

Anemia Study in Elderly Population

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Received: 15-10-2022 / Revised: 15-11-2022 / Accepted: 11-12-2022

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Conflict of interest: Nil

Abstract

Anemia is very common in elderly people. Anemia is a sign and not a diagnosis and evaluation is always warranted to identify the etiology in this age group. The purpose of the study was to find the clinical profile of the elderly patients with anemia and to study the characteristics of the hematological type of anemia and the closest possible etiological profile. Total of 110 patients above the age of 60 attending OPD/IPD/emergency were included in the study. Detailed clinical history taken and physical examination done followed by relevant laboratory investigations were conducted on all the patients. Most of the patients had normocytic type of anemia on peripheral smear examination, renal failure was the most common underlying chronic disease. A significant proportion of the patients was on long term use of NSAIDs which could contribute to gastrointestinal blood loss and microcytic anemia in the elderly. 73.3% of the patients in microcytic group had an underlying GI lesion on endoscopy. 14% of the patients had an underlying malignancy. So, it is clear anemia in the elderly should not be considered an ageing process and its detection should prompt the physician to plan the relevant investigation to detect the etiology and treatment plan. Early detection and management of anemia in elderly people would improve the quality of life as well as decrease morbidity and mortality.

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Introduction:

Anemia is defined as a decrease in the number of circulating red blood cells or reduced amount of hemoglobin concentration than the normal value in the blood. In elderly persons anemia is frequently encountered as a clinical entity or an incidental diagnosis contributing to general incapacity. The WHO criteria for anemia are a hemoglobin concentration of less than 13 gm/dl in males and 12 gm/dl in females [1]. The NHANES -III study conducted by WHO in the United States found the prevalence of anemia in persons older than 65 years of age to be 11% in males and 10.2% in females rising to 20%

in persons older than 80 years of age [2]. The effects of anemia in elderly include a wide spectrum of conditions such as increased risk of mortality [3,8]. Cardiovascular morbidity, depression, cognitive decline, dementia [4,5,9,10] longer hospitalization, falls and fractures and low bone density, decreased physical activity [6,14]. Etiology of anemia is different in elderly people as compared to younger people. Several studies have focused on the cause of anemia in this age group and found that in a significant number, a complex interplay of factors contributes to the condition including

nutritional deficiency, chronic inflammation causing the functional iron deficiency, gastrointestinal blood loss, myelodysplasia, malignancies, and declining kidney function with erythropoietin deficiency. In some elderly patient's anemia remains unexplained.

Aims and objectives: To study the clinico hematological and etiological profile of anemia in persons who are 60 years or more of age.

Material and Methods

All persons who were 60 years or more of age attending OPD/Emergency/IPD at MMIMSR, Mullana, Ambala were enrolled in the study. A total number of 110 cases was studied. Ethical clearance in compliance with the applicable norms was obtained from the ethical committee of the hospital and written consent from all the enrolled patients was obtained on prescribed proforma. Elderly people were defined as those having attained the age of 60 years or more[7]. It was an observational prospective hospital-based study conducted between April 2018 to May 2019.

Inclusion criteria: All persons 60 years or greater in age visiting OPD, admitted in IPD or emergency of the hospital in whom anemia was diagnosed Hb concentration of less than or equal to 13gm / dl in males and 12 gm dl in the females as per the WHO criteria.

Exclusion criteria: 1- Persons, who refused consent for evaluation, 2- Persons, who were in the institute due to trauma or gave history of major trauma or surgery in the past 3 months. 3- Persons. who were critically ill and could not be subjected to extensive evaluation. 4- Patients, who were on myelosuppressive drugs.

Patients complete history including demographic data, symptoms at presentation, history of worm infestation, history of diabetes, hypertension osteoarthritis, blood transfusion, drug history, dietary history were recorded. A

detailed physical examination was performed on all the subjects. Subjects were undergone basic and other relevant investigations for the workup of anemia after integrating the clinical picture and general physical examination.

Symptoms: Breathlessness, generalized weakness, easy fatiguability, blood in stools, black coloured stools, worm in stools were asked. History of drug use e.g, analgesics (NSAIDs) methotrexate were recorded. History of diabetes mellitus, hypertension, CAD, cerebral vascular accident, hemorrhoids, rheumatoid arthritis, osteo arthritis, were obtained. In personal history smoking habits, alcohol intake enquired, dietary history of vegetarian/non-vegetarian was asked. Investigations were advised-CBC, RBC indices, General blood picture, ESR, reticulocyte count, LDH, fasting blood sugar, blood sugar (PP), RFT, LFT, Thyroid function test, Lipid profile, Stool for occult blood, serum ferritin, percent saturation, total iron binding capacity, chest x-ray, ultrasound abdomen, UGI Endoscopy, colonoscopy, bone marrow examination, vitamin B12, folate level, ANA, lymph node biopsy, CT /MRI (where indicated) recorded. The blood samples were collected in sterile ED tubes and sent to the lab and measurements were done with an automated system.

Anemia was defined according to WHO criteria as a hemoglobin concentration of lower than 13gm / dl in men and 12 gm/dl in women which is further graded into mild, moderate, and severe anemia. In males Hb level of 11- 12.9 gm/ dl categorised as mild anemia, Moderate anemia with Hb levels of 8-10.9 gm/dl and severe anemia with Hb level lower than 8 gm / dl. In women mild anemia is Hb level of 11- 11.9 gm/dl, moderate anemia is Hb level of 8-10.9 gm/dl and severe anemia is Hb level lower than 8 gm/dl.² Iron deficiency anemia in elderly people is defined as low serum iron lower than (50 micro gm/dl in women and 60 micro gm/dl in men, low ferritin, lower

than 15 nano gm/ml, low transferrin saturation rate, lower than 16%, increased total iron binding capacity higher than 450 micro gm/ dl or absence of bone marrow hemosiderin and transferrin is increased. In anemia of chronic disease serum iron and transferrin saturation levels are reduced while serum ferritin and marrow stainable iron are increased. The reduced transferrin saturation is because of increased production of transferrin and decreased serum iron.

Megaloblastic anemia is defined as increased mean corpuscular volume (MCV)>115, anisocytosis, poikilocytosis, hyper segmented neutrophils, macro ovalocytes RBC in the peripheral blood smear followed by low serum B12 levels and folate levels. Clinical and hematological improvement on receiving injection B12 and oral folic acid by persons

is also considered diagnostic of megaloblastic anemia. Folic acid level lower than 3 nano gm/ml was suggestive of folic acid deficiency anemia and vitamin B12 level lower than 200 pgm/ml was diagnostic of vitamin B12 deficiency anemia. Hematological malignancy was diagnosed as per the guidelines laid down in wintrobe’s clinical hematology. Anemia was further classified according to mean corpuscular volume (MCV) as normocytic normochromic 80-100 fl, microcytic hypochromic MCV<80 and macrocytic anemia >100. [1] Dimorphic anemia was morphologically characterized by two circulating red cell populations on peripheral blood smear. One population could be microcytic hypochromic and the other either normocytic or macrocytic.

Results

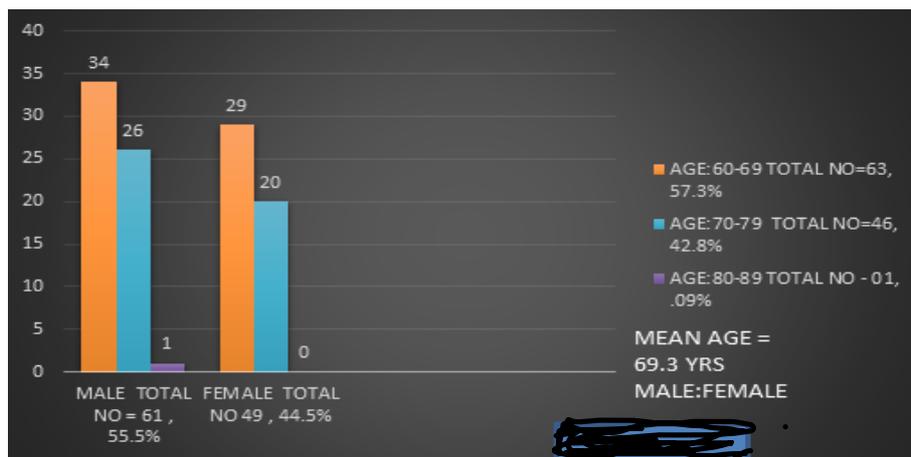


Figure 1: Distribution of anemia according to age and sex

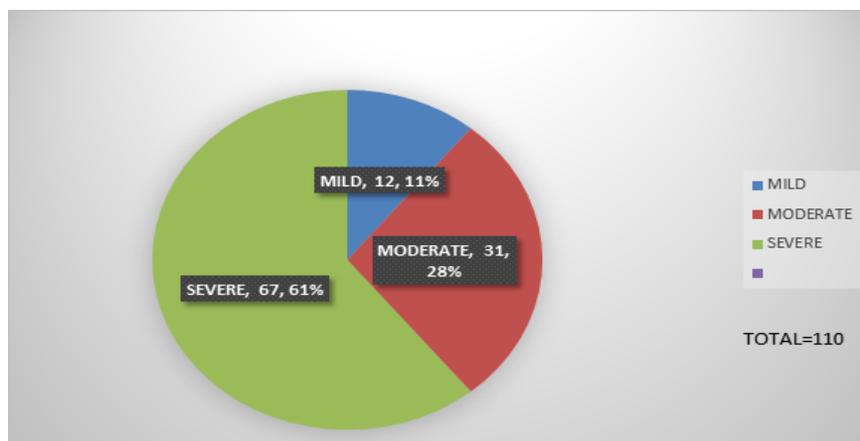


Figure 2: Distribution of patients according to the severity of anemia

Clinical profile of anemic patients:

The clinical profile included easy fatiguability in 90% of the cases, breathlessness in 89% of cases, swelling bilateral feet in 75%, decreased appetite in 60%, generalized weakness in 66%, bleeding in 17%, dizziness in 31%, pain B/L legs in 32%, paresthesia in 25%, headache in 14%, fever in 11%, pain

abdomen in 8% and bone pain/myalgia/arthritis in 4% cases.

Physical signs of anemic patients:

The physical sign included pallor presence in 70%, peripheral edema in 30%, glossitis in 12%, lymph adenopathy in 14%, splenomegaly in 18%, hepatomegaly in 8%, hepatosplenomegaly 6%, koilonychia in 20% and platynychia in 12% cases.

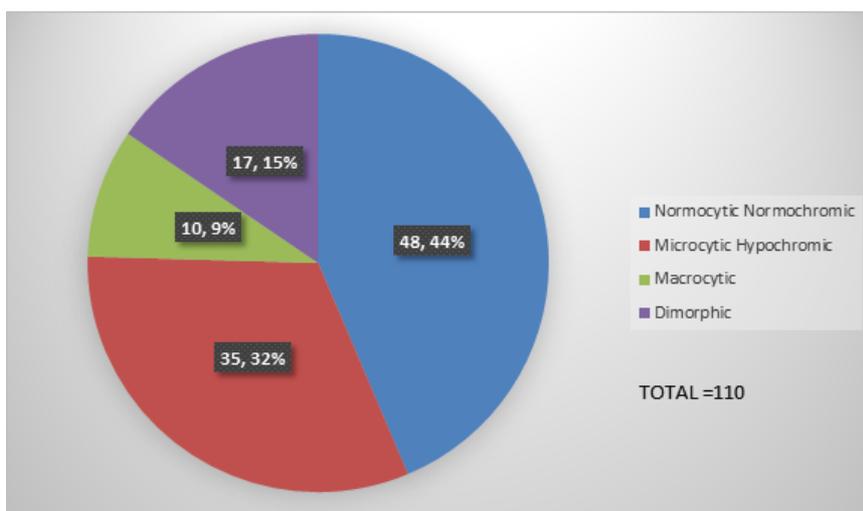


Figure 3: Distribution according to the pattern of anemia

Etiology

Table 1: Etiology of normocytic anemia

Anemia of chronic disease	
Solid tumor malignancy	4
Chronic liver disease	5
Chronic infections (tuberculosis, liver abscess, pulmonary aspergillosis)	7
Chronic inflammatory conditions (rheumatoid arthritis, polymyalgia rheumatica)	5
Myelodysplasia	4
Multiple myeloma	3
Non hodgkin lymphoma	3
Chronic lymphocytic leukemia	4
Unexplained cause	2
CKD	11
TOTAL	48

Table 2: Etiology of microcytic anemia

Chronic gastritis	3
Peptic ulcer disease with bleed	1
Esophagitis with hiatus hernia	1
Ca esophagus	1
Celiac disease	1
Esophageal varices	1
Worm infestation	2
Anemia of chronic disease (hepatitis C)	1
Beta thalassemia	1
Total	12

Lower GI lesion

Adenocarcinoma	1
Colon carcinoma	2
Hemorrhoids	2
Carcinoma rectum	3
Total	8

Table 3: Etiology of macrocytic anemia

Folic Acid deficiency	1
Vitamin B12 deficiency	3
Myelodysplastic syndrome	2
Hypothyroidism	3
Alcoholic liver disease	1
Total	10

Table 4: Etiology of dimorphic anemia

Duel deficiency of iron and vitamin B12/folate	9
Myelo dysplastic syndrome	3
Post blood transfusion to a patient with hypochromic anemia	3
Unexplained	2

Discussion

Anemia is a common clinical phenomenon seen in the elderly population in the community. A high prevalence of anemia is seen among hospitalized or institutionalized elderly individuals. [1] However comorbidities make the casual diagnosis difficult. [2] In our study a maximum number of anemic patients fall in the age group of 60-69 years i.e. 57.3% followed by age group of 70-79 years i.e.42.8%. Similar results are found in two more Indian studies done by Bhasin et al. [3] and Srivastava et al [4] where maximum number of patients were seen in the age group of 60-69 years. Another study done by Vijai Tilak et al. [5] reported maximum

number of elderly patients with anemia in the age group of 60-65 years with mean age 64.6 years. The mean age of the patients was 64.48 ± 4.04 in our study. However, in various international studies the mean age of anemic elderly patients was 75.9 to 76.9 years. Dharmarajan et al [6] found a maximum number of elderly anemic patients in the age group of 70 -79 years. Tay et al [7] reported maximum cases in 75-84 years age group. This discrepancy in age between Indian and western studies is because of the differences in life expectancy which is low in India as compared to the west.

In our study anemia was more prevalent in elderly males (55.45%) than elderly

females (44.55%) with a ratio of 1.2:1. Dheeraj Sharma et al [8] reported male to female ratio of 1.6:1. A study done by Bhasin et al [3] also noted male preponderance (52% males, 42% females). Srivastava et al [4] observed geriatric anemia more in elderly males than females (60% males, 40% females). The Third National Health and Nutrition Examination Survey (NHANES III) study [9] also found an increased incidence of anemia in males than females older than age 65 years (11% and 10%) respectively.

Thus geriatric anemia is a unique anemia where male preponderance is more than the female in contrast to the anemia in younger adults where the incidence of anemia is more in females as compared to males. The onset of menopause in elderly females might be one of the reasons for this observation. To define anemia in the geriatric population same WHO cut-off values are applied as we use in young adults. A number of times it has been questioned is it still logical to diagnose anemia in geriatric population with a similar WHO cut-off used to define anemia in adults especially in geriatric females as physiology changes in the female after menopause [10]. Mcleman et al have observed that in postmenopausal women the Hb concentration increases by 0.6gm/dl per decade. [11]

The mean Hb was 7.9 ± 1.8 gm/dl with a range of 3.5 to 13 gm/dl. Majority of the elderly patients present with severe anemia i.e. 67(60.91%), 31(28.18%) with moderate anemia and 12(10.91%) with mild anemia. Dharmarajan et al [6] and Bosco et al [9] reported mild anemia in most of the cases. Demographic and socioeconomic conditions might be the main reason for this variation. The most common symptom in elderly patients was easy fatigability-90% followed by breathlessness-89%, decreased appetite -60%, pain bilateral legs -32.3%, dizziness-31%, paresthesias-25%, headache-14%, fever-11.4%, bleeding-11%, pain abdomen-8%, bone pain,

myalgia, arthralgia 4%. On physical examination, pallor was present in 70% of elderly anemic patients followed by edema (peripheral edema) 21.9%, glossitis 7%, lymphadenopathy 4%, splenomegaly, Hepatomegaly, platynychia, koilonychia. Shrivastava et al [4] found mainly chronic diseases e.g. Renal diseases, liver diseases, infectious diseases, diabetes, hypertension etc. associated with anemic patients. Bhasin et al [3] finding in anemia of chronic disease group revealed an underlying renal disease to be most common finding.

Anemia characterization based on RBC indices and peripheral smear revealed that Normocytic normochromic anemia was the most common morphological type of anemia seen in geriatric patients. 48 cases (43.6%) had normocytic normochromic anemia, 35(31.8%) had microcytic hypochromic anemia, 17 cases (15.4%) had dimorphic anemia and 10(9.1%) had macrocytic anemia. Normocytic normochromic morphological type of anemia is the most common type of anemia seen in geriatric patients irrespective of gender. A study done by Vanamala Alwar, K. Reethi and Karuna Ramesh kumar [12] also found normocytic normochromic anemia as the most common type of morphological anemia in elderly patients. In their study 66.01% had normocytic normochromic anemia. Soni PN, Jawale RB and Soni SP [13] also reported normocytic normochromic anemia as the most common type of morphological anemia in geriatric patients. Bhasin et al. [3] also observed the most common type of anemia to be normocytic (62%). Shrivastava et al. [4] reported 69.8% cases of normocytic normochromic anemia.

Among normocytic anemia of chronic disease is the most common etiology with 44% of the patients have ACD – 11 patients had CKD, 2 solid tumor malignancy, 5 chronic liver disease, 5 chronic infections (tuberculosis, liver abscess, pulmonary aspergillosis), 4 chronic inflammatory conditions (rheumatoid arthritis,

polymyalgia rheumatica), 3 myelodysplasia, 3 multiple myeloma, 3 non hodgkins lymphomas, 2 chronic lymphocytic leukemia, 2 unexplained anemia. Bhasin et al [3] reported 77% cases of microcytic anemia having occult stool blood. In our study cases of chronic gastritis, peptic ulcer, esophagitis with hiatus hernia esophageal varices constitutes 58.3% cases.

Nutritional anemia was found in 14 patients and in one patient no etiology of anemia was found.

10 patients of Macrocytic anemia (1) had Folic acid deficiency, (3) had vitamin B 12 deficiency, (2) had Myelodysplastic Syndrome, (3) had Hypothyroidism, (1) had Alcoholic Liver Disease. Bhasin et al [3] reported no underlying disease in few cases of macrocytic anemia. In our study out of 17 patients with Dimorphic anemia (9) had dual deficiency of iron and vitamin B 12 /Folate, (3) had Myelodysplastic Syndrome, (3) Post Blood Transfusion patient with Hypochromic anemia and (2) patients remained unexplained. In our study 12 cases (11%) of vitamin B12/Folate deficiency found to be the underlying cause of macrocytic or dimorphic anemia. Bhasin et al [3] reported 5% such cases. In a comprehensive study of African population Joseph O. Mogisha et al [10] found IDA and B12 deficiency in 2% cases of anemia.

Unexplained anemia of the elderly (UAE): It is defined as a hypo proliferative normocytic anemia and characterized by normal hepcidin levels with blunting of the erythropoietin response to anemia. It is a separate entity from nutritional anemia and anemia of chronic inflammation or CKD. In this study etiology of anemia in 5(4.5%) cases no defined underlying cause found. Bhasin et al [3] reported 2% of patients had no obvious underlying cause. As per Bianchi et al [19] unexplained/unclassified anemia constitutes 25-33% cases of anemia in elderly and includes anemia that cannot be classified into any other categories.

Hepcidin inhibits iron absorption from the duodenum and release of iron by the bone marrow. Hepcidin also decreases erythropoietin synthesis and impairs its biological activity[19]. Ferrukki L. Et al [18] reported in elderly patients low level of testosterone to be the underlying cause of anemia.

Conclusion

Geriatric anemia is a very common condition in the elderly which increases frailty, impairs cognition and contributes to frequent hospitalizations as well as morbidity and mortality. The picture becomes more grave in situations of comorbidities. Complaints of Easy fatigability and generalized weakness should not be ignored by the treating physician as these complaints are the early pointers of the underlying conditions and not secondary to aging. It has been observed as age progresses there is a decline in the hematopoietic cell to fat ratio in the marrow along with less response of the bone marrow to erythropoietin stimulus. Etiology of anemia in the elderly population varies from the young population. Anemia of chronic disease is the most common etiology seen in the elderly population. Anemia is also because of chronic blood loss from the GI tract as well as due to B12, Folate deficiency and MDS. At times it could be multifactorial in origin. So, anemia in the geriatric population should not be treated with hematinics without evaluating the etiology of anemia. Anemia in these populations should be thoroughly worked up and after that only adequate treatment should be initiated.

References

1. Smieja MJ, Cook DJ, Hunt DL, Ali MA, Guyatt GH. Recognizing and investigating iron deficiency anemia in hospitalized elderly people. *CMAJ*. 1996;155(6):691-696.
2. Bopp-Kisthler L, Ruegger-Frey B, Grob D, Six P. Vitamin B12 deficiency

- in geriatrics. *Schweiz Rundsch Med Prax.* 1999;88:1865-1867.
3. Bhasin, Rao MY. Characteristics of Anemia in Elderly: A Hospital Based Study in Elderly: A Hospital Based Study in South India. *Indian J Hematol Blood Transfus.* 2011; 27(1):26-32.
 4. Shrivastava SR, Hippargi SB, Ambali AP, Yelikar BR. Patterns of Anemia in Geriatric Age Group. *JKIMSU.* 2013; 2(1):77-81.
 5. Tay MRJ, Ong YY. Prevalence and risk factors of anemia in older hospitalized patients. *Proceedings of Singapore Healthcare.* 2011; 20(2):71-79.
 6. Dharmajan TS, Avula Sai, Norkus EP. Anemia increases risk for falls in hospitalized older adults: An evaluation of falls in 362 hospitalized, ambulatory, long-term care, and community patients. *J Am Med Dir Assoc.* 2006; 7:287-293.
 7. Vijai Tilak, Deepa Rani, IS Gambhir. Characteristics of Geriatric Anemia in and around Varanasi: A Hospital Based Study. *Indian J. Prev. Soc. Med.* 2013; 44(1-2):93-101.
 8. Mitrache C, Passweg JR, Libura J, Petrikos L, Seiler WO, Giratwohli A et al. Anemia: an indicator of malnutrition in the elderly. *Ann Hematol.* 2001; 80:295-298.
 9. Bosco, RDM. Anemia and functional capacity in elderly. Brazilian hospitalized patients. *Cad. Saunde. Publia, Rio de Janeiro* 2013; 29(7):1322-1332.
 10. Joseph O. Mugisha, Kathy Baisley, Gershim Asiki, Janet Seeley, Hannah Kuper. Prevalence, Types, Risk Factors and Clinical Correlates of anemia in Older People in a Rural Ugandan population. *PLOS ONE* 8(10): e78394.
 11. Guralnik JM, Eisenstaedt RS, Ferrucci L, Klein HG, Woodman RC. Prevalence of anemia in persons 65 years and older in the United States: evidence for a high rate of unexplained anemia. *Blood.* 2004; 104: 2263-2268.
 12. Mcleman WJ, Andrews GR, Mclead C, Laird FI. Anemia in elderly. *WJ Med.* 1973; 52:1-13.
 13. Vanamala Alwar, K. Reethi, and Karuna Ramesh kumar. *Indian J Hematol Blood Transfusion. Geriatric Anemia: An Indian Perspective.* 2013 June; 29(2): 126-127.
 14. Soni PN, Jawale RB, Soni SP. Study of anemia in geriatric population: A hospital-based study in Marathwada region, Maharashtra, India. *Int J Adv Med* 2016; 3:197-9.
 15. Sumner AE, Chin MM, Abraham JL, Berry GT, Gracely EJ, Allen RH, et al. Elevated methylmalonic acid and total homocysteine levels show high prevalence of vitamin B12 deficiency surgery. *Ann Intern Med.* 1996; 124: 469-476.
 16. Chernetsky A, Sofer O, Rafael C, Ben-Israel J. Prevalence and etiology of anemia in an institutionalized geriatric population. *Harefuah.* 2002; 141(7):591-594, 667.
 17. Stabler SP. Vitamin B₁₂ deficiency in older people: improving diagnosis and preventing disability [Editorial] *J Am Geriatr Soc.* 1998;46:1317-1319.
 18. Ferrucci L, Maggio M, Bandinelli S, Basaria S, Lauretani F, Ble A, Valenti G, et al. Low testosterone levels and the risk of anemia in older men and women. *Arch Intern Med.* 2006; 166(13):1380-1388.
 19. Bianchi V E. Anemia in the Elderly Population *J Hematol.* 2014;3(4):95-106.