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Comprehensive Screening for Anemia

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Abstract In the field of healthcare, the assessment of patients' conditions plays a crucial role in providing timely and accurate treatment. Traditionally, the assessment process begins from the moment a patient is admitted to the hospital. In a recent study conducted on a group of 100 patients, we delved deep into the complaints and medical history of each individual to gather insightful data on the prevalence and severity of anemia. Upon thorough examination, we found that the duration of illness varied among the patients. Only 19 individuals had been suffering from anemia for more than 10 years, while 50 patients had a history of 1-5 years with the condition. Additionally, 31 patients had been diagnosed with anemia for 5-10 years, indicating a diverse range of experience with the disease. Interestingly, we observed that the early detection of anemia, particularly in its Stage I (mild severity) form, was noted within 3-5 years for 22 participants. However, 13 individuals were diagnosed after more than 10 years, and 16 were diagnosed within 1-3 years. As the disease progressed to Stage II (moderate severity), we observed an equal distribution among participants with a long-standing diagnosis of more than 10 years and those diagnosed for 5-10 years. Among those with moderate-severity anemia, the duration of illness ranged from 2 to 5 years. During the study, we conducted thorough clinical and laboratory investigations to ascertain the severity of anemia among the participants. The results revealed an average hemoglobin level of 73.9±1.99 g/l. When categorizing the severity of anemia based on hemoglobin levels, we found that 51 individuals fell under the mild category with a hemoglobin level of 91.9±0.27 g/l. Thirty-four participants were classified as having moderate-severity anemia, with a hemoglobin level of 62.7±0.46 g/l, and 15 individuals were diagnosed with severe anemia, characterized by a hemoglobin level of 44.4±0.86 g/l. One of the most intriguing findings of our study was the diagnosis of Stage III (severe) anemia exclusively in individuals with a disease duration of more than 10 years. This sheds light on the importance of early detection and timely intervention in managing the progression of the disease. Additionally, the correlation between hemoglobin levels and the severity of anemia underscores the significance of regular monitoring and appropriate treatment protocols for patients.

Keywords Anemia, Diagnosis, Treatment, Severity of the disease, Blood diseases

1. Introduction

Anemia is a condition characterized by a decrease in the level of hemoglobin, leading to the inability to meet the body's physiological oxygen needs [1]. The World Health Organization (WHO) defines specific hemoglobin values (120 g/L for women and 130 g/L for men), the reduction of which allows for the diagnosis of anemia.

Research from the past two decades indicates a high prevalence of anemia in older age [2-4]. Furthermore, there is a noted trend of increasing anemia frequency with age: from 10–15% in the 65–74 age group to 20–25% in the 75–84 age group, peaking at 26–50% in those aged 85 and above [5-7]. It is well known that advancing age brings a heightened risk of developing geriatric syndromes (GS) – multifactorial age-associated clinical conditions that diminish quality of life, elevate the risk of adverse outcomes (death, dependence on external assistance, recurrent hospitalizations, long-term care needs), and lead to functional impairments [8]. In the past five years, there has been an emergence of publications in international journals that examine anemia as an independent GS [9,10].

The perspective on anemia in older individuals is well-founded, as a decrease in hemoglobin levels leads to a decline in both functional and cognitive statuses. This is associated with an increased risk of falls and fractures, sarcopenia, malnutrition, depression, ultimately resulting in a higher frequency of developing asthenia and reducing a person's level of independence at any age. It also raises the likelihood of unfavorable outcomes, including mortality [7,11-16].

However, there is still a lack of epidemiological data on the prevalence of anemia in the population of our country. A

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sub-analysis was conducted on patients with anemia as part of the research, the results of which are presented in this article.

The research objective is to assess the prevalence of chronic anemia (CA) and analyze its associations with biochemical blood parameters among individuals of varying age groups.

2. Material and Method Research

In the context of the implementation of therapeutic and preventive measures, the condition of people suffering from anemia was studied in three groups: the first group (n=17) - with mild anemia in traditional treatment; the second group (n=17) (mild anemia) received traditional pharmacotherapy together with "Hemofen". The third (n=17) (mild anemia) was treated with Hemofen.

The following parameters were analyzed using the Human RX biochemical analyzer by Human Diagnostics RX series (Germany): hemoglobin level, serum total iron binding capacity, serum iron level and transferrin saturation (TSS).

3. Results and Their Discussion

The assessment of patients' condition traditionally began from the moment they were admitted to the hospital. We investigated the complaints of all patients (n=100). During the patient interviews, we found that only 19 patients had been ill for more than 10 years, 50 had been ill for 1-5 years, and 31 had been diagnosed with "anemia" for 5-10 years. Upon examining the duration of the illness, it was observed that 19 individuals had been affected by the disease for more than 10 years, 50 had a duration of 3-5 years, and 21 had been diagnosed with the condition for 5-10 years. The early detection of the disease we studied, which presented as a rapidly progressing Stage I (mild severity) form, was noted within 3-5 years for 22 participants. In our research, 13 individuals were diagnosed with this condition after more than 10 years, and 16 individuals were diagnosed within 1-3 years. Upon careful examination of the progression of anemia to stage II (moderate severity), we observed an equal number of participants, with 7 individuals in both the group of individuals with the diagnosis for more than 10 years and those with the diagnosis for 5-10 years. Among the 20 individuals diagnosed with moderate-severity anemia, the duration of illness varied from 2 to 5 years respectively. Surprisingly, stage III (severe) anemia was only diagnosed in individuals with a disease duration of more than 10 years.

A qualitative medical examination showed that most patients complained of dizziness (45 people), increased fatigue (89 people), brittle nails (88 people), taste bud perversion (41 people), dry skin (79 people), brittle hair (65 people), sleep disturbances (82 people), loss of appetite (81 people), sweating (64 people), darkening of the eyes (75 people) and general weakness (37 people), memory impairment (19 people). 82 of the examined people complained of temporary shortness of breath. Many of them associated the appearance of the listed symptoms with diagnosed anemia. The frequency of complaints increased with an increase in the duration of the disease.

During lung auscultation of the majority of patients diagnosed with anemia, a decrease in breath sounds was identified in 80 individuals. When using a stethoscope to listen to the lungs, accelerated and heavy breathing, as well as rapid heartbeat, were heard in 42 patients, and expiratory wheezes were present in 32 patients. Heart murmurs were observed in 27 of the examined individuals.

Thus, the complaints mostly coincided with the symptoms of the main disease - anemia. Furthermore, it was found that patients considered themselves sick before seeking treatment at the clinic, most commonly for less than 5 years, and almost all received conservative treatment at local medical facilities.

During the study, we obtained interesting results of clinical and laboratory studies. Thus, the obtained results indicated that the average hemoglobin level was 73.9±1.99 g/l. When diagnosing the severity of anemia, the following hemoglobin level results were obtained: mild - 91.9±0.27 g/l (51 people), moderate - 62.7±0.46 g/l (34 people), and severe - 44.4±0.86 g/l (15 people).

In our research, we observed a mild form of anemia in 42.1% of the individuals examined, whose duration of illness did not exceed 5 years, while the average severity of anemia was diagnosed in 58.8%, and the severe form was not observed in this category of patients. Patients with the pathology we studied lasting between 5 and 10 years exhibited a mild form in 31.4% and a moderate form in 20.6%. Among individuals diagnosed with anemia for more than 10 years, only severe anemia was observed, accounting for 15% of the total number of individuals examined by us.

Table 1. Assessment of the severity of anemia depending on the duration of the disease

Indicator	General			Light			Average			Heavy		
	abs.	M±m	%	abs.	M±m	%	abs.	M±m	%	abs.	M±m	%
Total	100	73,9±1,99	100	51	91,9±0,27	51	34	62,7±0,46	34	15	44,4±0,86	15
up to 5 years	42	78,0±2,31	42	22	92,0±0,4	43,1	20	62,7±0,54	58,8	0	0±0	0
5-10 years	23	83,0±2,85[a]	23	16	91,7±0,53	31,4	7	63,1±1,37	20,6	0	0±0	0
More than 10 years	35	65,7±3,67[b,c]	35	13	91,9±0,51	25,5	7	62,4±1,04	20,6	15	44,4±0,86	100

Explanation: [a] – reliability in relation to the total number of studied (p≤0,01);
[b]- Reliability for anemia diagnosed up to 5 years (p≤0,01);
[c]- Reliability for diagnosed anemia 5-10 years (p≤0,001).

Table 2. With the use of certain types of medical and preventive measures for mild anemia assessment of changes in blood parameters

Period	Traditional		Traditional + "Hemofen"		"Hemofen"	
	M±m	P	M±m	P	M±m	P
	Hemoglobin (Hb) (120-160 g/l)					
Before treatment	91,6±0,53	-	92,0±1,97	-	91,9±0,41	-
12 days	92,1±1,25	-	94,2±0,82	-	97,2±0,67	-
30 days	99,5±1,6 [а,б]	0,001	105,3±1,48 [а,б]	0,001	103,1±1,34 [а,б]	0,001
60 days	108,1±1,83 [а,б,в]	0,001	119,1±1,57 [а,б,в]	0,001	117,7±1,31 [а,б,в]	0,001
Iron-binding capacity of serum (45.3-77.1 μmol / l)						
Before treatment	82,5±0,52	-	82,6±0,4	-	82,7±0,63	-
12 days	81,8±0,78	-	81,1±0,72	-	81,6±0,66	-
30 days	79,8±1,02 [a]	0,05	74,1±1,23 [а,б]	0,001	76,4±0,96 [а,б]	0,001
60 days	76,5±1,54 [а,в]	0,01	68±1,64 [а,б,в]	0,001;0,01	71,9±1,27 [а,б,в]	0,001;0,01
Serum iron (4.8-5.9 μmol / l)						
Before treatment	3,0±0,26	-	3,1±0,24	-	2,9±0,25	-
12 days	3,1±0,28	-	3,5±0,28	-	3,2±0,28	-
30 days	3,4±0,29	-	4,0±0,29 [a]	0,05	3,5±0,31 [b]	-
60 days	3,8±0,31 [a]	0,05	4,6±0,27 [a,b]	0,001;0,01	4,1±0,29 [a,b]	0,01; 0,05
Transferrin saturation with iron (16-47%)						
Before treatment	9,9±0,21	-	10,0±0,15	-	10,0±0,16	-
12 days	10,0±0,24	-	10,4±0,16	0,001	10,3±0,2	-
30 days	10,5±0,26 [b]	-	13,1±0,43 [a,b]	0,001	11,2±0,26 [a,b]	0,001;0,01
60 days	11,2±0,34 [a,b]	0,01	15,6±0,59 [a,b,c]	0,001	12,3±0,41 [a,b,c]	0,001;0,05

Note: [a] – reliability compared to the number before treatment (p≤0,01; p≤0,05; p≤0,001);
[b]- reliability compared to 12 days after the start of treatment (p≤0,01; p≤0,001);
[c]- reliability compared to 30 days after the start of treatment (p≤0,01; p≤0,05; p≤0,001);

In order to implement therapeutic and preventive measures, individuals suffering from anemia were divided into eight groups: the first group (n=17) - with mild anemia, the fourth group (n=11) with moderate anemia and the seventh group (n=7) with anemia. in severe cases, in traditional treatment; the second group (n=17) (mild anemia), the fifth (n=11) (moderate anemia) and the eighth group (n=8) (severe anemia) received traditional pharmacotherapy together with "Hemofen". The third (n=17) (mild anemia) and sixth (n=12) (moderate anemia) groups were treated with "Hemofen".

Demographic data, adverse events, hemoglobin (Hb), TIBC, SI, and TSI were compared with the patients' parameters before the start of treatment and preventive measures, as well as 12 days after the end of therapy, 30 and 60 days. As indicated above, patients with mild anemia were divided into groups receiving traditional therapy, traditional therapy in combination with the dietary supplement "Hemofen", and a group receiving the dietary supplement "Hemofen". In patients after the treatment measures, on the 12th day from the start of treatment measures, an increase in the concentration of hemoglobin in the blood serum was noted in all groups by 0.5%; 2.4% and 1.4%. After 30 days, the concentration in all examined groups continued to increase dynamically (92.1±1.25; 94.2±0.82; 93.2±0.67 versus 99.5±1.6; 105.3± 1.48; 103.1±1.34), respectively (p<0.001). The second group showed the best result compared to the comparison groups. On the 60th day, when studying the hemoglobin concentration indicators in the first group, we observed an increase of 18%. We observed interesting indicators in the group receiving Hemofen, where the difference with the initial data was 28.1%, which is higher than the indicators in the group with traditional therapy. In the second group, the data showed the best result, i.e. the difference between the hemoglobin concentration indicators in the blood serum before the start of therapy and after its completion after 60 days was 29.5%. As is known, the hemoglobin level returns to normal after 6-8 weeks. Treatment of mild anemia usually lasts 3 months, the reason for which is that the hemoglobin level in the second month was lower in all study groups, but in the second group, which received combined treatment, by the end of our study, the indicators were close to normal, and in the group receiving only "Hemofen", they were higher than the results of the first group by an average of 9.6 g/l, but lower than the results of the second group by 1.4 g/l.

When studying the total iron-binding capacity, we observed a similar picture as when studying the concentration of hemoglobin in the blood serum in mild anemia. Thus, in the first group, the total iron-binding capacity indicators decreased by 0.85%; 3.3% and 7.3%, respectively. In the second group, they were lower than the initial results by 1.8%; 10.3% and 17.7%, which is higher than the results of the group receiving traditional therapy. It was interesting to observe the results of the group receiving the new domestic dietary supplement "Hemofen". The results showed a positive

effect, i.e. the results of the parameter we studied were lower than the indicators before the start of treatment by 1.3%; 7.6% and 13.1%.

In our studies, we considered it necessary to study the total iron-binding capacity of serum (TIBC), since it is one of the main precursors to the study of anemia. The following reference values are established for TIBC: 45.3-77.1 μmol / l. In our studies, TIBC is higher than the reference values by 7.4%, respectively. The serum iron (SI) test shows the level of iron in the blood serum and allows you to determine the deficiency or excess of iron. In addition, it is used in monitoring studies, differential diagnostics of anemias and control of the effect of their treatment. If the normal values of SI are 4.8-5.9 μmol / l, then in our studies they were lower than the normal values by 49.2%. A significant decrease in the concentration of iron in the blood serum is observed with iron deficiency in the body, however, determining the amount of iron in the serum is not enough to diagnose latent anemia.

Transferrin saturation with iron and serum iron are also of great importance both in diagnostics and in therapeutic measures for anemia of varying degrees. In our studies, serum iron in all groups tended to increase by 0.1; 0.4 and 0.3 μmol/l compared to the results obtained before treatment, when the transferrin saturation values with iron in this period of the study exceeded the initial values by 0.1; 0.4 and 0.3%, respectively. A month later, we obtained the following values, which constantized the increase in serum iron by 1.13; 1.29 and 1.2 times. The data obtained at this stage of the study showed similar results for the first and third groups. The results of the concentration of transferrin saturation with iron in the blood serum also showed an increase at this time in all groups compared to the previous values by 0.5; 2.7 and 0.9%. On day 60 of our study, the results of the second group were similar in both serum iron and iron-saturated transferrin, and the serum iron and iron-saturated transferrin values of the first and third groups were higher than the baseline values by 26.7; 41.4% and 1.3; 2.3%.

Therefore, we used this test in our study, knowing that it is necessary to determine the iron saturation coefficient of transferrin. The transferrin saturation coefficient is one of the indicators of microelement metabolism in the body. If iron deficiency anemia is suspected, it is prescribed in combination with other laboratory tests. From 16 to 47% of the transferrin coefficient in percent is determined as the norm. According to our data, this indicator was reduced to 10% accordingly.

4. Conclusions

A comprehensive assessment of patients' conditions, such as anemia, is crucial in guiding healthcare professionals towards effective diagnosis and treatment strategies. By delving deep into the duration of illness, early detection, disease progression, and clinical findings, we can gain valuable insights that can aid in improving the overall management of anemia and enhancing patient outcomes.

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