chitinase, which is closely related to the inflammatory response of the human body. Scientific studies have shown that YKL-40 plays a crucial role in the development and evolution of Parkinson's disease, and its performance level can affect the cognitive ability of Parkinson's disease patients, as well as the severity of the disease [9] . OPN is a highly phosphorylated glycoprotein that plays a dual role in the development of Parkinson's disease. On the one hand, it can resist cell death and stimulate cell growth to protect nerve cells; on the other hand, it can also accelerate the development of Parkinson's disease [10] . Studies have shown that the arginine-glycine-aspartic acid peptide in the structure of OPN is unique, which can reduce the activity of glial cells, reduce inflammatory response, and thus protect tyrosine hydroxylase positive cells. This study found that before treatment, the levels of OPN and YKL - 40 in the two groups were similar ($P > 0.05$), and after treatment, the levels of OPN and YKL - 40 in the study group were lower than those in the control group ($P < 0.05$). The results showed that the combined application of hyperbaric oxygen and idebenone could reduce the expression levels of YKL-40 and OPN in serum, reduce the damage to the nervous system, and thus improve the symptoms of Parkinson's patients. This may occur because the brain structure of Parkinson's disease patients is affected, resulting in insufficient blood and oxygen supply to the brain, leading to a more severe inflammatory response in the body. However, hyperbaric oxygen can significantly improve the blood and oxygen supply to the brain, alleviate the inflammation of the brain, and significantly reduce the concentration of serum YKL - 40 and OPN, thus significantly alleviating the clinical signs of patients.

5. Conclusions

To sum up, the combination of hyperbaric oxygen and idebenone is very effective in the treatment of elderly patients with Parkinson's disease, which can significantly enhance the cognitive ability of patients and effectively reduce the levels of YKL - 40 and OPN in the serum of patients, so it has a high application value in medical application.

References

[1] Liu Na, Jiang Sen, Cai Qian, et al.Correlation between serum bone protein and severity of Parkinson's disease and cognitive impairment [J].Journal of Stroke and Neurological Diseases, 2021, 38 (12): 1095-1098.

[2] Liu Ting, Meng Xinling, Li Dan, et al. Clinical value of osteopontin and TNF - α in the diagnosis of Alzheimer's disease [J]. Journal of Cardiovascular and Cerebrovascular Diseases of Integrated Traditional Chinese and Western Medicine, 2022, 20 (15): 2853-2857.

[3] Zhang Peng, Wang Zengwu, Zhou Jun, et al.Effects of hyperbaric oxygen on cognitive ability, striatal dopamine and its metabolites in Parkinson's disease model rats [J].Chinese Journal of Nautical Medicine and Hyperbaric Medicine, 2020,27 (6): 696-698,703.

ISSN 2616-5791 Vol. 6, Issue 2: 16-20, DOI: 10.25236/AJMHS.2025.060203

ZHENG Xiuqin, ZHU Tian, CUI Hongxia, et al.Hyperbaric oxygen improves clinical signs and symptoms of Parkinson's disease patients by intervening cell senescence-related phenotype [J].Chinese Journal of Nautical and Hyperbaric Medicine, 2023,30 (2): 176-180.

[5] Chen yuan, Chang Yunyun, Shen Ping, et al. Effect of virtual reality technology combined with exercise rehabilitation nursing on clinical efficacy of hyperbaric oxygen therapy in patients with Parkinson's disease [J]. Chinese Journal of Nautical Medicine and Hyperbaric Medicine, 2023, 30 (3): 332-336.

[6] Zhang Zhanshuai, Qin Shaoqiang, Wang Yaling, et al. Correlation of serum levels of human cartilage glycoprotein 39 and soluble tumor necrosis factor receptor 1 with cardiac function and prognosis in patients with acute myocardial infarction [J]. Chinese Journal of Arteriosclerosis, 2022, 30 (3): 243-247,259.

[7] Parkinson's Disease and Movement Disorder Group of Neurology Branch of Chinese Medical Association, Parkinson's Disease and Movement Disorder Specialty of Neurologist Branch of Chinese Medical Doctor Association. Diagnostic Criteria for Parkinson's Disease in China (2016 Edition) [J]. Chinese Journal of Neurology, 2016, 49 (4): 268-271.

[8] Chinese Medical Association, Journal of Chinese Medical Association, General Practice Branch of Chinese Medical Association, et al. Guidelines for Primary Diagnosis and Treatment of Parkinson's Disease (Practice Edition · 2019) [J]. Chinese Journal of General Practitioners, 2020, 19 (1): 18-26.

[9] Luo Hanjiang, Li Jiayu, Liu Chengwei, et al. Effect of α-Syn overexpression on the expression of dopamine receptor D1 in substantia nigra of Parkinson's disease model mice [J]. Chinese Journal of Neuroimmunology and Neurology, 2021, 28 (1): 36-40.

[10] Xiong Jiangbo, Du Jun, Xiang Bin, et al.Changes of osteopontin, S-100β protein and matrix metalloproteinase-9 levels in patients with acute cerebral hemorrhage and their correlation with neurological function recovery and prognosis [J].Journal of Clinical Practical Hospital, 2021, 18 (5): 60-64.