

Anemia in Surgical Patients

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Objective: To find out prevalence of surgery related anemia in the patients routinely admitted in a general surgical ward. **Design:** Prospective, Cohort Study. **Place of study:** Surgical Unit II, Jinnah Hospital, Lahore. **Materials and methods:** 100 studied patients included males and females of all age groups from 13 years to 70 years. They were assessed for the effect of surgery on the preoperative hemoglobin levels and causes of anemia in relation to socioeconomic status. **Results:** Total of 100 patients were randomly selected for the study but after applying exclusion principles, 95 patients were left with mean age of 33 years, mean hemoglobin concentration of 8.66 in all and 8.79 after excluding the patients with massive blood losses post trauma/gunshot. Mean postoperative hemoglobin excluding trauma patients was 8.71. 52% of patients had anemia due to nutritional deficiency, of which 82% were females; followed by 31% related to chronic diseases and the rest due to acute blood loss. **Conclusion:** Anemia is still one of the major co-morbidities in preoperative patients and we found that surgical procedures did not cause significant difference to hemoglobin levels postoperatively. Almost all the patients who had low hemoglobin had it preoperatively and that was found to be caused most commonly by nutritional deficiency followed by chronic diseases. They are more prevalent in people from socioeconomically deprived groups of society.

Key words: Anemia, Hemoglobin, Nutritional deficiency

Anemia is defined as hemoglobin concentration in red blood cells less than certain values, which are set out by WHO, but can be variable according to the individual societies and nations¹. Anemia is one of the major co-morbidities in the patients in the surgical wards, responsible for the poor surgical outcomes contributing to wound infections, delayed wound healing, heart attacks, prolonged hospital stay and hence burden on the vital health care resources^{2,3,4,5}. Consequences of anemia affect whole of the families in terms of care, economic instability and reduced work capacity among the people of low socioeconomic groups thus producing a vicious cycle of further poverty.

Anemia is a concern for surgical patients in two phases of treatment; before and in the immediate postoperative period, which includes both the surgery itself and the time spent in the hospital during postoperative recovery. Surgery patients may develop preoperative anemia from acute or chronic blood loss e.g. major trauma or peptic ulcer oozing, iron, folate or vitamin B 12 deficiency caused by poor nutrition^{6,7}, menstrual bleeding, renal insufficiency, prolonged or chronic disease processes e.g. Rheumatoid Arthritis, Inflammatory Bowel Disease, Tuberculosis and almost all malignancies^{8,9}. Patients who have anemia before surgery are more likely to need blood transfusions, have long hospital stays and die during or after surgery than those who do not have anemia¹⁰.

Materials and methods

The patients included in the study were selected randomly as the first one hundred patients admitted in the Surgical Unit II of Jinnah Hospital Lahore Pakistan from 1st March 2004 onwards. Following patients were included in the study.

1. Males and non-pregnant females from all age groups ranging from 13 years to 70 years of age.

2. Patients with hemoglobin concentration of less than 11.0 for males and less than 10.0 for females on admission.
3. Those patients who do not take any haematinics or supplements in any form.

All those patients were excluded from the study that didn't fulfill the inclusion criteria mentioned above. To evaluate any deficiency of the nutritional factors, their dietary habits and for socioeconomic status and prevalence in different areas, monthly income of the family, number of dependents and their addresses were recorded. The criteria for very poor was decided according to international standard of income less than 1 \$ per day or Rs.1500 per month, poor were those from Rs.1500 to 6,000 per month and middle class from Rs. 6000 to 12000 per month. The disease, which led to their admission in the surgical ward whether acute, or elective, any previous history of blood loss in the form of trauma or major surgery was also recorded including the menstrual blood loss in females.

No costly investigation was advised for the diagnosis of anemia because of the vast majority of patients belonging to the poor class. Full blood count, urea & electrolytes as part of routine preoperative work up along with peripheral blood picture were advised. Diagnosis of anemia was made purely on the hemoglobin concentration and red cell morphology on a peripheral blood picture. They were followed afterwards recording the operative procedures and postoperative hemoglobin levels to assess the effects of surgical procedure on it and also if they needed blood transfusion.

Results

Total of 100 patients were selected randomly who had a hemoglobin levels lower than the set levels before undergoing any definite procedure. After applying the

exclusion principles we were left with 95 patients in total to continue with them, as 5 patients were those who had very low hemoglobin, required multiple transfusions or had other major complications. Of 95 patients, 49 were males and 46 were female patients. Their ages ranged from 13 years to 70 years with mean age of 33 years. Among male patients mean age was 31 years and in females it turned out to be 35 years. Interestingly, 31 out of 95 patients were less than or equal to 20 years old.

Table 1: Age/sex distribution

Age in years	Male	Female
13-20	17	14
21-30	11	09
31-40	09	06
41-50	06	07
51-60	03	07
61-70	03	02

Table 3: Causes of low hemoglobin

Hypochromic microcytic		Normochromic normocytic		Normochromic microcytic	
Iron deficiency due to poor intake, gastro-intestinal ulcers, malignancies		Hemorrhage due to road side accidents, firearm injuries etc.		Chronic diseases including Tuberculosis, Rheumatoid Arthritis, I.B.D etc.	
Male	Female	Male	Female	Male	Female
9	40	15	1	25	5

Total of 48 were admitted through emergency, of which 33 were males and 15 were females. Remaining 47 were admitted for elective operation lists, of them 16 were males and 31 females. A previous history of blood loss in the form of trauma or major operations was present in 31 patients excluding the menstrual blood loss in females; among them 24 were males and 7 females. 48 patients underwent major operations like laparotomies with tumor or bowel resections, thyroid and biliary surgeries and vascular repairs etc. while rest of them had operations of minor categories.

Table 2: Hemoglobin concentrations

	Pre Op	Post Op
Including patients who suffered major hemorrhage	8.66	8.98
Excluding patients who suffered major hemorrhage	8.79	8.71

The patients needed variable number of blood transfusions preoperatively or postoperatively with an average of 2 blood units. Those with preoperative trauma/ gunshot hemorrhage received on average 5 transfusions while rest of them 1.2 blood units, while 1/3 did not receive any transfusion at all. Postoperative hemoglobin of those patients who did not suffer any pre operative hemorrhage showed an average decrease of 0.08 mg/dl from 8.79 to 8.71 mg/dl and none had per operative transfusion. This showed that surgical procedures on their own did not

produce significant difference to the preoperative levels of hemoglobin. The main causes of anemia in this study turned out to be preoperative anemia, of which iron deficiency anemia is predominant followed by anemia of chronic diseases and acute blood loss.

An important aspect of study was the effect of socioeconomic factors and majority of the patients in the study belonged to the lower socioeconomic background with the average income of Rs. 1500 per month in the very poor group, Rs. 3000 per month in poor group and Rs. 9000 per month in middle class. Majority of them belonged either to rural areas of the poor areas of urban slums around Lahore. Average number of dependents in each family was 5 persons. Most of these patients had vegetables as the main source of food with consumption of meat on an average of less than once in a week with amount available to each person being less than adequate. Patient distribution was as follow:

Table 4: Socioeconomic status distribution

Very poor		Poor		Middle Class	
Male	Female	Male	Female	Male	Female
12	8	32	35	5	3

Discussion

The number of preoperative patients presenting with anemia of any origin is on the rise globally. According to one study by Goodnough and Shander, the prevalence of anemia in elective surgical patients may be as frequent as 75% in certain populations¹¹. In another study the prevalence ranged from as low as 5% (in female geriatric hip fracture patients) to almost 76% (in Duke Stage D colon cancer)¹². Studies have also shown that anemia is present in 34% to 56% of patients before surgery (depending upon the type of problem they are having surgery for and their overall health)^{2,13}. After surgery anemia is even more common affecting 84% to 90% of patients^{2,13}. Anemia is more prevalent in Asia and Africa as compared to developed countries of Europe and North America but according to some surveys, it is present in 30-35% of preoperative patients in certain groups of population in developed countries as well.

Main finding of this study was little effect of different surgical procedures on the preoperative hemoglobin levels, which remained nearly the same whether the surgical procedure was major or minor. This necessarily is attributed to good surgical techniques with careful tissue handling, working in proper surgical planes and adequate hemostasis at every step leading to a minimal blood loss during the procedures.

Iron deficiency is by far the commonest cause of anemia in the preoperative patients in the surgical wards all over the world. This is also the case in this study although it has very few patients included, 52% in all, followed by anemia related to chronic disease, which was 31% while rest of them had anemia secondary to acute

blood loss. Females turned out to be the major portion of the patients (82%) suffering from the iron deficiency anemia in this study, which correlates with the trends in the general population. Main causative factors for this are inadequate dietary intake of iron and other nutritional supplements because of socio cultural reasons where they are living in poor conditions and are under nourished right from their childhood. This is aggravated by menstrual blood losses, multiple pregnancies and certain chronic diseases. This is also proven in this study from the data in terms of their family income, dietary habits and number of dependents. Some of the earlier studies have shown the iron deficiency anemia due to malnutrition and poverty in pregnant females to be around 86%. Studies on the hemoglobin levels in adult females in USA, UK, China and South Asian countries have also suggested the widespread prevalence of anemia due to nutritional deficiency especially iron and folate¹⁴. The population suffering from the anemia due to nutritional deficiencies in the majority of the third world countries lives in the rural areas and this study has also tried to highlight the same trend as well, as most of the patients in this study belonged to the rural areas of the Punjab province and the underdeveloped slums around as well as inside Lahore, important areas being villages along Raiwind Road, Multan Rad and areas of Township and Greentown etc.

Another important cause of preoperative anemia in this study is anemia related to chronic diseases notably tuberculosis being the most endemic disease of this part of world and some of the very common malignancies. According to official statement of American Thoracic Society in 1999, 19-43% of world's population suffers from tuberculosis and 95% of these live in developing countries. In one of the studies by Sei Won Le, MD and Deog Kyeom Kim, MD, mild anemia is common hematological complication of tuberculosis and usually is of normochromic and normocytic pattern¹⁵. Chronic disease related anemia is generally light and moderate, its symptoms being masqueraded by the underlying disease and is associated with reductions both in the quality of life and survival. Results of this study also show 31% of patients suffering from anemia related to chronic conditions attributed mainly to slow unnoticed course of the diseases among the masses.

Anemia secondary to massive blood loss is an important cause of low hemoglobin in patients encountered in emergency departments all over the world. In this study also 17% of the patients had acute blood loss from massive hemorrhage after road traffic accidents or firearm injuries as a result of domestic violence. 93% of these patients

were males and majority of them suffered from firearm injuries.

Conclusion

Anemic patients in surgical wards have low hemoglobin levels not because of the surgical procedures but it is mainly preoperative and due to nutritional deficiency mainly iron, followed by chronic diseases. This is due mainly to poor socioeconomic conditions and endemic diseases, and females are affected more. This needs major measures to improve the economic conditions of the people especially in the villages, along with awareness about the diseases and their prevention.

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