# ASSESSMENT OF ANAEMIA AND ITS ASSOCIATED FACTORS AND MEDICATION ADHERENCE IN TERTIARY CARE HOSPITAL

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**ABSTRACT:**

**Background:** Anaemia is also the third leading cause of death among children and women. Iron Deficiency Anaemia is the most common type of Anaemia globally. Blood transfusion is the primary management for severe anaemia. Oral supplements are cheap, safe and effective at correcting anaemia. The purpose of this study is to assess anaemia and its associated risk factors and the impact of blood transfusion in anaemic patients and assessment of medication adherence in a tertiary care hospital.

**Materials and Methods:** A 6-month prospective observational study was done at Vivekananda General Hospital, Hubli. The study was conducted from November 2021 to April 2022, with 214 patients enrolled with all age groups.

**Results:** Among the 214 patients who participated in this study, 117 were males and 97 were females. Most patients (78%) consumed a mixed diet and the most common social behaviour being alcoholic. Among the common types of anaemia, microcytic hypochromic (47.1%) accounted for the majority. As a result of analysing the data, we found that fatigue (32.24%) was

the most common symptom found at admission. There was statistical significance between pre and post haemoglobin concentrations, i.e., P value <0.05. In addition, the efficacy of blood transfusion was found to be significant when comparing it to risk factors or underlying conditions. Patients based counselling was done and later assessed for adherence and found that subjects were moderately adherent (69%) to their medication. After blood transfusions, severe anaemia cases decreased in the study.

**Conclusion** We conclude that patient quality of life improved following blood transfusion. Patients with tuberculosis, immunodeficiency syndrome, and chronic kidney disease showed no significant improvement.

**Keywords**: Anaemia, Blood transfusion, Medication Adherence, Patient counselling, Clinical Pharmacist

## INTRODUCTION:

Anaemia is a condition characterized by decreased haemoglobin (Hb), either from diminished production of red blood cells (RBCs), or destruction of RBCs, or loss of RBCs due to accident, bleeding and consequently their oxygen-carrying ability diminishes, is insufficient to meet up to the body's physiological needs.[1] Anemia can be caused by iron deficiency majorly, but other nutritional deficiencies, inflammation, parasites, and genetic disorders. It can be subdivided based on cell size, into macrocytic, microcytic, or normocytic. Severe anaemia may cause decrease in quality of life (QoL) by causing shortness of breath, and reduced exercise tolerance.[2] Approximately one-third of the world's population suffers from anaemia.[3] Anaemia is a widespread problem that adversely impacts children and pregnant women worldwide. According to WHO, 42 percent of children below 5 years and 40 percent of pregnant women are globally anaemic.[4] In developing country like India, as per the survey conducted in 2018, it was found that 58% of children at the age of 6-59 months suffer from Anemia. Adolescent girls and boys at the age of 15-19 years have a prevalence rate of 54% and 29% respectively. It is estimated that 50% of pregnant and childbearing women are iron deficient and 58% of breastfeeding mother suffer from anaemia due to increased need of nutrition.[3] Clinical sign and symptoms of anaemia varies with the type of anaemia and severity. Patients initially experienced symptoms such as weakness, tiredness, chest ache, and breathlessness when haemoglobin levels drop.[5] Blood transfusions are an essential part of saving lives and improving health, but there is

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an increased risk of transmitting infectious agents (HIV,Syphilis etc)., and occurrence of transmission related complication.[6] Transfusion-transmitted infections are screened for, and blood is processed by the blood bank. Pre-transfusion testing determines whether patients' blood and components are serologically compatible.[7] In obstetric wards, blood and blood component transfusions are frequent. Obstetric haemorrhage is a leading cause of maternal death in India, with substandard care being a factor in 80 percent of cases. [8]

2012 guidelines recommended transfusions to occur if haemoglobin concentrations were less than 7–8 g/dL[9] For hospitalised adult patients who are haemodynamically stable, including critically ill patients, transfusion is not recommended until the haemoglobin concentration is 7 g/dL. For patients undergoing orthopaedic surgery, cardiac surgery, and those with pre-existing cardiovascular disease with decrease heart function like, a restrictive transfusion threshold of 8 g/dL is recommended.[10] Recent study has indicated that those with haemoglobin levels from 7 to 10 g/dL may not require a blood transfusion, or that in some circumstances, one pint is adequate, however in severe cases, multiple units are necessary.[11] Inappropriate blood transfusion can lead to non-availability of blood products in emergency. Oral supplements are quite effective in reducing the risk of anaemia. Adherence to medication is defined as "the extent to which a patient's behaviour matches the agreed recommendations from a healthcare provider.[12] Hence this study was carried out to assess anaemia and its associated risk factors and the impact of blood transfusion in anaemic patients and assessment of medication adherence in a tertiary care hospital and to assess the patient related outcome and health-care utilization in blood transfusion.

## Methodology

Vivekanand General Hospital is a tertiary care teaching hospital with bed facility of more 300. It was a 6 months prospective observational study. Ethical clearance was obtained from institutional human ethical committee KLE College of Pharmacy, Hubballi. Based on pilot study estimated sample size was above 200 patients. The inclusive criteria were all anaemic inpatients including paediatrics, geriatric with all blood groups and hemodynamically stable patient. Exclusion Criteria included was neonates and acute trauma and haemorrhage and

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hemodynamically unstable patient. Patients who are in outpatient settings and psychiatry were also excluded.

Data was collected through the patient case sheets. Patient demographic details, laboratory data, treatment progress chart was extracted through the data available. During the ward rounds and post rounds interaction was made with patient and discussion with the healthcare professional. Self-made patient counselling questionnaire for blood transfusion and medication adherence was used for collecting data. Questionnaire, was of two part one for ensuring blood transfusion and patients attitude towards blood transfusion and their satisfaction in Blood transfusion practice other part was intended for medication adherence and its role in improving anemia.

The data collected was categorized and was statistically tested with help of descriptive analysis, & parametric (t-test). Sample size was calculated using sample t-test. The categorized data was presented as percentage and obtained data was represented in graphs.

**RESULTS**:

The primary purpose of the study was to assess the factors associated with anaemia and to assess the medication adherence in patients in tertiary care hospital.

An initial sample of 214 inpatients was randomly chosen based on the patient diagnosed as anaemic at Vivekananda General Hospital, Hubballi, of whom 97 were female and 117 were male. As per age group classification into Child, Adolescence, Adult and Senior, Adult (67%) group was found to be more anaemic with least count (5%) for adolescence. Mean age was 38.31± 19.3. In total, 78% of the population was found to have mixed diets, while 22% were found to be vegetarians. [Table 1]

From *Table 2*, fatigue (32.24%) was the most common symptom presented by the patient on admission, following with Generalised Weakness and Loss of Appetite (23.36), Sense of Breathlessness (19.62%), Abdominal Pain (8.41%) And Giddiness (7.00%). Least experienced were Loose Stools (2.33%), Fever (1.40%), Bilateral Swelling (1.40%), Breathlessness (1.40%), Irritation (0.90%), Tachycardia (0.90%), Headache (0.90%), Dizziness (0.46%), Koilonychia (0.46%), And Haemoptysis (0.46%).

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In total population, 43 patients (20.09%) had social habit of alcoholism. But majority of the population (75.7%) had no habits. According to correlation with diet, the lowest mean haemoglobin levels were found in individuals with vegetarian diets and a history of alcoholism. [Figure 2] A comparison of peripheral smear reports with different age groups showed that Microcytic Hypochromic was prevalent in the adult (18–59 years) and common in all age groups. [Figure 3]

Total of 214 patients, 137 patients had received blood transfusions, and 77 individuals were taking oral iron supplements. [Table 2] When a patient received blood transfusions, mean haemoglobin raised; however, when a patient received supplements, mean haemoglobin increased gradually because iron supplements take time to restore the reserves. In the questionnaire, the attitude of the patient towards practice and technique of blood transfusion was assessed in relation to Patient Related Outcome (PRO). Among 137 patients, 40 rated the practice as good, 60 as satisfied, 18 were dissatisfied and 19 felt very poor. [Figure 4] In order to compare the impact of blood transfusion on haemoglobin levels, a paired t-test was performed. This case involved the collection of Pre- and Post-Hb levels from the hospital. Haemoglobin levels significantly rose following blood transfusion. In comparing the Pre- and Post Hb of total blood transfusion (n=137) using the paired student t-test, it was found that the test was significant (P= 0.0001). In patient with tuberculosis and ID syndrome, blood transfusion did not have much effect on haemoglobin level (P value= 0.155595, 0.050409 respectively; mean difference of -0.4714, -1.62 respectively). We have also found that per rectal bleed is a common symptom and life-threatening cause of anaemia and Hb did not rise significantly and patient sign and symptoms were not reduced (P value= 0.13893 mean diff of -1.02857). In CKD patient, because of deficiency of erythropoietin, the Hb did not rise significantly (p value = 0.214609 mean difference of -0.3083). [Table 2 & 3] The least prevalent types of anaemia in adults were macrocytic hypochromic, normocytic hypochromic and hairy cell leukaemia type. In total 137 blood transfusions, the most common type of blood transfusion given was Packed Red Blood Cells (PRBC) and Whole Blood (WB), depending on comorbidity, type of anaemia, etc. Based on the collected data and analysis of the haemoglobin levels and other parameters, it was concluded that in most of the cases there was an impact of the treatment on patient condition. Initially, 128 patients were found to have severe anaemia, but after treatment the number decreased to 76 patients. Prior to medical treatment, 60 patients had moderate to severe anaemia,

while 97 patients had moderate. 24 patients were found mild anaemic prior to management and 31 patients after management. [Figure 5] In patient with severe anaemia due to effect of Blood Transfusion number of severe cases are decreased. In patient with Microcytic and Hypochromic, other pharmacotherapeutic management is done and there is not much difference in number of patient post management.

In the questionnaire carried out for medication adherence, it was asked to assess impact of patient counselling on medication adherence in taking iron supplements. Patients of 14% were highly adherent to prescribed medication followed by 69% moderate and 17 % very low adherent. The 77 subjects that did not require blood transfusions underwent other medical management, which included Cyanocobalamin, Folic acid and Ferrous Sulfate for supporting management of anaemias, such as Iron Deficiency Anaemia (IDA) and Pancytopenia. [Figure 4]

We have disseminated the data based on major system and symptoms and one tailed student t-test was performed and there was significant rise in Hb level after blood transfusion.

## DISCUSSION

In our study, 67% were adults (N=142), 15% senior adults (N=33), 13% child(N=27), and 5% were adolescent groups. 214 anemic subjects were enrolled in the study out of which 54.67% (N=117) were males and 45.33% (N=97) were females.  In the similar studies done by *Suresh Kishore et al in Uttarakhand*, 50% of females were anemic and 44.3 % were males.[13] In our study males are more prevalent as they are more prone to diseases Alcoholic Liver Disesase, Chronic Liver Disease, Chronic Kidney Disease. A variety of factors may contribute to this condition, such as social habits, eating habits, or underlying complications. According to *Oliver Didzun et. al.*, In India, anaemia in men is a serious public health issue. Because the influences of geographic and demographic and socioeconomic variance of anaemia in men and women are identical, future initiatives to minimize anaemia among men might focus the same populations groupings as current initiatives to minimize anaemia amongst women.[14]

In our study, there was an increase in patients' haemodynamic parameters(P=<0.0001) post treatment which comprehensively concludes that there is an impact of blood transfusion in patient. In our study the most prevalent type of anaemia was found to be microcytic hypochromic

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and the second most common was pancytopenia. Amongst all the causative factors, dietary habits have highest risk factors for causing anaemia. In his study *Hammad Chaudhary et. al.* he stated that, Deficiency in iron Microcytic hypochromic anaemia is caused by a disturbance in iron delivery in the dietary due to low iron intake, small intestine pathologies such as gastritis and chronic diarrhoea, gastrectomy, and vitamin C insufficiency. It could be caused by chronic or acute blood loss, as well as higher demands from pregnancies, serious trauma, or surgery.[15]

While collecting the data we found that most of the patients belonged to BPL and APL classes. Similar to our study we found that *Anil Bilimale et. al.* stated that in his study he found that prevalence of anaemia was too high i.e., 97.1%.  most of his subjects belonged to Class VI i.e., lower class and Class III i.e., middle class. He also concluded that diet influenced the patient's condition which is meant by 72.1%, dry fruits by 63.2%, eggs by 52.7% etc. [16]

We also done patient counselling in patients regarding the medication adherence and patient counselling regarding blood transfusion and iron supplements. In the questionnaire, the attitude of the patient towards practice and technique of blood transfusion was assessed in relation to patient related outcome. Among 137 patients, 40 rated the practice as good, 60 as satisfied, 18 were dissatisfied, and 19 felt very poor. In the questionnaire carried out for medication adherence, it was asked to assess impact of patient counselling on medication adherence in taking iron supplements. 14% were highly adherent to prescribed medication followed by 69% moderately and 17 % were very low adherent.

The present study reveals per-rectal bleeding as a significant co-morbidity associated with anaemia. As per a study conducted by *Don C. Rockey and et.al,* on the evaluation of GIT in patients with iron deficiency anaemia it was noted that idiopathic iron deficiency anaemia in adults is believed to result from chronic colonic blood loss due to mass lesions. Therefore, the following study also focuses on chronic blood loss from the distal small bowel responsible for iron deficiency anaemia. Thus, the observations support present study on PR bleeding being a comorbidity associated with anaemia.[17]

Cheryl Gilamrtin concludes her study that, pharmacists can assist the patient having CKD in overcoming obstacles to anaemia treatment. Anaemia treatment programs run by pharmacists provide both clinical and financial advantages.[18] *Jenny M Debenito et.al.* stated in their research that, when compared to patients getting usual care, those treated by a clinical pharmacy anaemia

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service exhibited greater adherence to nationwide criteria for monitoring, similar safety results, as well as reduced prescription consumption.[19]

From overall study we can conclude that day to day life and habits may lead to gradual decrease in haemodynamic parameters leading to blood disorders. We faced certain limitations from which we advise the future investigator, to research in a multi-centre setup, to collect thorough case reports.

**CONCLUSION**

The study examined anaemia, its prevalence, causes, comorbidities and the impact of blood transfusion and its associated factors in anaemia and its impact on improving quality of life. Statistical analysis showed that the blood transfusion was significant in improving Hb level. In anaemia, especially iron deficiency (Microcytic Hypochromic) diet, life style modifications and proper medication adherence should be ensured very strictly. Patients from the lower and middle classes are more likely to be unaware of the necessity of medication adherence in anaemia, resulting in poor medication adherence, was seen in our study. A well-balanced diet has a major role in preventing anaemia. Clinical Pharmacist has a vital role in patient education like patient counselling and diet plan in preventing and management of anaemia. This study demonstrated the value of patient counselling in improving iron supplementation adherence leading to increased quality of life (QoL).

Table 1: Demographics and Clinical Profile of Blood Transfusion and Non-blood Transfusion Patients

| Characteristics | Blood Transfusion n=137 (%) | Non-blood Transfusion n=77(%) |
|---|---|---|
| Gender | | |
| Male (n=117) | 73(53) | 44(57) |
| Female(n=97) | 64(47) | 33(43) |
| Age group | | |
| Child(n=27) 0-12 years | 22(16.1) | 5(6.5) |
| Adolescent(n=11) 12-18 years | 75.1(5.1) | 4(5.2) |
| Adult(n=143) 18-59 years | 89(65) | 54(70.12) |
| Senior adult(n=33) Above 60 | 19(13.8) | 14(18.18) |
| Mean Hb | | |
| Pre-Hb | 5.49 | 2.96 |
| Post-Hb | 7.32 | 2.72 |
| Clinical Symptoms | | |
| Fatigue(n=73) | 60(82.2) | 13(17.8) |
| Loss of appetite(n=51) | 42(82.35) | 9(17.65) |
| Breathlessness(n=45) | 23(51.1) | 22(48.9) |

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*Figure 1: Social Habits of Patients*
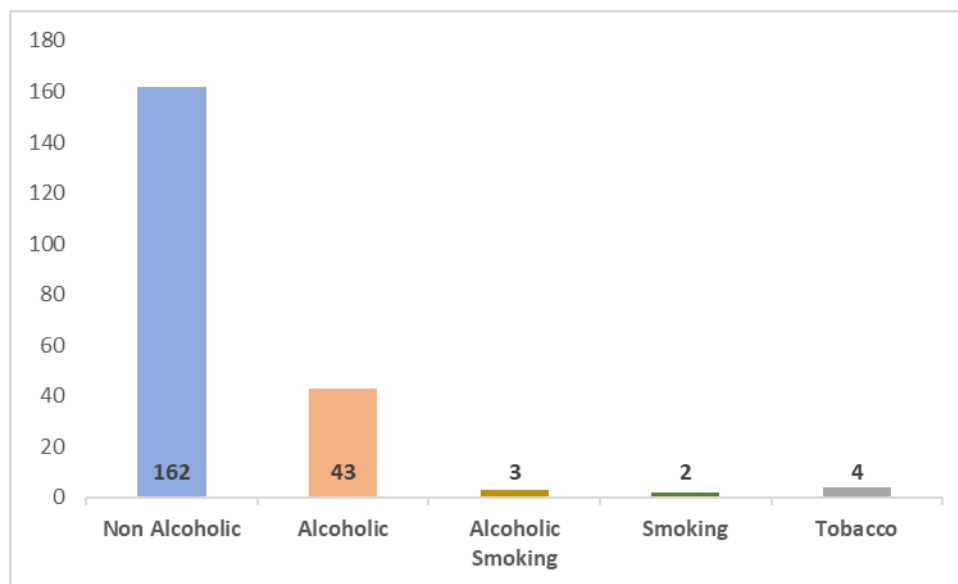


*Figure 2: Diet vs Social History Correlation*



|  | Alcoholic | Non Alocholic |
|---|---|---|
| Veg | 5.442857143 | 6.7625 |
| Mixed | 6.722682927 | 6.313571429 |

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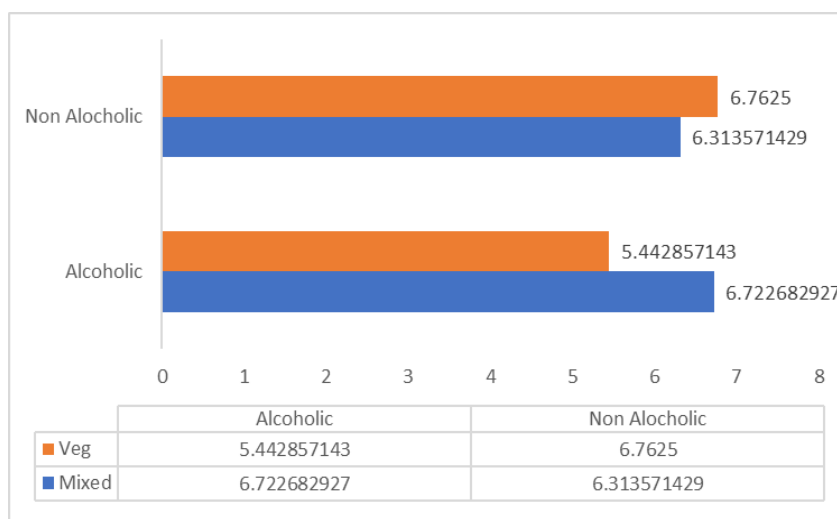
*Figure 3: Comparisons of Peripheral Smear report*



| | Dimorphic | Hairy cell leukemia | Macrocytic | Macrocytic hypochromic | Microcytic | Microcytic hypochromic | Normocytic normochromic | Normocytic, hypochromic | Pancytopenia |
|---|---|---|---|---|---|---|---|---|---|
| ■ Adolescence | 2 | 0 | 0 | 0 | 0 | 7 | 1 | 0 | 1 |
| ■ Adult | 20 | 1 | 7 | 1 | 1 | 63 | 23 | 1 | 26 |
| ■ Child | 3 | 0 | 1 | 0 | 0 | 20 | 2 | 0 | 1 |
| ■ Senior Adult | 4 | 0 | 3 | 0 | 2 | 11 | 8 | 0 | 5 |

PS REPORT
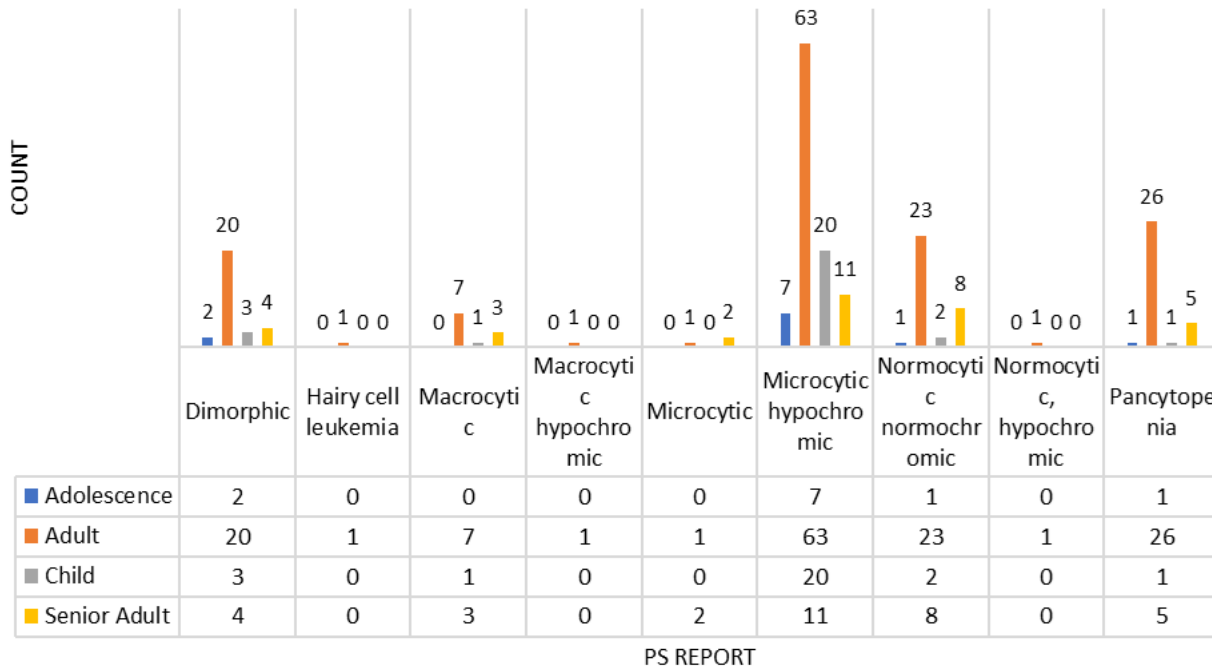
*Figure 4: Attitude Assessment of Patient towards Blood Transfusion Practice and Technique*



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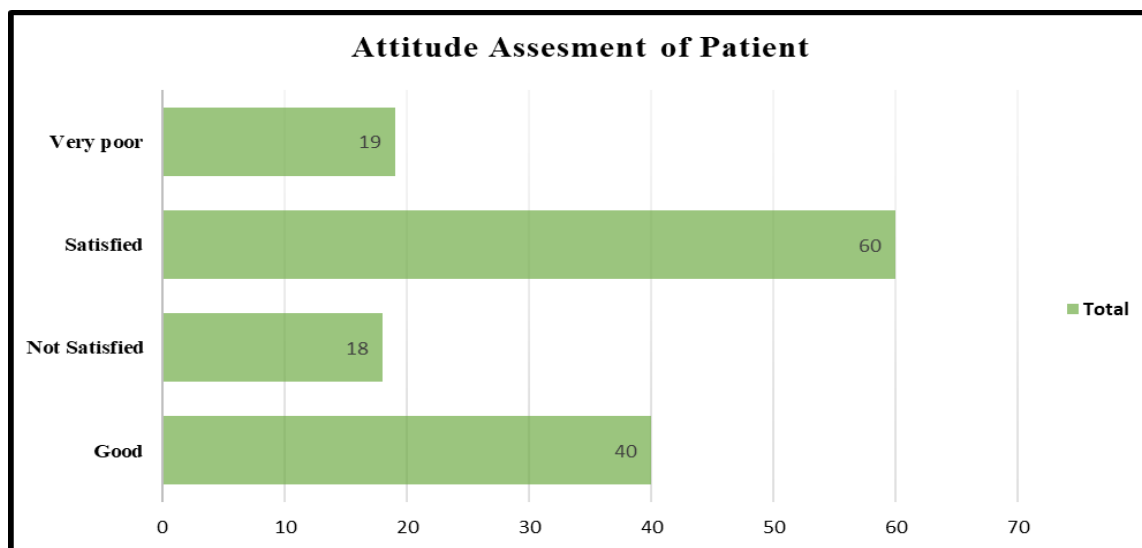
*Table 2: Total number of Symptoms presented by patients on day of admission*

| | SYMPTOMS | PERCENTAGE(N) |
|---|---|---|
| 1 | Fatigue | 32.24% (69) |
| 2 | Generalised Weakness | 26.63% (57) |
| 3 | Loss of Appetite | 23.36 % (50) |
| 4 | Sense of Breathlessness | 19.62% (42) |
| 5 | Abdominal Pain | 8.41% (18) |
| 6 | Giddiness | 7.00% (15) |
| 7 | Vomiting | 2.80% (6) |
| 8 | Loose Stools | 2.33% (5) |
| 9 | Fever | 1.40% (3) |
| 10 | Bilateral swelling | 1.40% (3) |
| 11 | Breathlessness | 1.40% (3) |
| 12 | Irritating | 0.90% (2) |
| 13 | Tachycardia | 0.90% (2) |
| 14 | Headache | 0.90% (2) |
| 15 | Dizziness | 0.46% (1) |
| 16 | Koilonychia | 0.46% (1) |
| 17 | Haemoptysis | 0.46% (1) |

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*Table 1: Risk Factors and blood transfusion impact on Hb*

| | **Parameters** | Count(n) | Mean Pre-Hb | Mean Post-Hb | Critical value (95%) | P value (One tailed) |
|---|---|---|---|---|---|---|
| | **Co Morbidities** | | | | | |
| 1 | Tuberculosis | 7 | 4.64 | 5.11 | 1.94 | 0.155* |
| 2 | ID syndrome | 5 | 4.54 | 6.16 | 2.13 | 0.050* |
| 3 | Chronic Kidney Disease | 12 | 3.02 | 3.33 | 1.79 | 0.214* |
| 4 | Rectal Bleeding | 7 | 4.42 | 5.45 | 1.94 | 0.138* |
| 5 | Respiratory disease | 20 | 3.63 | 4.11 | 1.72 | 0.016* |
| 6 | Haematological diseases | 7 | 5.3 | 8.3 | 1.94 | 0.004 |
| 7 | Central Nervous System | 6 | 4.55 | 5.8 | 2.01 | 0.214 |
| 8 | Endocrinology | 28 | 4.09 | 4.65 | 1.70 | 0.006 |
| 9 | Gastro Intestinal Tract | 24 | 4.35 | 4.95 | 1.71 | 0.003 |
| 10 | Thalassemia | 19 | 6.2 | 9.8 | 1.66 | <0.0001 |
| | **Without Co-morbidities** | | | | | |
| | Without Co-morbidities | 79 | 4.7 | 5.8 | 1.66 | <0.0001 |

In order to compare the impact of blood transfusion on haemoglobin levels, a paired t-test was performed. In comparing the Pre- and Post Hb of total blood transfusion (n=137) using the paired student t-test, it was found that the test was significant (P= 0.0001). In patient with tuberculosis and ID syndrome, blood transfusion did not have much effect on haemoglobin level (p value= 0.155595, 0.050409 respectively; mean difference of -0.4714, -1.62 respectively) **.

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*Table 2: Frequency of Medication Adherence based on Demographic Distribution*

| *Demographics* | Medication adherence | | |
|---|---|---|---|
| | **High (17%)** | **Moderate (69%)** | **Low (14%)** |
| Gender | | | |
| Male (n=117) | 23(63.9) | 79(53.02) | 15(51.7) |
| Female(n=97) | 13(36.1) | 70(46.9) | 14(48.3) |
| Age group | | | |
| Child(n=27) | 3(8.3) | 19(12.75) | 5(17.24) |
| Adolescent(n=11) | 1(2.7) | 9(6.04) | 1(3.44) |
| Adult(n=143) | 27(75) | 99(66.44) | 17(58.62) |
| Senior adult(n=33) | 5(14) | 22(14.77) | 6(20.7) |

*Figure 3:Comparison of WHO anaemic grading before and after Therapeutic Management.*
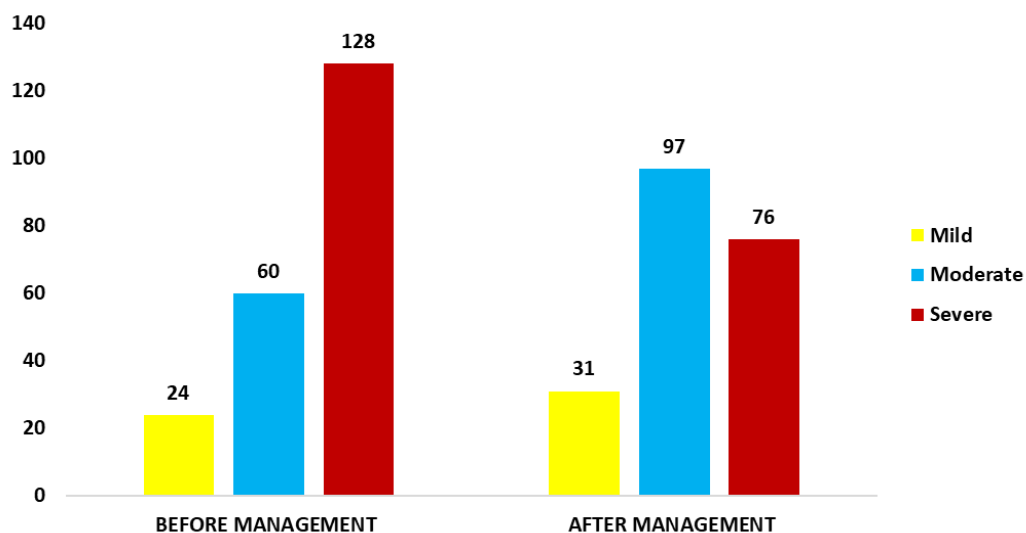
## ACKNOWLEDGEMENT

## CONFLICT OF INTEREST

The authors confirm that there is no conflict of interest.

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