



CORRELATION BETWEEN TYPES AND SEVERITY OF ANEMIA WITH OTHER COMORBIDITIES PRESENT IN GERIATRIC PATIENTS ADMITTED IN A TERTIARY CARE HOSPITAL IN KOLKATA

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ABSTRACT Due to the recent advancement in medical science, life expectancy of a human being has gradually increased. By and large old people are worst & the most common sufferer from any disease & anaemia will rank very high & in elderly it is almost a constant co-morbidities with other chronic diseases that an elderly is very likely suffering from. The aim of the study shall be to find out different types of anaemia in geriatric population, its correlation with associated co-morbidities and also to identify the modifiable risk factors so that they can be useful in planning treatment strategy. This study was done in Department of General Medicine, Calcutta National Medical College & Hospital, Kolkata among 100 randomly selected anaemic (Hb in male: <12g/dl, female <11g/dl) geriatric (age \geq 60yrs) patients attending medicine outdoor, geriatric clinic and admitted in medicine indoor. Among 100 cases 43 are male and rest 57 are female. After analysing the data, it is established that iron deficiency (46%) & anaemia of chronic disease (43%) is most prevalent among elderly population. Majority of elderly population suffering from moderate (6 to 9g/dl) degree of anaemia. Severity of anaemia correlated with severity of co morbidities. Most of the cases anaemia is not related with the mini mental score. Though daily activities of living score is related with severity of anaemia. Constant association of anaemia with different co morbidities establish the importance of its' recognition, evaluation and proper treatment & it has always some influence in the outcome and treatment of other co-morbidities.

KEYWORDS : Anemia, Severity, Geriatric, Co morbidities, Correlation

Introduction:

Ageing is a universal process. Sir James sterling Ross commented "you do not heal old age, you protect it, you promote it and you extend it." Ageing is not a disease; however, the risk of developing disease is increased, often dramatically, as a function of age¹. In the year 2002 there were an estimated 605 million old person in the world of which 400 million were living in low income countries². Between 2000 and 2030, the number of older adults worldwide is expected to increase from 420 to 974 million¹. Expectation of life at birth for males and females in India, it is projected to be 67 years in 2011-16 for males and 69 years for females². A projection beyond 2016 made by United Nations has indicated that 21% of the Indian population will be 60+ by 2050 which was 6.8% in 1991². In India for the year 2003 the sample registration system estimates that 7.2% of total population of India are above the age of 60 years³. By and large old people are worst and the most common sufferer from any diseases and in any busy hospital, at least 40% of the beds are occupied by the elderly where as only 7% of the general population are in elderly age group. Of the few commonly found diseases in elderly, anaemia will rank very high and most important point regarding anaemia in elderly is the fact that it is not only a common primary disease, in elderly it is almost a constant co-morbidities with other chronic diseases that an elderly is very likely suffering from. Consonant with this belief, suggestions have also been made that evaluation in the elderly should only begin when the anaemia is at least moderate (less than 10g/dl), since work up of mild anaemia may yield a poor list of identifiable cause^{4,5}. Conversely, others have stated that anaemia should always be regarded as being pathological and hence evaluated so as not to miss any underlying treatable conditions especially in their early stages^{6,7,8}. Recognition, evaluation and proper treatment of anaemia in elderly is probably the most important basic task for treatment of any disease in elderly as it has always some influence in the outcome and treatment of other co-morbidities. Anaemia is currently defined by WHO as a haemoglobin level < 13 gm/dl in men and < 12 gm/dl in women. Anaemia in elderly individual is associated with a very wide range of complications including increased risk of mortality and morbidity from cardiovascular and renal diseases, stroke, cognitive dysfunction, longer duration of hospitalisation, reduced bone density, history of fall and fracture⁹. Not surprisingly anaemia has also a significant effect on

the quality of life in elderly. Most anaemia in older individual results from iron deficiency, chronic disease and chronic inflammation or it may be unexplained^d. It becomes clear that adequate work up of different types of anaemia will be always helpful in keeping geriatric population healthy. Our motto is to evaluate the depth of this problem and its consequences in geriatric age group so as to help us take preventable measures to remedy the anaemia related morbidity in this age group. The aim of the study shall be to find out (1) Different types of anaemia among the elderly. (2) Association of other co-morbidities in the elderly with anaemia. (3) Correlation of severity of anaemia with the types and number of co-morbidities.

Material & methods:

It was a cross sectional study conducted in Dept. of Medicine, Calcutta National Medical College & Hospital, West Bengal during the period January 2017 to June 2017. On obtaining clearance from the institutional ethical committee & written informed consent from each patient, 100 geriatric patients of age group 60 years or above, of both sexes (43 males & 57 females) included randomly who were attending general medicine OPD, geriatric clinic or admitted in general medicine ward of CNMC&H with haemoglobin level < 12gm/dl for men and < 11 gm/dl for women. We have taken the cut off value of haemoglobin 1 gm/dl less than the standard set by WHO as the prevalence of anaemia in India is very high. Seriously ill patients were excluded from the study. No controls were taken. Detailed history of the present episode along with relevant past history of blood loss, blood transfusion, hypertension, diabetes, tuberculosis or any other chronic illness and any positive family history collected from each patient. A thorough clinical examination including general survey and detailed systemic examination was done in all cases as per pro-forma specially prepared for this study. Routine measurement of height, weight, blood pressure & routine investigation viz. complete haemogram, peripheral blood smear, random blood sugar, urea, creatinine, LFT, Stool for OBT/OPC for 3 days, urine RE/ME/OBT and serum iron status, bone marrow aspiration were done in all. Whenever needed USG, chest x ray PA view, ECG, echocardiography, haemoglobin electrophoresis, Coombs' tests, bone marrow biopsy was also considered. At the end of study period the collected datas were analysed. Criteria used for diagnosis of different types of anaemia are Hb% <12gm/dl(male),

<11gm/dl(female) with **a**) Criteria used for diagnosis of *iron deficiency¹⁰ anaemia* : RBC morphology microcytic, hypo-chromic, reticulocyte index <2.5, serum ferritin <10 ng/ml , TIBC >400µg/dl , serum iron <30µg/dl, transferrin saturation <10%, marrow iron store nil. **b**) Criteria used for diagnosis of *megaloblastic anaemia¹⁰* : MCV >100fL, RBC morphology macrocytosis, reticulocyte index <2.5, hyper cellular bone marrow with megaloblastic bone marrow pictures, with increased marrow iron *with or without* hyper segmented (≥6) neutrophils, diminished serum B12 <100 ng/L, diminished serum folate <5.4 ng/mL **c**) Criteria used for diagnosis of *anaemia of chronic kidney Disease¹⁰* : Reticulocyte index <2.5, GFR <90 mL/min per 1.73 m2 (with demonstrated kidney damage viz. persistent proteinuria i.e. persistence in the urine of >17 mg of albumin per gram of creatinine in adult males and 25 mg albumin per gram of creatinine in adult females, abnormal urine sediment, abnormal blood and urine chemistry, abnormal imaging studies) (GFR calculated as $186 \times Cr^{-1.154} \times Age^{-0.203}$ x (for female by 0.742) *with or without* normocytic, normochromic anaemia, serum iron >50µg/dl, TIBC >300µg/dl, ferritin levels >115 ng/ml **d**) Criteria used for diagnosis of *anaemia of chronic liver disease¹⁰* : Reticulocyte index <2.5 and established case of liver disease with sign/symptoms & investigation conforming to liver disease *with or without presence* of elevated levels of serum alanine and aspartate aminotransferases (ALT >41U/L and AST >38U/L), alkaline phosphatase, direct (>0.4mg/dl) and total serum bilirubin(>1.3mg/dl), prothrombin time(>1.7times of normal), diminished albumin(<4gm/dl), ultrasound of the abdomen (heterogeneous liver with or without evidence of portal hypertension) **e**) Criteria used for diagnosis of *anemia of endocrine disease¹⁰* : Reticulocyte index <2.5 *particularly presence* of thyroid hormone abnormality(FT4 <0.8 ng/dL, TSH >4.24µIU/mL), diabetes (fasting plasma glucose >126 mg/dl or 2 hours plasma glucose >200 mg/dl during an oral glucose tolerance test using a glucose load of equivalent to 75 gms anhydrous glucose in water or symptoms of diabetes plus a random plasma glucose >200 mg/dl **f**) Criteria used for diagnosis of *anaemia of chronic diseases¹⁰* : signs and symptoms suggestive of chronic infective or inflammatory disease Reticulocyte index <2.5 *with* normocytic and normochromic or a hypochromic microcytic RBC, ferritin level is 30-200µg/L , TIBC <300µg/dl ,Serum iron <50µg/dl, transferrin saturation 10-20%, normal marrow iron store **g**) Criteria used for diagnosis of *anaemia of haemoglobinopathy in elderly¹⁰* : Reticulocyte index >2.5 ,microcytic and/or hypochromic with targeting RBC ,haemoglobin electrophoresis suggestive of haemoglobin pattern abnormality *with or without* ferritin level is 50-300µg/L, TIBC 300-360µg/dl, serum iron >50µg/dl, transferrin saturation 30-80%, bone marrow showing moderate cellularity with erythroid hyperplasia with normal to increased marrow iron store, bilirubin total >1.3mg/dL, increased lactate dehydrogenase (>221U/L), increased aspartate transaminase(>38U/L) **h**) Criteria used for diagnosis of *haemolytic anaemia in elderly¹⁰* : reticulocyte index >2.5, macrocytosis, bilirubin total >1.3mg/dL, increased lactate dehydrogenase (>221U/L), increased aspartate transaminase (>38U/L), bone marrow showing erythroid hyperplasia **i**) Criteria used for diagnosis of *anaemia of myelodysplastic syndrome in elderly¹⁰* : dysmorphic (or abnormal appearing) usually cellular bone marrow with ineffective blood cell production *either alone or as part of* bi or pancytopenia(RBC < 4.00 x 106/mm3, WBC (<4000/mm3, platelet < 165 x 103/mm3) *with or without* macrocytosis **j**) Criteria used for diagnosis of *anaemia with malignancy in elderly¹⁰* includes Hb% <12gm/dl(male), <11gm/dl (female) with presence of any haematological or non haematological malignancy.

Observation: Among 100 cases 60+ age group is 60%(66.96%) of the total cases, 70+ age group is 33% (25.89%), 80+ age group is 7% (7.14%)of the total cases(Table2,3) (n.b.. Values within the bracket is national average)²². The female : male ratio is 1.3 : 1 (0.93: 1)¹¹. In this study highest number of cases found in sixth decades in both sexes[table 2,3]. Among different types of anaemia, iron deficiency is most common 46%, next common is anaemia of chronic disease 43%[table 1]. In both sexes distribution is similar[table1]. Severity of anaemia is graded as mild as above 9 gm/dl, moderate as ≥6gm/dl to < 9g/dl, and severe is < 6gm/dl. Study shows that most of the elderly population of both sexes are suffering from moderate anaemia (41.9% in males, 50.9% in females). The distribution of different types of anaemia among mild, moderate & severe anaemia shows[fig 1] iron deficiency anaemia mostly present as moderate(38%) to severe(42%) anaemia, megaloblastic anaemia mostly present as mild(50%) to

moderate(50%), kidney(68%) & liver diseases(67%) mostly present as moderate, hypothyroid, diabetes mostly present as moderate(42%) to severe(42%) anaemia. The correlation between severity of anaemia with CKD stages showing[fig 2a] 100% of moderate and severe anaemia are in stage 5. The correlation among severity of anaemia and Child- Pugh Classification of Cirrhosis showing[fig 2b] that as the Child Pugh score deteriorates, more severe is the anaemia.. Study also showing[fig 3a,3b] that MMSE score has no significant influences on the severity of anaemia. Our study showing[fig 4a,4b] that in both sexes the daily activities of living score has some detrimental effect on severity of anaemia but definitely not the only contributory factor .

Types \ Sex	Male	Female
ID	22(51.16%)	24(42.10%)
FD	1(2.32%)	3(5.26%)
ACD	10(41.86%)	25(43.85%)
1.KD	0(18.60%)	10(17.54%)
2.LD	4(9.30%)	5(8.77%)
3.ED	4(9.30%)	0(14.03%)
4.O	2(4.65%)	2(3.50%)
HGP	0(0%)	1(1.75%)
HLA	0(0%)	2(3.50%)
MRA	0(0%)	2(3.50%)
M	2(4.65%)	0(0%)
total	43(100%)	57(100%)

[ID: iron deficiency anemia; FD: megaloblastic anemia; ACD: anemia of chronic disease, KD: chronic kidney disease; LD: chronic liver disease; ED: endocrine disease; o: others; HGP: hemoglobinopathy; HLA: haemolytic anemia; MRA: anemia due to marrow causes; M: malignancy]

Table1: Different types of anemia in elderly males & females

age \ types	60-69	70-79	80-89	90-99	TOTAL
ID	17(62.96%)	5(45.45%)	0(0%)	0(0%)	22
FD	1(3.70%)	0(0%)	0(0%)	0(0%)	1
KD	6(22.22%)	1(9.09%)	1(25%)	0(0%)	8
LD	1(3.70%)	1(9.09%)	2(50%)	0(0%)	4
ED	1(3.70%)	3(27.27%)	0(0%)	0(0%)	4
O	1(3.70%)	0(0%)	0(0%)	1(100%)	2
HGP	0(0%)	0(0%)	0(0%)	0(0%)	0
HLA	0(0%)	0(0%)	0(0%)	0(0%)	0
MRA	0(0%)	0(0%)	0(0%)	0(0%)	0
M	0(0%)	1(9.09%)	1(25%)	0(0%)	2
TOTAL	27	11	4	1	43

Table2: Age distribution of different types of anemias in males

age type	60-69	70-79	80-89	90-99	TOTAL
ID	9(27.27%)	14(63.63%)	1(100%)	0(0%)	24
FD	3(9.09%)	0(0%)	0(0%)	0(0%)	3
KD	6(18.18%)	4(18.18%)	0(0%)	0(0%)	10
LD	3(9.09%)	2(9.09%)	0(0%)	0(0%)	5
ED	7(21.21%)	0(0%)	0(0%)	1(100%)	8
O	2(6.06%)	0(0%)	0(0%)	0(0%)	2
HGP	1(3.03%)	0(0%)	0(0%)	0(0%)	1
HLA	2(6.06%)	0(0%)	0(0%)	0(0%)	2
MRA	0(0%)	2(9.09%)	0(0%)	0(0%)	2
M	0(0%)	0(0%)	0(0%)	0(0%)	0
TOTAL	33	22	1	1	57

Table3: Age distribution of different types of anemias in females

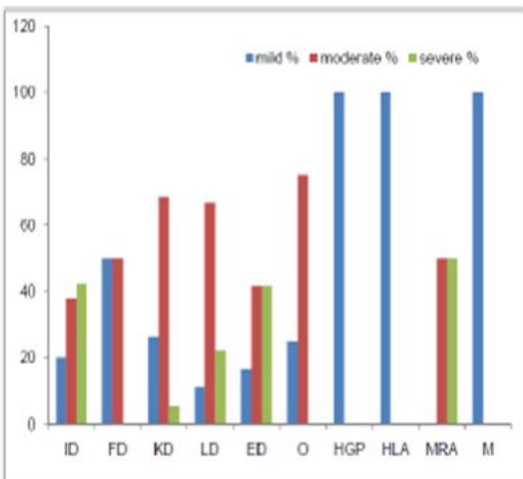


Fig1: Severity of different types of anemia(in percentage)

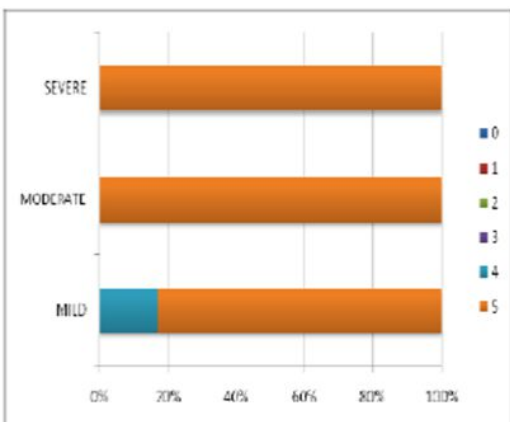


Fig 2a: Correlation between severity of anemia and CKD stages

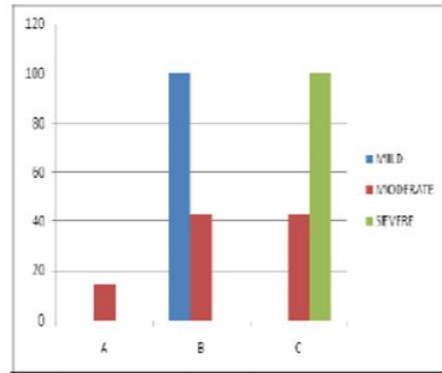


Fig 2b: Correlation between severity of anemia and Child-Pugh classification of cirrhosis of liver

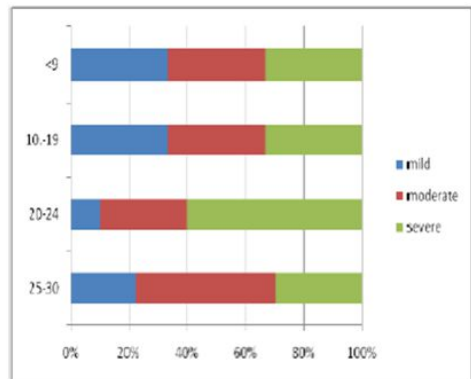


Fig 3a: Comparison between severity of Anemia & MMSE in males

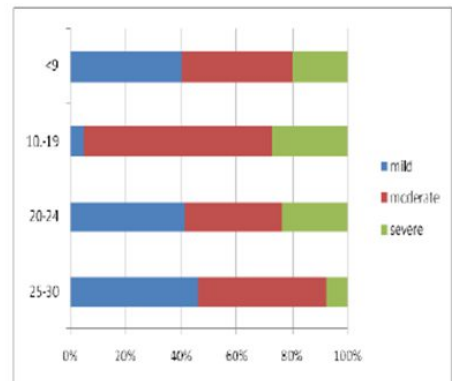


Fig 3b: Comparison between severity of Anemia & MMSE in females

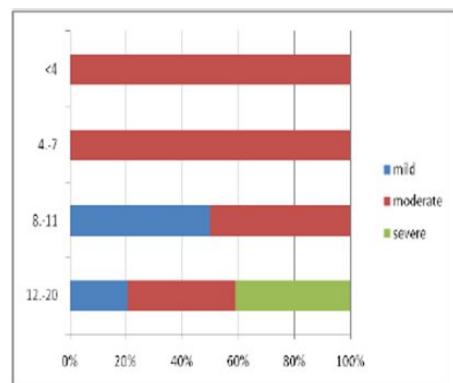


Fig 4a: Comparison between severity of Anemia & DAL score in males

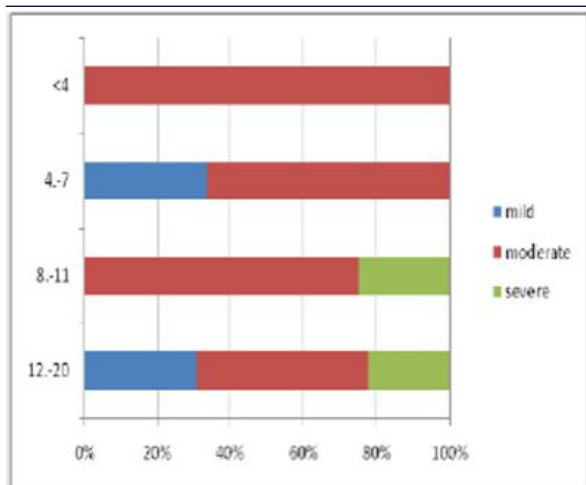


Fig 4b: Comparison between severity of Anemia & DAL score in females

Discussion:

After analysing the data, it is established that anaemia is always a presenting problem in elderly population in both sexes. The sex ratio among the elderly in India has favoured males²² as against the trend prevalent in other parts of the world, this study showing female preponderance probably due to good reporting of female from local community. The preponderance of females in extreme old ages needs to be brought to the attention of planners and policy makers. Though we know anaemia is more common in elderly, become more prevalent as age becoming more, but perhaps the random selection criteria of first 100 elderly anaemic patient in our hospital, biased the result. The distribution of different types of anaemia among mild, moderate & severe anaemia, shows that iron deficiency anaemia is commonest anaemia of mild variety among both sexes, majority of moderate variety of anaemia is due to anaemia of chronic diseases. Iron deficiency anaemia is the leading cause of severe anaemia in elderly too. In the world scenario among aged population, the most common causes of anaemia are nutritional (mainly iron deficiency anaemia), and anaemia of chronic disease. In developed nation, anaemia of chronic diseases are little bit more common where as nutritional anaemia is more common in developing & in third world countries like us. The percentage of different types of anaemia we found similar to different past studies. Data from Joosten E, Pelemans W *et al.* on prevalence and causes of anaemia in a geriatric hospitalised population¹² showing cases suffering from anaemia of chronic disease is 30 to 45%, iron deficiency 15 to 30%, vitamin B12 5 to 10%, myelodysplastic anaemia 5%, haematological malignancy 5%, haemolysis 5 to 10%, non identifiable cause 15 to 25%. In another study by Andrew S Artz, MD, William B Ershler, MD¹³ had shown that anaemia of chronic disease is 15-35%, iron deficiency 15-23%, vitamin B12 0-14%, myelodysplastic anaemia 0-5%, non identifiable cause 17-45%, chronic kidney disease 8%, endocrinopathy <5%. In this study we have shown that sex has no significant influences neither on the severity of anaemia nor on types of anaemia. We have already shown that CKD stage 5, Child Pugh score stage C associated with severe anaemia, so we can conclude that correlation between severity of anaemia with severity of different co morbidities are significant and therefore it almost certain that severity of anaemia has significant influences on the outcome of different co morbidities because most of them present as moderate to severe anaemia and it is also established in earlier studies^{14,15,16,17,18,19,13}. Poor MMSE score has no impact on severity of anaemia in both sexes. It is also evident that in both sexes the daily activities of living score has some impact on severity of anaemia. Though dementia has social impact on nutritional & health status that may lead to more severe anaemia, but in this study it was not established. One previous study²⁰ provides preliminary evidence in support of the hypothesis that mild anaemia might be an independent risk factor for executive function impairment in community-dwelling older adults. Whether such an association is causal or non causal remains to be determined. Another article revealed that "Higher Hb values were significantly associated with more favorable values of all indexes measuring mental and functional capacity, depression and co morbidities. For all indexes (MMSE, DAL) improvements from

baseline were significantly related with concomitant Hb increases"²¹. Probably poor DAL score leads to person more bed bound, that secondarily has negative impact on health and nutritional status of the elderly people. So in conclusion all the elderly people should be enquired about their nutritional background & related issues in details. Simultaneously possibility of different types of anaemia of chronic disease viz. chronic kidney disease, chronic liver disease, hypothyroidism, diabetes should be kept in mind. Last but not the least is that it is mainly an observational study on small number of subjects. Due to logistic constrain, this study is limited within targeted 100 anaemic cases, but still it gives some direction to us for future research on this aspect. Further a large scale study will throw more light on the problem.

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