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Original Research Article

EFFECT OF GLARGINE INSULIN ON GLYCEMIC CONTROL IN PATIENTS OF TYPE 2 DIABETES MELLITUS UNDERGOING ON-PUMP CORONARY ARTERY BYPASS GRAFT

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Abstract

Background: Diabetes mellitus increases the risk of cardiovascular complications and worsens outcomes in patients undergoing coronary artery bypass grafting (CABG). Continuous intravenous insulin infusion (CIII) is commonly used for perioperative glucose management, but insulin glargine, a long-acting insulin analog, may offer a more stable alternative with fewer complications. This study aimed to compare the effectiveness of preoperative insulin glargine in combination with CIII versus CIII alone for controlling perioperative blood glucose levels, and to evaluate the impact on postoperative complications, ICU stay, and hospital stay in CABG patients. **Materials and Methods:** In this prospective study, 60 CABG patients were divided into two groups: Group 1 received CIII, while Group 2 was administered CIII with glargine preoperatively. Blood glucose levels, postoperative complications, and lengths of ICU and hospital stays were compared between the groups. **Result and Conclusion:** Group 2 (insulin glargine) showed significantly lower blood glucose levels from the start of bypass until 24 hours post-surgery compared to Group 1. Group 2 also had fewer complications, including no sternal wound infections, and shorter ICU and hospital stays ($p < 0.01$). Additionally, the insulin infusion rate was significantly lower in Group 2 ($p < 0.01$). Addition of preoperative insulin Glargine was more effective that CIII alone for glucose control in CABG patients, leading to better glycemic control, fewer complications, and reduced ICU and hospital stays. These results suggest that supplementing CIII with insulin Glargine, instead of relying on CIII alone, could be a preferable alternative for managing glucose in CABG procedures.

INTRODUCTION

The global burden of diabetes has escalated dramatically since 1990, with the prevalence expected to rise from 476.0 million in 2017 to 570.9 million by 2025.[1] Among patients requiring coronary artery bypass grafting (CABG), the prevalence of diabetes mellitus is evidently high, ranging from 20% to 30%.[2] This comorbidity is associated with a heightened risk of recurrent episodes of angina, significantly complicating the clinical management of these patients.[3,4] Hyperglycemia is a well-established risk factor for increased postoperative morbidity and mortality in patients undergoing cardiovascular surgery.[5,6] These patients often experience inferior perioperative outcomes, reduced long-term survival, and a higher likelihood of recurrent angina episodes.[7,8] Previous research has demonstrated that hyperglycemia in the immediate postoperative phase significantly elevates the risk of infections in both diabetic and non-diabetic patients, with the risk correlating directly with the level of hyperglycemia.[9,10] Emerging evidence have suggested the importance of achieving glycemic control in diabetic patients to reduce perioperative morbidity and enhance both short-term and long-term survival.[11] Elevated fasting glucose levels prior to surgery and persistent hyperglycemia during and immediately after cardiac surgery are strong predictors of increased perioperative complications, irrespective of diabetic status.[12]

Recently, a long-acting insulin analog, glargine (Lantus®, SoloSTAR® Pen), has been developed.[13] This insulin analog has a pharmacokinetic profile characterized by an onset of action at approximately 2 hours and a duration of action extending up to 24 hours without a peak effect.[14] Administering glargine insulin as a basal insulin once daily is anticipated to reduce blood glucose levels effectively without causing hypoglycemia.[13] Combining

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glargine with continuous insulin infusion in patients undergoing CABG surgery is hypothesized to prevent blood glucose fluctuations and provide superior glycemic control.[15]

The efficacy of weight-based dosing of insulin glargine within 24 hours of cardiac surgery for maintaining blood glucose levels within a target range of 80–140 mg/dL remains uncertain. Current literature on the use of glargine insulin in the perioperative period for CABG patients is sparse. However, one study has indicated that a combination of continuous insulin infusion and glargine insulin can enhance glycemic control in diabetic patients undergoing CABG.[16] Another study found that weight-based dosing of insulin glargine is safe,[17] but larger-scale studies are required to confirm its efficacy before widespread adoption.

Thus the objectives of this study are to evaluate the impact of glargine insulin combined with continuous insulin infusion versus continuous human insulin infusion alone on perioperative glycemic control and postoperative complication rates in patients with type 2 diabetes mellitus (T2DM) undergoing on-pump CABG, and to compare the efficacy of these two insulin regimens in achieving optimal perioperative outcomes in this patient population.

MATERIALS AND METHODS

Study Setting and Ethical Considerations: This prospective observational study was conducted over two years in the Department of Anaesthesiology at D.Y. Patil Deemed to be University School of Medicine, Nerul, Navi Mumbai. The study was carried out in the Operation Theatre Complex of the same department. Ethical approval was obtained from the Institutional Ethics Committee prior to the study's commencement. Furthermore, written informed consent was obtained from each subject before enrollment, and an information sheet was provided to all participating patients.

Study Population and Randomization: The study included sixty patients with type II Diabetes Mellitus scheduled for CABG surgery. Patients were randomly divided into two groups of thirty each using a computer-generated random number table:

Group 1 (Control Group): Normal saline + human insulin infusion during the perioperative period

Group 2 (Glargine Group): Glargine + human insulin infusion during the perioperative period

Eligibility Criteria

Inclusion criteria encompassed patients aged 40-70 years with type II Diabetes Mellitus on preoperative oral hypoglycemic drugs, those with coronary artery disease, hemodynamically stable patients with normal investigation results, patients accepted for surgery under ASA grades II and III, patients with an LVEF > 40%, and those for whom insulin glargine was not contraindicated. Exclusion criteria included a history of previous cardiac operations, liver and renal dysfunction, lung disease, or carotid intervention, coronary artery disease with valvular involvement, infection at the site of insulin injection, known or suspected allergy to study drugs, recent history of myocardial infarction, and patients undergoing emergency CABG.

Preoperative Assessment: A thorough preoperative assessment was conducted, including a detailed patient history, general physical examination (height, weight, pulse rate, blood pressure), systemic examination, and airway assessment. Routine investigations such as complete blood count (CBC), fasting and postprandial blood glucose, glycosylated hemoglobin, renal and liver function tests, urine analysis, serum electrolytes, coagulation profile, chest X-ray, and electrocardiogram were performed. Patients with serum creatinine levels within the normal range and HbA1C levels less than 8% were considered for inclusion. Additionally, 2D echocardiograms and coronary angiography were conducted.

Patients meeting the inclusion criteria were invited to participate, provided written informed consent, and were randomly assigned to one of the two groups. Fasting blood sugar was checked two hours before surgery. In the control group, normal saline was administered subcutaneously using an insulin syringe, while in the glargine group, glargine (BASALOG) was administered subcutaneously at a dose of 0.1 unit/kg. All patients were kept fasting for 8 hours and managed with subcutaneous insulin (Human Actrapid) using a sliding scale for glycemic control starting five days before surgery.

Intraoperative Monitoring: In the operation theatre, standard monitors (pulse oximetry, ECG leads, non-invasive BP cuff, temperature probe) were used. Radial and femoral arteries were secured for continuous invasive BP monitoring, and the internal jugular vein was secured for inotropic support and central venous pressure monitoring. Patients were intubated, nasogastric tubes were inserted, and patients were catheterized. Continuous human insulin infusion (Human Actrapid) was used for blood glucose control, prepared as a 50 ml solution with 50 units of insulin mixed with 0.9% normal saline (1 unit/ml). Infusion rates were adjusted based on blood glucose levels, monitored using a glucometer before bypass, during bypass, and after coming off bypass.

Postoperative Monitoring: Postoperatively, blood glucose levels and human insulin infusion rates were measured at 1 hour, 4 hours, 8 hours, and 24 hours, along with hemodynamic monitoring. The degree of inotropic support, incidence of postoperative complications, and duration of ICU and hospital stay were recorded for comparison between groups.

Variables: Variables in this study included preoperative and postoperative parameters. Preoperative variables consisted of age, gender, body mass index, hypertension, diabetes mellitus duration, oral hypoglycemic agents, insulin with oral hypoglycemic agents, fasting blood sugar levels, postprandial blood sugar, and glycosylated hemoglobin. Postoperative variables included the

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incidence of complications (infections, antibiotic step-up), ICU stay, and hospital stay.

Statistical Analysis: Data were entered in Microsoft Excel and analyzed using SPSS software version 22. Qualitative data were presented as frequencies and percentages and analyzed using the chi-square test. Quantitative data were presented as means and standard deviations and compared using the t-test. A p-value < 0.05 was considered statistically significant.

RESULTS

The study comprised 60 patients, divided equally into two groups of 30 each, with distinct demographic and preoperative characteristics. The age distribution highlighted that the majority of patients were in the 55 to 65 years age bracket, with a higher representation in Group 2 (56.7%) compared to Group 1 (40.0%). Conversely, the 40 to 45 years age group was the least represented, with 3 patients in Group 1 and none in Group 2. The 45 to 55 years age range showed a fairly balanced distribution between the groups (Table 1). Gender distribution revealed a slight male predominance in both groups, with Group 1 having 21 males and Group 2 having 19 males. Female representation was marginally higher in Group 2 (36.7%) compared to Group 1 (30.0%) (Table 1). Hypertension was more prevalent in Group 1, affecting 66.7% of patients, whereas in Group 2, 53.3% of patients were free from hypertension. This highlights a significant difference in the baseline cardiovascular risk factors between the groups (Table 1). Lifestyle habits such as tobacco chewing and alcohol consumption showed some differences. Tobacco use was reported by 36.7% of patients in Group 1 and 30.0% in Group 2, indicating a slightly higher prevalence in Group 1. Alcohol consumption was notably higher in Group 1, with 40.0% of patients reporting use, compared to only 20.0% in Group 2 [Table 1]. Regarding the duration of diabetes mellitus, the majority of patients had been managing the condition for 10 to 20 years. This was more pronounced in Group 2, where 76.7% of patients fell into this category, compared to 66.7% in Group 1. A small subset had diabetes for less than 10 years, while those with diabetes for more than 20 years were few, with Group 1 having twice as many patients in this category as Group 2 [Table 1].

[Table 2] summarizes the comparison of mean age, BMI, CP bypass duration, surgery duration, RBS levels at various intervals, and insulin infusion rates between the study groups. The mean age was similar between the groups, with Group 1 averaging 60.03 years and Group 2 at 58.00 years (p = 0.397). Similarly, BMI values were comparable, with Group 1 at 25.64 and Group 2 at 26.65 (p = 0.651). The durations of CP bypass and total surgery were also similar between the groups, with no significant differences observed (CP bypass: p = 0.439; Surgery: p = 0.341). These results suggest that the two study groups were well-matched in terms of demographic characteristics and surgical parameters, minimizing confounding variables and allowing for a clearer assessment of postoperative outcomes.

However, there were significant differences in RBS levels across various time points. Group 1 had higher RBS levels before and during bypass, and at several postoperative intervals compared to Group 2, with all differences reaching statistical significance ($p < 0.05$) (Table 2). Additionally, the rate of insulin infusion was significantly higher in Group 1 (4.10 ± 1.20) compared to Group 2 (1.34 ± 0.30) (p = 0.001), indicating a more intensive glycemic control strategy in Group 1 [Table 2].

[Table 3] presents the mean SBP and DBP at various time intervals among the study groups. Both SBP and DBP remained stable and showed no significant differences between Group 1 and Group 2 at all measured intervals. The slight variations observed at different times, such as before and after bypass, were not statistically significant, indicating similar hemodynamic stability in both groups throughout the perioperative period. This trend suggests that the management of blood pressure was equally effective in both groups.

[Table 4] details the incidence and types of postoperative complications, as well as the mean hospital and ICU stay among the study groups. Group 1 had a significantly higher incidence of postoperative complications (30.0%) compared to Group 2 (7.0%) (p = 0.001). Specifically, Group 1 experienced higher rates of sternal wound infections (13.3% vs. 0.0%, p = 0.03), respiratory tract infections (16.7% vs. 3.3%, p = 0.08), urinary tract infections (23.3% vs. 6.7%, p = 0.07), and bacteremia (10.0% vs. 0.0%, p = 0.07). In terms of hospital stay, Group 1 had a significantly longer mean hospital stay of 7.65 days compared to Group 2's 4.59 days (p = 0.001). Similarly, the mean ICU stay was longer in Group 1 at 4.25 days compared to 2.04 days in Group 2 (p = 0.001).

Table 1: Demographic and Preoperative Characteristics of Study Groups.

Parameter		Group 1 Count (%)	Group 2 Count (%)	Total Count (%)
Age Group	40 to 45 years	3 (10.0%)	0 (0.0%)	3 (5.0%)
	45 to 55 years	8 (26.7%)	11 (36.7%)	19 (31.7%)
	55 to 65 years	12 (40.0%)	17 (56.7%)	29 (48.3%)
	More than 65 years	7 (23.3%)	2 (6.7%)	9 (15.0%)
Gender	Female	9 (30.0%)	11 (36.7%)	20 (33.3%)
	Male	21 (70.0%)	19 (63.3%)	40 (66.7%)
Hypertension	Absent	10 (33.3%)	16 (53.3%)	26 (43.3%)
	Present	20 (66.7%)	14 (46.7%)	34 (56.7%)
Tobacco Chewing	No	19 (63.3%)	21 (70.0%)	40 (66.7%)

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	Yes	11 (36.7%)	9 (30.0%)	20 (33.3%)
Alcohol	No	18 (60.0%)	24 (80.0%)	42 (70.0%)
	Yes	12 (40.0%)	6 (20.0%)	18 (30.0%)
Duration of Diabetes Mellitus	10 -20 years	20 (66.7%)	23 (76.7%)	43 (71.7%)
	< 10 years	6 (20.0%)	5 (16.7%)	11 (18.3%)
	> 20 years	4 (13.3%)	2 (6.7%)	6 (10.0%)

Table 2: Comparison of Mean Age, BMI, CP Bypass Duration, Surgery Duration, RBS Levels at Various Intervals, and Insulin Infusion Rates Between Study Groups

Parameter	Group 1 Mean ± SD	Group 2 Mean ± SD	P Value
Age	60.03 ± 11.749	58.00 ± 5.657	0.397
BMI	25.64 ± 2.159	26.65 ± 2.654	0.651
Duration of CP Bypass (minutes)	56.21 ± 12.76	58.12 ± 13.11	0.439
Duration of Entire Surgery (hours)	5.12 ± 1.30	5.28 ± 1.50	0.341
RBS Before Bypass	285.50 ± 53.90	269.17 ± 57.84	0.263
RBS On Bypass	245.50 ± 45.20	215.83 ± 51.30	0.033
RBS After Coming Off Bypass	205.50 ± 44.50	161.40 ± 46.55	0.001
RBS Immediate Post-Operative	235.50 ± 42.10	168.07 ± 32.40	0.001
RBS After 1 Hour of Surgery	243.50 ± 38.60	175.07 ± 28.23	0.001
RBS After 4 Hours of Surgery	261.50 ± 33.50	181.07 ± 27.40	0.001
RBS After 8 Hours of Surgery	238.50 ± 32.30	187.07 ± 26.40	0.001
RBS After 24 Hours of Surgery	229.53 ± 22.60	176.77 ± 29.12	0.001
Rate of Infusion of Human Actrapid Insulin	4.10 ± 1.20	1.34 ± 0.30	0.001

Table 3: Mean SBP and DBP at Various Time Intervals Among Study Groups

Time Interval	SBP			DBP		
	Group 1	Group 2	P	Group 1	Group 2	P
Before Bypass	126.2 ± 9.39	126.6 ± 10.0	0.895	81.60 ± 3.08	80.20 ± 4.40	0.159
On Bypass	124.6 ± 8.47	125.5 ± 9.86	0.716	79.53 ± 4.02	79.33 ± 4.01	0.848
After Bypass	124.2 ± 8.38	123.0 ± 7.76	0.567	78.13 ± 3.27	77.80 ± 3.25	0.694
Immediate Post-Operative	123.9 ± 8.34	122.3 ± 7.75	0.445	77.40 ± 2.88	76.53 ± 2.82	0.244
Post 1 Hour	120.7 ± 3.46	119.8 ± 5.84	0.488	76.80 ± 2.85	76.07 ± 2.99	0.336
Post 4 Hours	121.2 ± 3.66	120.0 ± 4.15	0.267	75.73 ± 2.81	75.53 ± 2.27	0.763
Post 8 Hours	120.9 ± 3.59	119.7 ± 3.88	0.219	75.07 ± 2.71	74.27 ± 2.27	0.221
Post 24 Hours	120.6 ± 3.41	118.8 ± 3.70	0.064	73.07 ± 2.71	72.27 ± 2.27	0.221

Table 4: Incidence and Types of Postoperative Complications, Mean Hospital Stay, and ICU Stay Among Study Groups

Parameter	Group 1 Count (%)	Group 2 Count (%)	P
Incidence of Complications			
Yes	9 (30.0%)	2 (7.0%)	0.001
No	21 (70.0%)	27 (90.0%)	-
Types of Complications			
Sternal wound infection	4 (13.3%)	0 (0.0%)	0.03
Respiratory tract infection	5 (16.7%)	1 (3.3%)	0.08
Urinary tract infection	7 (23.3%)	2 (6.7%)	0.07
Bacteremia	3 (10.0%)	0 (0.0%)	0.07
Length of Stay			
Mean Hospital Stay (days)	7.65 ± 1.7	4.59 ± 0.8	0.001
Mean ICU Stay (days)	4.25 ± 0.3	2.04 ± 0.5	0.001

DISCUSSION

Diabetes mellitus doubles the risk of cardiovascular disease, and about 75% of deaths in diabetic patients are due to coronary artery disease.[18,19] Studies have demonstrated increasing short- and long-term mortality in diabetic patients undergoing CABG compared with non-diabetic patients.[20,21] However, more recent reports have shown a significant reduction in mortality among patients with diabetes.[22] The association between perioperative hyperglycemia and adverse outcomes after cardiac surgery is well established.[23] Currently, in most cardiac centers, perioperative blood glucose is managed by continuous intravenous insulin infusion (CIII). However, CIII is fraught with the risks of fluctuations in blood glucose levels and the risk of hypoglycemia.

Insulin glargine, a long-acting and "peakless" insulin analog, was introduced into clinical practice several years ago for blood glucose control in the outpatient setting.[24] This specific type of insulin requires only a single daily dose of subcutaneous injection, which is more convenient and requires fewer devices. Several studies have demonstrated optimal blood glucose control with the use of insulin glargine without hypoglycemic complications, particularly in outpatients with both type-1 and type-2 diabetes mellitus.[25–27]

In this study, we compared blood glucose levels, the requirement for regular insulin, postoperative complications, and ICU and hospital stay between patients given glargine insulin preoperatively and those who were not.

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The present study revealed that the most common age group was 55 to 65 years in both study groups, followed by 45 to 55 years and more than 65 years, with no statistically significant difference between the groups. This trend aligns with findings by Patil et al., who reported a statistically significant increase in the prevalence of diabetes mellitus with age.[25] Similar observations were noted by researchers in both Indian and international contexts.[28–31] Ahmad et al. also reported a near threefold increase in diabetes mellitus prevalence after the age of 60, with rates rising from 5.8% in the 40–60-year age group to 16.66% in those over 60 years.[28] Regarding BMI, no significant difference was found between the study groups. This outcome is consistent with the findings of Gandhi et al., who reported comparable mean ages in their study groups.[15] Similar results were also observed by Forouzanniahi and co-workers.[32] This suggests that BMI may not significantly influence the comparative outcomes of patients managed with glargine insulin preoperatively versus those who were not, highlighting the consistency of our demographic data with existing literature.

The present study showed a male predominance (66.7%) compared to females (33.3%) in both study groups, with the difference being statistically insignificant. These findings align with the study conducted by previous study where 76% of the study population were male and 24% were female.[15] In the current study, the prevalence of diabetes mellitus was higher in males (13.75%) compared to females (7.5%), which was statistically significant ($P < 0.05$) 149. Similar results were reported by other set of researchers as well.[30,31] Conversely, other population-based studies found a higher prevalence in females.[18,29–31]

In this study, 66.7% of participants in Group 1 had a history of hypertension compared to 46.7% in Group 2, with the difference being statistically insignificant. These findings are consistent with those of Gandhi et al., where hypertension was observed in 44% of the control group and 40% of the glargine group.[15] Most participants in Group 1 had diabetes for 10 to 20 years, followed by less than 10 years. In Group 2, 76.7% had diabetes for 10 to 20 years, followed by less than 10 years (16.7%), with the difference being statistically insignificant. The present study found no significant differences in age, BMI, duration of CP bypass, and total surgery duration between the study groups. These findings are consistent with previous study which also reported comparable mean ages in both groups.[15] Similar findings were noted by Forouzanniahi and colleagues.[32] This consistency in demographic and procedural characteristics reinforces the reliability of the comparative outcomes observed in our study.

The present study demonstrated that while preoperative RBS levels and those at the start of the surgery were comparable between Group 1 and Group 2, RBS levels in Group 1 were significantly higher than those in Group 2 from the start of bypass until 24 hours post-surgery. Yeldandi et al. have shown that once-daily glargine insulin provides effective glycemic control in hyperglycemic patients following cardiovascular surgery, with outcomes comparable to those achieved with twice-daily NPH/regular insulin.[33] This finding is consistent with Gandhi et al., who observed that in the glargine group, RBS levels at 2 hours were significantly higher compared to those at 0 hours, whereas RBS levels in the control group showed no significant changes from 0 to 2 hours and 4 hours during surgery.[15] Furthermore, Silinski et al. reported that insulin glargine, when dosed based on weight or percentage, achieved a mean blood glucose level with a 66% success rate in maintaining glucose within the target range of 80–140 mg/dL.[34] In our study, the 100% conversion dose of daily regular insulin to glargine insulin resulted in a better glycemic control success rate. These findings are supported by other researchers, who demonstrated that continuous insulin infusion with glargine insulin provided adequate glycemic control and maintained glucose levels within the desirable range for up to 48 hours post-surgery. Their study reported that the mean blood glucose level in the glargine group was significantly lower than in the normal saline group, and the frequency of hypoglycemic events was reduced.[32]

Although there were no significant differences in SBP and DBP between the two study groups from the start of bypass until 24 hours post-surgery, a notable trend emerged. Patients in the glargine group exhibited less pronounced fluctuations in both SBP and DBP throughout the intraoperative and postoperative periods. This stability in blood pressure was likely due to the more consistent blood glucose control achieved in the glargine group, which may have contributed to a reduced need for ionotropic support compared to the control group. The reduced fluctuations in blood pressure observed in the glargine group suggest that better glycemic control can have beneficial effects on hemodynamic stability during and after surgery.

In the present study, the rate of continuous insulin infusion of HAI was significantly lower in Group 2 compared to Group 1. This finding is consistent with the study conducted by Gandhi et al., which reported comparable insulin requirements between the glargine and control groups during the initial half of surgery, but a significantly higher insulin requirement in the control group compared to the glargine group during the latter half of surgery and post-operatively.[15] This reduced infusion rate in the glargine group can be attributed to the efficacy of glargine insulin in maintaining steady blood glucose levels over a prolonged period, which minimizes the need for additional insulin adjustments. Furthermore, the results of our study highlight that glargine insulin, with its prolonged action and steady pharmacokinetics, offers an effective alternative to continuous intravenous insulin infusion by achieving adequate glycemic control with a lower infusion rate.

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Postoperative complications were significantly lower in Group 2 compared to Group 1. Specifically, the incidence of urinary tract infections, respiratory tract infections, and sternal wound infections was notably higher in Group 1 patients compared to Group 2. The difference in the rate of urinary tract infections between the two groups was statistically significant ($p < 0.05$), while other complications such as respiratory tract infections and sternal wound infections, although observed more frequently in the control group, did not reach statistical significance. These findings align with the results from previous work where complications like wound infections and lower respiratory tract infections were more prevalent in the control group compared to the glargine group, though these differences were not statistically significant.[15] Additionally, Furnary et al. demonstrated that continuous intravenous insulin infusion can reduce the incidence of deep sternal wound infections and improve outcomes in diabetic patients undergoing cardiac surgery.[35,36] Recent literature supports the notion that tight glycemic control, including through the use of glargine insulin, reduces postoperative complications such as sternal wound infections and lowers ICU stay and mortality rates in patients undergoing CABG.[37–39] Our study corroborates these findings, revealing that the implementation of preoperative glargine insulin significantly reduced postoperative morbidity.

The study found that the duration of ICU stay and hospital stay was significantly shorter in Group 2 compared to Group 1. These results are in parallel to reports suggesting significant reduction in both ICU and hospital stays for patients receiving glargine insulin compared to those on continuous insulin infusion.[15] This reduction in ICU and hospital stay can be attributed to the better glycemic control achieved with glargine insulin, which not only stabilizes blood glucose levels but also contributes to a smoother postoperative recovery process. By reducing the rate of postoperative complications and improving glycemic management, glargine insulin effectively shortens both ICU and hospital stays, enhancing overall patient outcomes.

CONCLUSION

This study demonstrates that the preoperative administration of insulin glargine, in combination with continuous intravenous insulin infusion (CIII), significantly improves perioperative glycemic control compared to CIII alone in patients undergoing CABG. The use of insulin glargine resulted in lower rates of postoperative complications, reduced ICU and hospital stays, and a lower rate of continuous insulin infusion. These findings suggest that insulin glargine offers a viable and effective alternative for managing blood glucose levels in the perioperative setting for diabetic patients undergoing CABG. Given these benefits, insulin glargine could be considered a preferred option for preoperative glycemic control in similar clinical contexts. However, future multi-center, randomized controlled trials with larger sample sizes and longer follow-up periods are needed to further validate these results and explore the long-term effects of insulin glargine on postoperative outcomes in cardiac surgery.

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