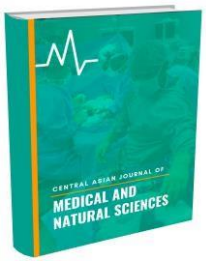

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Article

Effect of Preoperative Hematocrit on Prolonged Hospitalization for Patients Undergoing Coronary Arteries Bypass Grafting surgery: A Comparative Study

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Abstract: This research intended to address the question, "How does a low preoperative hematocrit level affect the risk of prolonged hospital stay in patients undergoing coronary artery bypass grafting surgery?". The methodology of this research is a prospective comparative study. the study included a random selection of one hundred patients who were scheduled to have isolated coronary artery bypass graft surgery. These patients were admitted to the surgical ward sequentially and monitored throughout their procedures, both during and after surgery. The anemic group consisted of patients whose preoperative hematocrit levels were below 36%, whereas non-anemic group consisted of patients whose previous hematocrit levels were over 36%, based on data obtained from direct interviews and patient medical records. patients were monitored both during and after the procedure in the surgical ward, the intensive care unit and the intraoperative period. Information gathered from patient medical records, interviews, and observation. The use of a checklist composed of four parts. Part 1: Patients' socio-demographic and clinical characteristics preoperative, part2: intraoperative data, part3: intensive care unit data, part4: postoperative surgical ward. The research examined 41 individuals of anemic group patient who had low hematocrit levels before surgery. Significant variations were seen in variables related to intraoperative events such as changes in ECG, resuscitation, blood and platelet transfusion, and mortality. Among the groups undergoing Coronary Artery Bypass Grafting surgery procedure, there were a notable increase of early complications in the anemic group issues linked to postoperative intensive care unit and surgical ward stay, including ventilator time, pulmonary difficulties, drain volume, and blood transfusion. Significant prolonged hospital stay is associated with lower hematocrit levels before Coronary Artery Bypass Grafting surgery; however, other risk factors should also be taken into account.

Keywords: hematocrit, prolonged hospitalization, coronary artery bypass grafting, comparative study

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1. Introduction

Coronary artery disease (CAD) has attracted a lot of concern from people all over the world because of its possibly fatal effects. Coronary artery bypass grafting (CABG) is one procedure used to treat CAD patients [1, 2]. Cardiovascular disease is the main reason behind over 63% of deaths from chronic illnesses globally [3, 4].

Abdulrdha and Mansour [5] heart surgery is the primary treatment option for several heart conditions that cannot be effectively treated with medicinal means. CABG is a

widely used therapy for coronary artery diseases, particularly when angioplasty and medication are not sufficient [6].

The importance of preoperative risk factors for patients having CABG surgery has increased due to the numerous research carried out over the past ten years to determine surgical risk factors for CAD. To some degree, the removal or amelioration of these elements or their countermeasures determines the effectiveness of surgery [7].

Santos et al. [8] A low hemoglobin level is a recognized risk factor for cardiovascular disease before surgery. Several studies have shown that individuals with low hemoglobin or hematocrit levels are more likely to die or have serious complications, especially those with congestive heart failure, coronary artery disease, or acute coronary syndrome. This is particularly prevalent for the elderly population [9, 10].

Other investigations failed to find any differences in the unfavorable outcomes of persons and length of hospitalization with low and normal hematocrit levels, however the impact of preoperative low hematocrit in cardiac surgery is still debatable [10, 11].

Kulier et al. [12] Research has shown that anemia in individuals having CABG surgery is only a reliable indicator of non-cardiac problems. On the other hand, negative heart-related events, such as mortality caused by heart problems, heart attacks, and heart failure, were more strongly associated with the other health conditions of the patients rather than anemia.

More than two chest tubes, atelectasis, and atrial fibrillation after CABG were risk variables linked to extended ICU length of stay [13].

Improving patient care requires constant observation of key performance indicators and the detection of risk factors that might compromise quality. The Institute of Medicine has recommended improving resource use. [14] and that in order to enhance the quality of critical care, the duration of stay should be considered [15].

Proven risk factors for post-CABG ICU stays included personal factors like age, gender, and smoking; pre-surgery profile factors like Charlson comorbidity index (CCI), albumin, hemoglobin, cardiac, liver, and kidney function prior to surgery; and post-surgery characteristics like types of operations, duration of cardiopulmonary bypass, operative time, and blood transfusion units; and post-surgery factors like cardiac output and the Therapeutic Intervention Scoring System (TISS) [16].

Important of Study

Prolonged stays in the intensive care unit (ICU) have negative effects on patients and their families in addition to being expensive and a waste of limited resources. Furthermore, it impairs the patient's capacity for self-care, lengthens the rehabilitation process, lowers quality of life, and increases the difficulty of the patient's return to their previous duties and employment. Individuals may also encounter issues brought on by social isolation, which affects how well families operate as a whole and raises the death rate [17, 18, 19]. Few studies have addressed the low hematocrit factors relating to CABG patients about length of stay in the hospital [20, 21].

2. Materials and Methods

Study design

The research objectives have been achieved by using a comparative study to examine the differences between intact groups on some dependent variables of interest a prospective study design was carried out during the period from10th December 2023 to 1 June 2024.

Study Setting

Single center study in Iraqi Center of Heart Disease in Baghdad City Iraq/

Sample and Sampling

A non-probability sampling was applied. Patients was selected according to the following criteria; (1) Male and female patients aged 30 to 70 (2) Agreement to participate in the study. (3) No educational levels are defined. (4) Patient with ejection fraction above 40%**.**

The following patients are excluded: (1) the patients who have coronary artery bypass grafting and patients requiring additional surgical intervention other than CABG. (2) Patients with chronic kidney disease that can cause anemia, and patients who were on dialysis preoperatively. (3) Patients with hepatic failure and uncontrolled diabetes. (4) Patient with ejection fraction less than 20% and poor ventricular function**.**

Data Collection and Study Instruments

Data were collected by the researcher during morning and evening shifts for three times recording of the patient's intraoperative, ICU, and surgical ward data such as laboratory tests, patient medical records, and monitoring device results regarding CABG in the Iraqi center for heart disease. Hematocrit is obtained four times preoperative, intraoperative after cardiopulmonary bypass, ICU postoperative after 24 hours, and surgical ward for three days after the ICU stay.

The Use of a Checklist Composed of Four Parts:

Part 1: Patients' socio-demographic and clinical characteristics which included; age, gender, smoking, alcohol drinking, body mass index, ejection fraction, past medical history, past surgical history, Coronary angiography result (number of vessels), and type of operation.

Part 2: included operative time /hours, bypass time/min, aortic cross-clamp time/min, total urine output, post-operative arrhythmia, used D.C shock, used intra-aortic balloon pump (IABP), Laboratory test Blood gas, Use inotrope, ECG changes, Lowest MAP on bypass (mmHg), Recovery from bypass, return to bypass, Resuscitation, used internal D.C shock, Total blood transfusion(U), Total platelets transfusion (U), Total plasma transfusion(U), Blood allergic, Used for pacemaker stimulation, Cardiac arrest, Death, Cause of death.

Part 3: included stay in the intensive care unit (number of days), reason for a prolonged stay, ventilator hours, Hemodynamic data (Vital signs) reintubations, arrhythmia, pulmonary complication, neurological complication, total urine output /ml, Renal failure, Peripheral pulse, Total blood transfusion (U), Total platelets transfusion (U), Plasma transfusion (U), Blood allergic, Cardiac arrest, drain, amount (ml), resuscitation, given D.C shock, used intra-aortic balloon pump (IABP), Used pacing, emergency reopening of the chest in (ICU), cause of re-opening, re-turn to the theatre and its cause, readmission to (ICU)and it causes, Laboratory test (blood gas), death and causes of death.

Part 4: The length of stay in the ward, arrhythmia, Peripheral pulse, Read mission to (I.C.U), Resuscitation, used (D.C) shock, reopening of the chest, Total blood transfusion(U), Total platelets transfusion(U), Total plasma transfusion (U), infection, pulmonary complications, Neurological complications(stroke), Syncope, Renal failure, Angina pectoris, Myocardial infraction, mortality and causes of mortality, Laboratory test.

Ethical Considerations

The research was conducted with ethical permission from the College of Nursing at the University of Baghdad with ID UOB.CON.4831, as well as consent from the Ministry of Health. The nurses have provided their approval to participate in the research.

The patients have provided informed permission, indicating their voluntary involvement without any kind of pressure, and expressing trust that their data would be exclusively used for research purposes. Data gathering included the use of direct interviews and patient medical records.

Data Analysis

The tool's validity was assessed by a panel of 13 specialists from the University of Baghdad's College of Nursing and the Iraqi Centre for Heart Diseases. The specialists have a minimum of five years of experience in the research field. They assessed the clarity, relevance, and suitability of the materials for the successful completion of the study.

The tool's dependability was evaluated using Cronbach alpha reliability to measure its internal consistency. A satisfactory correlation coefficient of 0.867 was obtained.

The research findings were analyzed and assessed using statistical data analysis methodologies, specifically using the statistical software (SPSS) version 22.0. The analysis included examining frequencies, and percentages, as well as calculating the mean and standard deviation. The Odds Ratio (OR) and its corresponding 95% confidence interval (CI) are utilized to compare the relative odds of the outcomes of interest, such as high-risk factors and low-risk factors. They are also used to assess the magnitude of different risk factors for these outcomes based on case-control groups, such as HCT < 36% and HCT ≥ 36%.

3. Results

This study included 100 patients who were going to have coronary artery bypass grafting CABG. The patients were grouped into two groups: the first group consisted of 41 patients with low hematocrit levels before the surgery, called Group anemic. The second group, consisting of 59 patients, was called Group non-anemic.

Table 1. Socio-Demographic Characteristics of 100 Patient Undergoing (CABG) Surgery According to preoperative low hematocrit (HCT)

Characteristic	Pre-operative hematocrit				P value
	Anemic Group (n_1=41)		**Non-anemic patients (n = 59)**		
Gender	F	%	F	%	
Male	24	58.5	43	72.9	0.194*
Female	17	42.5	16	27.1	
		Age			
30-39 Years		-	-	-	
40-49 Years	2	4.8	7	11.9	0.3668 **

50-59	Years	17	41.5	21	35.6	
60-69	Years	22	53.7	31	52.5	
70 Years & above		-	-	-	-	
Mean ± SD		59.12 ± 5.90		57.81 ± 7.80		
Education level						
Not read & write		5	12.5	2	3.40	0.352***
Read & write		9	21.7	8	13.6	
Primary school		8	19.2	6	10.2	
Intermediate school		8	19.2	13	22	
Secondary school		4	9.6	16	27.1	
Institute		5	12.5	11	13.7	
University		2	4.8	5	10.0	
Higher education		-	-	-	-	
Occupation						
House wife		16	39.2	16	27.1	0.358***
Self-employee		16	39.2	24	40.7	
Retired		8	19.2	13	22	
Government employee		1	2.40	6	10.2	
Others		-	-	-	-	
Smoking Index						
Smoking		F	%	F	%	0.263
Active		9	22	20	33.9	
Passive		32	78	39	66.1	
Non smoking		32	78	39	66.1	
1-1.5 packet		4	11	6	11	

2-2.5 packet	3	6.5	10	20.9	
3 packet and above	2	4.5	4	2.0	
Living with smoker person	23	58.1	38	64.4	0.414*
Alcohol drinking	2	4.9	4	6.8	1.000*
BMI					
Normal weight	10	24.4	20	33.9	0.509*
Overweight	17	41.5	23	39	
Obesity	14	34.1	16	27.1	

Testing based on two independent samples** t-test, *** Chi-Square test, and *(FEP) Fisher Exact Probability test of 2X2 associated rank No. = Number; F = Frequent; % = Percentage SD = Standard deviation.

Table 1 illustrates the people's demographic traits. The demographics of Group 2 were quite similar to those of Group 1. A total of 24 patients with low hematocrit levels before to surgery made up the anemic group; men made up 58.5% of this group. These patients had an average age of 59.12 ± 5.90 years. The non-anemic group, on the other hand, consisted of 43 patients, 72.9% of whom were male, and had an average age of 57.81 ± 7.80 years.

Table 2. The Clinical Characteristics of 100 Patients Undergoing CABG According to the preoperative low hematocrit (HCT)

Variable	Pre-operative hematocrit				P value
	Anemic Group (n_1=41)		**Non anemic group (n=59)**		
Past medical history	F	%	F	%	
Hypertension (HT)	40	97.6	54	91.5	0.396*
Hyperlipidemia	11	26.8	12	20.3	0.477*
Diabetes mellitus (DM)	18	43.9	28	47.5	0.839*
Angina pectoris	19	46.3	21	35.6	0.306*
renal disease	6	15.2	2	2.7	0.103*

Pulmonary disease	3	7.3	1	1.7	0.302*
Past surgical history					
Appendix surgery	5	15.2	6	11	0.213*
Prostate surgery	4	13.2	5	10	0.109*
Cholecystectomy	7	20.5	4	6.8	
Ejection fraction					
30-39 %	-	-	-	-	0.108*
40-49 %	-	-	-	-	
50-59 %	15	36.6	12	20.3	
60-69 %	26	63.4	47	79.7	
> 70 %	-	-	-	-	
Coronary angio result					
One vessel	-	-	-	-	1.000*
Two vessels	2	4.9	6	10	
Three vessels	30	73.1	48	81.5	
Four vessels and above	9	22	5	8.5	
Type of operation					
Elective	4	9.8	8	13.6	0.757*
Urgent	37	90.2	51	86.4	

Based on two independent samples** t-test,*** Chi-Square test, and* (FEP) Fisher Exact Probability test of 2X2 associated rank No. = Number; F = Frequent; % = Percentage SD = Standard deviation.

Table (2) indicates that the study group as a whole has had a comparable distribution of observed frequencies for past-medical history at the time of surgery and the kind of operation, with no significant differences explained at P>0.05.

Table 3. Comparison of Complications of 100 Patients Undergoing (CABG) in the Intra Operative According to the preoperative hematocrit

Variables	Pre-operative hematocrit				P value
	Anemic Group (n_1=41)		**Non anemic group (n=59)**		
Operative time/hr	F	%	F	%	
>5-6 hours	8	19.5	5	8.5	
6 hours & above	33	79.5	54	91.5	
Mean ± SD	6.59	± 1.05	6.39	± 0.83	0.322*
Cardiopulmonary by-pass time /min					
< 60	-	-	1	1.7	
60-120	17	40	13	22	
> 120-180	12	28.8	18	30.5	0.912*
>180-240	13	31.2	27	45.8	
Mean ± SD	124.61 ± 33.71		123.859 ± 33.75		
Aortic cross-clamping time (minutes)					
< 60	16	39.5	18	30.6	0.429*
60-120	20	48.5	20	34	
> 120	5	12	21	35.4	
Total urine output					
≤ 500 ml					0.127**
500-1000 ml	15	36.3	20	34	

> 1000-2000 ml	16	39.5	28	47.5	
>2000 ml	4	9.6	5	8.5	
Electrocardiograph-y changes (ECG)					
Atrial flutters	1	2.4	4	9.6	
atrial fibrillation (AF)	10	24	3	5.1	0.002****
Ventricular tachycardia (VT)	5	12	4	6.8	
HCT (Mean ± SD)	27.168	± 2.815	29.602 ± 2.442		0.000 **
Used D.C shock					0.004***
One shock	8	19.5	4	6.8	
Two shock	5	12.2	1	1.7	
Lowest map on the by-pass					0.002****
Map ≤ 60	27	65.9	39	66.1	
Map >60	14	34.1	20	33.9	
Used Intra-Aortic Bal-loon Pump IABP					0.166****
yes	3	7.3	-	-	
no	38	92.7	59	100	
Total blood transfusion					
0 unit	-	-	24	40.7	0.000***
1-2 unit	17	41.5	28	47.5	
3 unit and more	24	58.5	7	11.9	
Mean ± SD	2.59 ± 0.69		1.13 ± 1.06		

Total plasma and platelet transfusion					
0 unit	-	-	-	-	0.230***
1-2 unit	-	-	-	-	
3 and more	41	100	59	100	
Death					
Yes	3	7.2	0	-	0.003****
No	38	92.8	59	100	

Testing based on two independent samples (**) =t-test, (***)=Chi-Square test, and (****)=(FEP) Fisher Exact Probability test of 2X2 associated rank No. = Number; F = Frequent; % = Percentage SD = Stander deviation; therefore (*)=Mann-Whitney test of a nonparametric method was requiring used.

Table (3) intraoperative data demonstrates that intraoperative time, total urine output, Used Intra-Aortic Balloon Pump IABP tests, and Total plasma and platelet transfusion based on HCT for both anemic and non-anemic diagnoses have recorded comparable results throughout the groups under study, with no significant differences accounting for P>0.05. while showed that Electrocardiography changes (ECG), HCT, Used D.C shock, Lowest map on the bypass, total blood transfusion and death were important distinctions between the two sets of data.

Table 4. Comparison of Postoperative Complications of 97* Patients Undergoing (CABG) in the Intensive Care Unit (ICU) According to the preoperative hematocrit. (During the First 48 Hours Postoperative)

Variables	Pre-operative hematocrit				
ICU stay	**anemic Group (n1=38)**		**Non anemic group (n=59)**		P value
(Number of days)	F	%	F	%	
One day	-	-	3	5.1	0.026**
Two days	33	79.2	54	91.8	
Three days & more	5	12	2	3.4	
Mean ± SD	2.28 ± 0.83		2.07 ± 0.31		0.038 **

Causes for prolong stay in ICU					
Hypoxia	5	12	1	1.7	
Re-intubations	5	12	1	1.7	0.002***
Chest tube (drain)	4	9.6	-	-	
Open sternum	4	9.6	-	-	
Ventilator hours					
1-5 hours	10	25	32	52	
6-11 hours	23	57.5	26	43	0.004**
11-20 hours	5	13.5	3	5.1	
Mean ± SD	4.71 ± 1.64		3.75 ± 1.53		
Re- intubations	5	13.5	1	1.7	0.025****
Cause of re-intubations					
Hypoxia	5	13.5	1	1.7	
Ventricular fibrillation (VF)	5	13.5	-	-	
Arrhythmia in ICU					
Atrial arrhythmia	4	9.6	3	7.2	0.104****
Ventricular arrhythmia	3	7.2	1	1.7	
Cardiac arrest	1	2.4	-	-	
Pulmonary complication					
Grade 1	3	6.4	3	6.4	0.067****
Grade 2	6	15	2	3.4	

Grade 3	-	-	-	-	
Grade 4	1	1.7	-	-	
Total urine output (ml/hr)					
	-	-	-	-	
≤ 500 ml					
500-1000 ml	-	-	-	-	
>1000-2000 ml	-	-	-	-	0.854*
> 2000 ml	38	95	59	100	
Mean ± SD	6894.74 ± 1042.07		6856.36 ± 976.19		
Renal failure	3	5.10%	-	-	0.082****
Drain amount (ml)					0.003*
	2	5	16	27.2	
≤ 500 ml					
500-1000 ml	17	40.8	28	47.6	
>1000-2000 ml	13	31.2	112	20.2	
> 2000 ml	6	14.4	-	-	
Resuscitation	5	13.5	1	1.7	0.024****
Use D.C shock					
One-two	5	13.5	1	1.7	
Emergency exploration of the chest	4	9.6	-	-	0.107****
Blood Pressure (Systolic)					0.101*

Mean ± SD	137.82	± 15.34	132.42	± 15.83	
Blood Pressure (Diastolic)					
Mean ± SD	72.76 ± 11.32		73.58 ± 11.90		0.739*
Temperature					0.027*
Mean ± SD	37.98	± 0.490	37.75 ± 0.501		
Pulse Rate					0.452*
Mean ± SD	97.32	± 8.87	95.58 ± 12.33		
Respiratory Rate (Breath/min.)					0.014*
Mean ± SD	20.92	± 1.88	22.31	± 2.54	
Total Blood Transfusion (Unit)					
0 Unit	-	-	10	16.9	0.000***
1 _ 2	3	7.9	18	30.5	
≥ 3	5	13.5	3	5.1	
Laboratory tests HCT Mean ± SD	32.78 ± 2.54		40.88 ± 3.35		0.000*

(*) S: Sig. at P<0.05; S: Sig. at P<0.05; NS: No Sig. at P>0.05; Testing based on two independent samples t-test =(*)for studied continues random variable that proved normal distribution function assumption in each group, exceptional of "Respiratory Rate (Breath/min.), and Ventilator (per hour)" which requiring used a Mann-Whitney test(**), as well as for discrete random variables used Chi-Square test(***), and (FEP) Fisher Exact Probability test(****) of 2X2 associated rank. No. = Number, F= Frequent; % = Percentage; SD = Stander Deviation; S = Significant; N.S = Non-Significant; O.C = Out of Comparative; P- Value = Probability Value = ≤ 0.05; * 3 Patients were excluded from the study due to death in ICU.

Table (4) The data presented shows that there are differences between the two groups in terms of blood transfusion, ventilator time, pulmonary complications, drain amount, blood transfusion, and hematocrit level, as well as various early complications related to patients undergoing CABG surgery in the intensive care unit. The significance level of the differences is set at P<0.05. Diastolic blood pressure, pulse rate, reintubation, neurological problems, total urine output, renal failure, plasma, platelets, blood allergy, cardiac arrest, resuscitation, use of D.C. shock, use of intra-Aortic balloon pump, pacing, return to the operating room, death, and readmission to the intensive care unit were extra variables or complications. On the other hand, when P>0.05, no significant changes were detectable.

Table 5. Comparison of Postoperative Complications of 97* Patients Undergoing CABG According to the preoperative HCT in the Surgical Ward

Variables	Pre-operative hematocrit				
Post-operative	**anemic Group (n_1=38)**		**Non anemic group (n=59)**		P value
stay/days	F	%	F	%	
5-15 days	36	95	59	100	
16-25 days	2	5	-	-	
26-35 days	-	-	-	-	0.003**
Mean	6.76±2.02		5.75±1.45		
Infection					0.007*
Sternum infection	6	14.4	1	1.7	
Renal Failure	7	18.4	4	6.8	104*
Blood Transfusion	12	28.8	10	17	0.260*
Laboratory tests (HCT)					
Mean± SD	28.92±3.22		30.38±4.33		0.041**

(*) HS: Highly Sig. at P<0.01; S: Sig. at P<0.05; NS: No Sig. at P>0.05; Testing based on (FEP) Fisher (*) Exact Probability test of 2X2 associated rank. Testing based on a Mann-Whitney test (**) of a non-parametric test. Elsewhere.

Table (5) Discovers issues in the surgical ward after surgery and the amount of time spent there based on preoperative hemoglobin concentration (HCT). The research discovered a significant difference between the groups with a p-value of less than 0.01 for the anemic group, representing lengthier hospital stays. A large number of "Surgical Ward" issues did not vary significantly (P>0.05) between the research groups of patients undergoing CABG surgery, according to previous results.

4. Discussion

This research examined the effect of preoperative hematocrit levels on prolonged hospital stay for patients undergoing CABG surgery. Results indicate that there was a statistically significant increase in mortality rate, postoperative drainage, ECG change, resuscitation, ventilator time, pulmonary problems, and blood and blood product transfusion in the group of patients with low hematocrit levels or anemia. The occurrence of comorbidity after CABG surgery remains a significant issue that have effect on prolonged hospitalization, even with the progress made in the field of cardiac surgery [22].

To determine the risks before surgery, it is crucial to assess this specific group of patients, since older individuals also exhibit elevated rates of heart illness and the associated mortality. To mitigate surgical problems, save costs, and decrease hospital stays, it is essential to use risk assessment methodologies. Risk-scoring systems assist surgeons, anesthesiologists, and intensive care unit nursing teams in comprehending patient expectations and reducing risks by implementing thorough preoperative treatments that target factors affecting morbidity and mortality [23, 24].

There are many different and complicated risk variables for prolonged ICU and surgical ward stays after CABG; few research has concentrated on a model-based analysis identifying such aspects. To assist ongoing efforts to enhance the quality of care in the ICU and surgical ward, this research offers data identifying preoperative hematocrit as risk factor for prolonged stays in the ICU.

The main findings of this study were as follows, after comparing between anemic and non-anemic group patient that there were no significant variations ($P>0.05$) in hematocrit levels between the analyzed groups in relation to sex and age factors, for anemia and hematocrit. However, it was shown that this factor directly affects the complications of coronary artery bypass grafting [25].

The patient above 80 years old had a higher risk of developing cardiac complications [26]. Men and women had mean hemoglobin levels of 13±1 and 15±1, respectively, with a higher percentage of anemia in women (age more than 70 has an association with low hematocrit due to chronic disease-associated anemia and has a higher level of comorbidity and mortality after cardiac surgery. sex especially females more expected to have low hematocrit and anemia, with more risk for complications after cardiac surgery [27]. In this study, author concluded that patient demographics include age, and sex exhibit no variation between anemic and non-anemic groups in relate to low hematocrit preoperatively.

Complications related to the operative period, as measured by low hematocrit, were significantly different between the two groups of patients undergoing CABG surgery ($P<0.01$). These complications included changes in electrocardiogram (ECG), resuscitation, transfusion of blood and blood products, and death in addition to anemia, additional variables that are related with atrial fibrillation and ventricular fibrillation include electrolyte disturbance, poor EF before surgery, hemorrhage, hemodynamic disturbance, and fluid disturbance [28]. In this study, author conclude that ECG change may associated with other risk factor than hematocrit, blood transfusion in anemic group in huge amount it reasons of early complication with low hematocrit, death in urgency patient with severely low hematocrit preoperatively.

The research found a statistically significant difference between the two groups in the anemic group for resuscitation ($p=0.004$) and the application of internal DC shock According to the study, diastolic dysfunction after weaning from cardiopulmonary bypass, extended bypass period of more than 180 minutes, and the kind of Cardioplegia utilized are all factors that contribute to anemia and low hematocrit levels below 25% [29].

The need for transfusions is correlated with a low hematocrit level before surgery. The mortality rate increases in tandem with the need for transfusions [30, 31]. Researchers are looking at the link between transfusions of blood and blood products and patients having cardiac surgery. There was a statistically significant difference in the number of fatalities between the anemic and non-anemic groups in our research ($P=0.003$). This is due to the fact that three people in the anemic group died during the first hour following cardiac surgery (38 percent; 3 percent). Crawford et al (2018) found that even one blood unit was linked to considerably lower survival and longer duration of stay following CABG, according to our joint statewide study.

The research discovered a significant difference between the groups with a p-value of less than 0.01 for the anemic group, representing lengthier hospital stays due to complications associated anemia and pulmonary complication, prolonged ventilator time, and electrical cardiac change. By the author opinion preoperative low hematocrit have strong

correlation prolonged hospital stay due to early complications that anemic patient presents them.

Patients with low hematocrit levels before surgery need more careful treatment planning to reduce the risk of postoperative complications and mortality. Though the hematocrit parameter is not currently included into mortality risk score systems, it is nonetheless beneficial for both the patient and the surgeon to pay attention to the simple and regular complete blood count test when making choices and organizing the surgery.

5. Conclusion

The study concludes that preoperative low hematocrit or anemia was identified as a risk factor for atrial arrhythmias intraoperative and in intensive care unit, prolonged ventilator hours in intensive care, blood transfusion rate and death and all that lead to prolonged hospitalization. Preoperative hematocrit levels ought to be included in risk-scoring systems so that patients' postoperative mortality risk, hospital stay duration, and morbidity may all be predicted.

6. Recommendation

The study recommended that further research must be carried out on larger samples and for longer periods to determine the effect of anemia on patients with coronary artery bypass graft surgery in hospitals and after discharge from the hospital.

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8. Conflict of interest

None.

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