AMERICAN JOURNAL OF APPLIED MEDICAL SCIENCE
ISSN: 2996-5101 (online) | ResearchBib (IF) = 9.818 IMPACT FACTOR
Volume-3| Issue-1| 2025 Published: |30-01-2025|

EVALUATION OF THE IMPORTANCE OF KLOTHO PROTEIN AND VITAMIN D IN EARLY DIAGNOSTICS OF RENAL DYSFUNCTION IN HYPERTENSION DISEASE.

https://doi.org/10.5281/zenodo.14634678

Rakhimova M.E., Sayidov K.Sh., Abduhalilova U.A.
Tashkent Medical Academy Department of Internal Medicine in Family Medicine №2. Tashkent, Uzbekistan

Abstract

In the context of this article, the prevalence of hypertension worldwide, including among the population of Uzbekistan, is explained, the consequences of which are the observed complications. Alternatively, with the development of renal dysfunction and chronic kidney disease in this disease, the effectiveness of Klotho protein and vitamin D is considered in detail.

Key words

hypertension disease, cardiovascular system disease, renin-angiotensin aldosterone system, ischemic heart disease, kidney dysfunction, chronic kidney disease, primary hyperparathyroidism, Klotho protein, vitamin D, blood pressure.

Abbreviated words

HD – hypertension disease
CVSD – cardiovascular system disease
CHKD – chronic kidney disease
BP – blood pressure
RF – risk factor
RAAS – renin-angiotensin aldosterone system
ACEI – angiotensin circulating enzyme inhibitors
IHD – ischemic heart disease
CHHF – chronic heart failure
PHPT – primary hyperparathyroidism

In the 80-90s of the 20th century, a slight decrease in the disease was achieved due to the fact that in European countries, HD prevention measures were improved and widely established on the basis of national programs. Belgium, for example, saw a decrease of 30.5% to 20% among women, 41% to 26.7% in men, and a similar result in other Western European countries. Unlike them, the number of people who have HD in the states of the Asian region is being determined to increase. In the people's Republic of China, HD was recorded to increase the total number of

patients from 19.1% to 25.8% among women, 20.2% to 28.6% in men, and 22.5% to 26.6% in Singapore, respectively [6; 7; 8; 14].

In some data, among the older population of economically developed countries, these figures reach 40%. At the same time, among adults over 65 years of age, this figure is 50-65% [10; 17].

HD is characterized by a modifiable risk factor (RF), which is important in the development of CVSD and stroke. In addition to these, this disease causes damage to the kidneys and, consequently, the development of chronic kidney disease (CHKD). This condition causes the incidence of arterial hypertension to increase. CHKD has been found in 67-71% of existing middle-aged patients, and arterial hypertension in 82% of adults, with a severe level of kidney disease accounting for 90% of this indicator [3; 7].

The high number of people with this disease among population, the high incidence of disability and fatal complications indicate that HD is an important medico - social problem [2; 3].

The increase in blood pressure (BP) in Uzbekistan was found to be higher than 60% in 13-15% of all residents, more than 30.4% in the 40-59 age group, and above 60% in the 60 + age group [1; 2; 6].

The kidneys are members with a complex structure and perform many tasks to maintain a stable state of homeostasis in the human body. In patients with HD, a in sync controls the daily changes in blood pressure during the onset of the disease. Later, in order to maintain intra-renal homeostasis, functional and then structural changes are observed in the wall of the vessels involved in the process [1; 3;9].

According to data from the available literature, almost 50% of patients with HD experience kidney dysfunction. Changes in the kidney in the early stages of the disease in most cases aggravate the course of hidden cardio-vascular diseases and increase the risk of death from them [9; 10].

Many scientific studies have confirmed that the changes observed in the kidneys of patients with HD dramatically aggravate the outcome of the disease. These changes were detected early and demonstrated in numerous observations that patients develop a severe terminal stage of CHKD without in sync treatment measures and irreversible processes occur in the body [3; 7; 16].

The change observed when HD and renal dysfunction come together allows to study the main pathophysiological mechanisms of the development of cardio-renal syndrome, the effect of renal dysfunction on the course and outcome of the underlying disease, and identify markers of its early diagnosis, develop an alternative treatment plan to improve the quality of life of patients, reduce the number of hospital recurrences and extend [14; 17].

AMERICAN JOURNAL OF APPLIED MEDICAL SCIENCE
ISSN: 2996-5101 (online) | ResearchBib (IF) = 9.818 IMPACT FACTOR
Volume-3| Issue-1| 2025 Published: |30-01-2025|

Diagnosis of HD at an early stage and carrying out measures of monand treatment, achieving targeted levels of BP not only has a positive effect on the life expectancy and quality of the population, but also provides the opportunity to prevent severe complications, including CHKD, such as cardiovascular system diseases, stroke, which are observed as a consequence [3; 7; 16].

In recent years, scientific work devoted to the study of the effect of the Klotho protein on kidney function and the course of HD has been of interest to most scientists. With age, the amount of Klotho protein decreases. In patients with CHKD, there is a decrease in the production of this protein, as a result of which degenerative processes (such as atherosclerosis, osteoporosis and skin atrophy) develop early and develop rapidly. It is released directly into the interspace of cells and is present in all biological fluids, such as blood, liquorice and urine. [13; 19; 20].

The Klotho gene is located in the kidney tissue and mainly carries out the synthesis of the α-Klotho protein. This protein has an important role in controlling the amount of phosphate in the human body. The amount of phosphates in the body is controlled by the kidneys. In healthy humans, excess phosphates are excreted in the urine and, when more is needed, the mineral is reabsorbed into the blood [19; 20].

It has been found that there is an opposite correlation between serum concentration of Klotho protein and CVSD complication. Alternatively, some scientific studies have observed continuity between a decrease in its amount and a deterioration in kidney function [20].

Since a number of years, active scientific research has been carried out on the study of the mechanisms of vitamin D production and its metabolism in the human body and its application in clinical practice [5; 8; 16; 19].

In research studies, it is found that vascular wall stiffness is one of the main causes in the mechanism of development of atherosclerosis. Vitamin D deficiency enhances this process, reduces the rigidity of the vessel wall. As a result of this, the pressure of the pulse wave on the strained vessel wall increases. As a result, the endothelium of the vascular wall is damaged, atherosclerosis gradually develops in the dressing stage and leads to an exacerbation and complication of HD [8; 13; 15].

Vitamin D belongs to the group of fat-soluble vitamins, is absorbed by the body with food, in addition, it is synthesized on the skin under the influence of ultraviolet rays of the sun. In two steps, hydroxylate undergoes active storage. The first stage of activation is performed in the liver, and the second stage is performed in the kidneys. The decrease in vitamin D in the body affects calcium metabolism, as a result of which the renin-angiotensin-aldosterone system is activated, endothelial dysfunction and metabolic syndromes occur [5; 8; 16; 19].

In the 70s of the 20th century, the discovery of mechanisms for the exchange of vitamin D in the body, the active production, metabolites and their analogues attracted attention from researchers, learning and application in clinical practice began to spread rapidly. [4].

It is known that through the renin-angiotensin - aldosterone system (RAAS), vascular contractility, electrolyte content in the blood, water and salt metabolism are controlled. Activation of this system has a significant effect in the pathogenesis of BP elevation. Through numerous scientific studies, vitamin D has been found to have counter-effects on the activity of this system. In studies conducted, the above-mentioned change was eliminated when given angiotensin II antogonist receptors or angiotensin circulating enzyme inhibitors (ACEI). The fact that a decrease in renin synthesis under the influence of Vitamin D was carried out in Chol, independent of calcium homeostasis and water-salt metabolism, was the reason for the awakening of interest by scientists [12, 18].

It is known that patients with HD, ischemic heart disease (IHD), chronic heart failure (CHHF) are forced to lead a low-risk lifestyle in most cases, and that walking out of the house is extremely rare affects the development of vitamin D deficiency in them to some extent. This in turn causes the underlying disease to escalate as well as complications.

Studies in recent years have concluded that patients with PHPT have high plasma renin activity and plasma aldosterone levels in patients with HD. These patients then experienced a decrease in the concentration of AP, plasma-containing renin, and aldosterone after thyroid surgery [12, 21, 22].

An analysis of the available literature shows that vitamin D deficiency has been found in 45-50% of the world's population. Comorbid disorders such as diabetes mellitus, obesity, as well as the presence of vitamin D deficiency in patients with HD, along with hereditary predisposition, low malaise, irritability and other risk factors, cause the disease to escalate, complicate and increase the number of hospital recurrences. Taking into account the above information, these groups, together with the universally accepted methods of examination in patients, make it possible to determine the amount of vitamin D in the blood serum and carry out treatment and preventive measures on the basis of the need to improve the outcome of the disease.

Conclusion: The analysis carried out confirms that HD and kidney damage in it are one of the most common pathological conditions in the world. The data obtained and the conclusions made make it possible to early diagnosis of kidney dysfunction in patients with HD to prevent the development of CHKD, improve the quality of life of patients and prolong life, and prevent sudden death cases. In

the early diagnosis of HD exacerbation and kidney damage as a result of this disease, the determination of Clotho protein as well as vitamin D, along with generally accepted examinations, has a significant effect. It is advisable to conduct additional scientific research in this regard, taking into account the above.

USED LITERATURE

1. Аляви А.Л., Сабирджанова З.Т. Диагностика, лечение и профилактика артериальной гипертензии. Ташкент, 2018.

2. Гадаев А.Г., Рахимова М.Э., Абдухолиқов О. З. Стабил зўриқиш стенокардияси билан оғриган, юқори хавф грухидаги беморларда буйрак дисфункциясини эрта ташхислаш. Тошкент тиббиет академияси ахборотномаси. 2023 й. №11. Б. 90-95б.

3. Зуева Т. В.,. Жданова Т. В. Артериальная гипертензия при хронической болезни почек: современное состояние проблемы. /Лечащий врач № 9/2020; С11-14.

4. Calvo M.S., Whiting S.J., Barton C.N. Vitamin D intake: a global perspective of current status. J Nutrit 2021; 135(2): 310-6.

5. Каронова Т.Л., Андреева А.Т., Злотникова Е.К., Гринева Е.Н. Недостаточность витамина D и артериальная гипертензия: что общего? Артериальная гипертензия. 2017; 23 (4): 275-81.

6. Қурбонов Р.Д., Ҳамидуллаева Г.А.; Артериал гипертония. “Ноширлик юлдузи” Т., 2017.

7. Леонова МВ. Европейские рекомендации по лечению артериальной гипертензии 2023 года: новые тенденции. *Медицинский совет*. 2024;18(5):30–39. https://doi.org/10.21518/ms2024-090.

8. Лысцова Н.Л., Петелина Т.И., Гапон Л.И., Авдеева К.С., Быкова С.Г., Суплотов С.Н. Роль витамина D в патогенезе развития артериальной гипертонии. Клиническая лабораторная диагностика. 2020; 65 (1): 5-10.

9. Муркамилов И.Т., Айтбаев К.А., Фомин В.В., Муркамилова Ж.А., Астанин П.А., Юсупова Т.Ф., Юсупов Ф.А. Поражения почек при гипертонической болезни. Клиническая медицина. 2023;101(11):569-576. https://doi.org/10.30629/0023-2149-2023-101-11-569-576

10. Об актуальных проблемах борьбы с сердечно-сосудистыми заболеваниями / О. Б. Аникеева, О. В. Павленко, С. Н. Титов, Е. А. Фалецкая. – Москва, 2015. – 108 с.

11. Чазова И. Е., Жернакова Ю. В. [от имени экспертов]. Клинические рекомендации. Диагностика и лечение артериальной гипертонии. Системные гипертензии. 2019;16 (1):6–31.

12. Медведев В.А., Доян Ю.И., Брутян Г.С. Роль витамина D в патогенезе острых и хронических нарушений мозгового кровообращения. Эффективная фармакотерапия. 2023; 19 (24): 16–20. DOI 10.33978/2307-3586-2023-19-24-16-20

13. Dobnig H, Pilz S, Scharnagl H, et al. Independent association of low serum 25-hydroxyvitamin d and 1,25-dihydroxyvitamin D levels with all-cause and cardiovascular mortality. Arch Intern Med. 2018; 168:1340-49. https://doi.org/10.1001/archinte.168.12.1340.

14. Mancia G, Kreutz R, Brunstrom M, Burnier M, Grassi G, Januszewicz A et al. 2023 ESH Guidelines for the management of arterial hypertension The Task Force for the management of arterial hypertension of the European Society of Hypertension: Endorsed by the International Society of Hypertension (ISH) and the European Renal Association (ERA). *J Hypertens.* 2023;41(12):1874–2071. https://doi.org/10.1097/HJH.0000000000003480.

15. Melaku L, Mossie A. Molecular mediators and controlling mechanism of vascular calcification. Int J Clin Exp Physiol. 2017; 4:3-14. https://doi.org/10.4103/ijcep.ijcep_3_17.

16. Riemer TG, Villagomez Fuentes LE, Algharably EAE, Schafer MS, Mangelsen E, Furtig MA et al. Do β-Blockers Cause Depression?: Systematic Review and Meta-Analysis of Psychiatric Adverse Events During β-Blocker Therapy. *Hypertension.* 2021;77(5):1539–1548. https://doi.org/10.1161/

17. Unger T, Borghi C, Charchar F, Khan NA, Poulter NR, Prabhakaran D et al. 2020 International Society of Hypertension Global Hypertension Practice Guidelines. *Hypertension.* 2020; 75(6):1334–1357.

18. Li Y.C., Qiao G., Uskokovic M., et al. Vitamin D: a negative endocrine regu lator of the renin- angiotensin system and blood pressure. J Ster Biochem Molec Biol 2020; 89-90: 387-92.

19. Yoshikawa R., Yamamoto H., at al. The age-related changes of dietary phosphate responsiveness in plasma 1,25-dihydroxyvitamin D levels and renal Cyp27b1 and Cyp 24a1 gene expression is associated with renal α-Klotho gene expression in mice. J. Clin. Biochem. Nutr., 2018, vol. 62, no. 1, pp. 68–74.

20. Zou D., Wu W., He Y., Ma S., Gao J. The role of klotho in chronic kidney disease. BMC Nephrol, 2018, vol. 19, no. 1, Article number: 285. doi: 10.1186 / s12882-018-1094-z.

21. Brown LL, Cohen B, Tabor D, Zappala G, Maruvada P, Coates PM. The vitamin D paradox in Black Americans: A systems-based approach to investigating clinical practice, research, and public health—expert panel meeting report. BMC Proceedings, 2018;12(Suppl 6):6

22. Gennari C., Nami R., Gonnelli S. Hypertension and primary hyperpara thyroidism: the role of adrenergic and renin-angiotensin-aldosterone systems. Min and Electrol Metab 2019; 21(1–3): 77-81.