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# Investigating the Prevalence of Delirium after the Coronary Artery Bypass Graft (CABG) and its Risk Factors in Patients in Basra Oil Cardiac Center Hospital during 2023 from January to May

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***Abstract***

***Introduction:*** *Postoperative delirium in heart surgery patients is linked to increased morbidity, long-term cognitive damage, and mortality. This investigation seeks to find the frequency of delirium, factors affecting patients' likelihood of developing it before, during, and after surgery, and the relationship between delirium and hospital LOS and mortality.* ***Methods:*** *This prospective cohort study at Basra Oil Cardiac Center Hospital from January to May 2023 examined patients with postoperative delirium using convenience sampling. The study analyzed 42 potential risk factors for delirium, including 17 before, 4 during, and 21 after surgery. Postoperative outcomes included hospital and ICU stays, fatality rates, and Data were examined using SPSS 22.0. In this study, a p-value of less than 0.05 was disregarded.* ***Results:*** *Over five months in 2023, 138 patients were prospectively evaluated in the ICU. It was discovered that delirious patients were found to have had longer mean stays in the ICU and hospital after coronary artery bypass grafting (CABG) at Basra Oil Heart Center Hospital. The optimal regression model included two preoperative variables, one intraoperative factor, and four postoperative factors. Patients with older age, preexisting atrial fibrillation, longer surgeries, poorer sleep quality, and longer mechanical ventilation durations had a higher risk of delirium.* ***Conclusion:*** *The study found that patients with delirium had longer stays in the ICU and hospital after CABG at Basra Oil Heart Center Hospital. Factors such as older age, preexisting atrial fibrillation, longer surgeries, poorer sleep quality, and longer mechanical ventilation durations increased delirium risk.*

***Keywords:*** *Coronary Artery Bypass Grafting; Delirium; Incidence; Risk Factors. Postoperative Delirium;*

## INTRODUCTION

Complex medical treatments like cardio surgical surgeries have a high risk of serious consequences. Organ malfunction (such as cardiac failure, renal failure, and extended intubation), neurological disorders (such as postoperative psychosis, and perioperative stroke), and surgical complications (such as operational mortality, deep sternal wound infection, and reoperation) are all quite common after surgery. (1, 2). Postoperative cognitive impairment, delirium, and stroke are all associated with cardiopulmonary bypass (CPB), which is largely believed to be a contributing cause. By keeping the body's blood oxygenated during cardiac surgery while the heart is stopped, cardiopulmonary bypass (CPB) is a lifesaver. Cardiopulmonary bypass (CPB) has been linked to the neuropsychiatric disorder

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delirium (5) ever since its debut into cardiac surgery. It's characterized as a mental state disorder that develops rapidly (within hours or days) and progresses erratically. After heart surgery, delirium is the most prevalent sign of Type-II brain injury (6, 7). Patients with delirium may have a more difficult time recovering from surgery and receiving postoperative care. Delirium may lead to several adverse outcomes; include higher death rates, postoperative cognitive problems, and inability to function independently after surgery. Delirium after coronary artery bypass grafting (CABG) scientific inquiry into surgery extensively, and its effects on patient outcomes have been noted in several research. A systematic study and meta-analysis conducted by Greaves et al. (2020) shed light on the prevalence to identify predisposing variables for post-CABG delirium. In order to assess the total prevalence, they pooled data from different research and found many risk variables for the onset of delirium. Their results added to the body of data about the causes of delirium, which may be used for risk assessment and more precise treatment (9). Furthermore, Li et al. (2021) evaluated how delirium affected outcomes after CABG surgery using a retrospective cohort study. The researchers analyzed the effects of delirium on postoperative such as duration of hospital stay, rate of death, and other outcomes. For healthcare personnel to take the necessary preventative measures and improve postoperative care techniques (10), they must have a firm grasp on the effects delirium has on patients. After (CABG) surgery, delirium is a typical and potentially a condition that poses a significant risk to an individual's life. That may negatively impact recovery and add to healthcare costs. Confusion, disorientation, and changes in attention and perception are some of the hallmarks of this condition, which has an abrupt start. Patients following CABG surgery should be monitored for delirium since it might have serious consequences for their health and rehabilitation. Optimizing patient care and enhancing postoperative outcomes necessitates an awareness of the occurrence of delirium after CABG and variables associated with its development. There is a necessity to conduct an inquiry into the variables that are linked to increased risk of consequences such as delirium as well as additional neurological complications subsequent to (CABG) surgery to avert their occurrence, diagnosis, and appropriate treatment is clear when one considers the prevalence of these issues and the significance of CABG surgery the most typical cardiac operations.

## OBJECTIVES

The present research set out to do the following: (1) quantify the incidence of delirium among those undergoing cardiac surgery; and (2) identify intraoperative, postoperative, and preoperative risk variables for ICU delirium following cardiac surgery. This research aims to determine whether delirium after heart surgery increases the risk of death, increases hospital stay, or necessitates transfer to the ICU.

## PATIENTS & METHODE

From January through May of 2023, researchers at the Basra Oil Cardiac Center Hospital performed a study for prospective cohort. The research was carried out in a cardiovascular ICU. Every eight hours, the patient was evaluated for signs of delirium using the CAM-ICU criteria. (at 8:00, 16:00, and 24:00). Standardized data input forms were used to prospectively record patient information, surgical details, and postoperative outcomes. Each participant provided written informed permission after the research was authorized by the Ethics Review Committee at Tehran University of Medical Sciences. Over the course of five months in 2023, 138 patients who had just had CABG at Basra Oil heart center Hospital were prospectively evaluated in the ICU.

Individuals who have been diagnosed beforehand with a mental ailment such as Alzheimer's, epilepsy, dementia, etc. Patients whose deaths occurred over the First Postoperative Day, Surgical patients were unable to regain consciousness, Fewer than 24 hours were spent in ICU. Patients under

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the age of 18, those whose laboratory tests were incomplete, and those with missing data were not included in the study. This analysis used a sample method known as convenience sampling. The term "convenience sampling" refers to a data collection strategy in which samples of respondents are selected based on their availability. Therefore, 138 post-CABG patients consecutively admitted to the ICU were involved. Two groups of patients were created.: those who had postoperative delirium [Delirium (+)] and those who did not [Delirium (-)]. In this research, a 2-step process was used to regularly screen for delirium using the CAM-ICU criteria. The Richmond Agitation and Sedation Scale (RASS) was initially utilized to measure the patient awareness. If the patient's RASS score was 3 or above, we moved on to Stage 2. Patients who scored 4 or below on the RASS (response to just physical stimulation) or 5 or lower (response to both physical and verbal stimuli) were disqualified for CAM-ICU evaluation. Sedation dosages, if used, would be changed, and patients would have an evaluation 20 minutes later. Next, we'll use CAM-ICU to conduct consistent evaluations of delirium. The CAM-ICU criteria consist of the following four elements:

1. Sudden shifts or swings in mental state during the last twenty-four hours.
2. Inattention
3. a lack of focus
4. a skewed sense of awareness (i.e., not really awake)

There are four criteria that must be evaluated before a diagnosis of delirium may be made. If (1), (2), (3), and (4) are present, then delirium is assumed to be present. Sedation, agitation, and changes in state of awareness may all be evaluated using RASS. For criterion 4, a score greater than 0 is considered a positive value. Due to the higher risk of delirium among ICU patients, this study's participants were assessed beginning on the day after surgery and continuing until the sixth postoperative day. The individual in charge of the research will also evaluate delirium. Each patient was given anesthesia with the same combination of medicines in the same amounts as prescribed by local protocol. Premedication with 1 microgram of fentanyl and 0.15 milligrams of midazolam per kilogram of body weight, induction with 6 milligrams of sodium thiopental per kilogram of body weight, and relaxation with 0.5 milligrams of atracurium per kilogram of body weight constitute a standard protocol for general anesthesia. Cardiopulmonary bypass (CPB) was carried out as per usual procedures. Patients required conventional postoperative care after heart surgery, which was provided in the cardiac (ICU).

## RESULTS

There were 147 CABG patients hospitalized to the ICU, 141 (97%) of whom were included in the cohort, and 3 (2.12%) who were not. Three individuals were left out of the analysis because either their data was inadequate or they did not survive the surgical procedure.

Our research found that over half of the elderly individuals who participated had symptoms of delirium. Patients in this analysis varied in age from 52 to 75, with a mean age of 62.80 and a standard deviation of 5.977. Patients in the control group had an average age of 60.61 years (range: 52-70), with a standard deviation of 4.927 years. Patients with delirium had a wide range of ages, from 54 to 75, with a mean age of 64.82 and a standard deviation of 6.172. A statistically significant difference was seen between the two patient groups on this measure ($P < 0.0001$).

There were 114 men (82.6% of the total) and 24 girls (11.8%). There were 54 men (81.8% of the total) and 12 women (18.2%) in the placebo group, and 60 men (83.3%) and 12 women (16.7%) in the delirium group. There was no statistically significant difference between the two patient groups on this measure ($P = 0.495$). Patients were placed into one of four predetermined weight groups based

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on their body mass index (BMI): underweight (BMI 18.5), normal (BMI 18.5-25), overweight (BMI 25-30), and obese (BMI > 30). Twelve patients (8.7%) were considered underweight, forty-seven (34.1%) were considered normal weight, fifty-seven (41.3%) were considered overweight, and twenty-two (15.9%) were considered obese. There was a statistically significant difference (P = 0.046) between the two patient groups on this measure. Two patients (3%) in the control group and 11 patients (15.3%) in the delirium group experienced difficulties with hearing or speaking. This metric showed a statistically significant difference between the two patient groups (P = 0.013). Thirty-two patients (45.5% in the control group and 32 patients (44%) in the delirium group reported current or former smoking during the prior three months. This metric did not change significantly between the two patient groups (P = 0.521). Thirty patients, or 21.7%, reported recent alcohol use, including 15 (22.7%) in the control group and 15 (20.8%) in the delirium group. There was no statistically significant difference (P = 0.474) between the two patient groups and this metric. A total of 51 individuals (37% of the total) reported having been diagnosed with diabetes or were receiving treatment with oral antidiabetic medications or insulin for their condition. There were a total of 57 patients, with 18 (27.3%) in the control group and 33 (45.8%) in the delirium group. There was a statistically significant difference (P = 0.018) between the two patient cohorts on this measure. Sixty-four and a half percent of patients said they had been diagnosed with hypertension or were taking medication to control it. The control group consisted of 43 patients (65.2%) while the delirium group consisted of 46 patients (63.9%). There was no statistically significant difference (P = 0.51) between the two patient groups on this measure. Twenty-four people (17.4%) said they had a condition that made them more susceptible to delirium, with five people (7.6%) in the control group and nineteen people (26.4%) in the delirium group reporting such a condition. There was a statistically significant (P = 0.003) difference between the two patient groups on this measure. Twenty-four patients (17.4%) reported having had heart surgery prior to hospitalization, with one patient (1.5% of the control group) and six patients (8.3% of the delirium group) reporting this risk factor. There was no statistically significant difference (P = 0.073) between the two patient groups on this measure. Four patients (6.1%) in the control group and 13 patients (18.1%) in the delirium group exhibited chronic renal disease (elevated creatinine levels or on dialysis). There was a statistically significant difference (P = 0.028) between the two patient cohorts on this measure. Seven patients (10.6%) in the control group and 28 patients (38.9%) in the delirium group reported having a diagnosis of atrial fibrillation. There was a statistically significant (P < 0.0001) difference between the two patient groups on this measure. According to the New York Heart Association categorization, patients' cardiac function was assigned to one of four categories, numbered from one to four. Six patients (9.1%) in the control group fell into class 1, 23 patients (34.8%) into class 2, 36 patients (54.5%) into class 3, and 1 patient (1.5%) into class 4. There were two patients with class 1 cardiac function (2.8%), twenty patients with class 2 cardiac function (27.8%), forty-five patients with class 3 cardiac function (62.5%), and five patients with class 4 cardiac function (6.9%) in the delirium group. There was no statistically significant difference (P = 0.13) between the two patient groups on this measure.

Echocardiography was used to classify patients into those with an LVEF of 50% or higher and those with an LVEF of 50% or below prior to surgery. The echocardiograms of 39 patients (28.1%) in this research showed LVEF of less than 50%; of these, 22 patients (30.6%) were in the delirium group, whereas 17 patients (24.8%) were in the control group. There was no statistically significant difference (P = 0.332) between the two patient groups on this measure. The tests revealed that 17 patients (12.3%) had inadequate hemoglobin levels; of them, 8 were in the control group (12.1%) and 9 were in the delirium group (12.5%). There was no statistically significant difference (P = 0.577) between the two patient groups on this measure. The tests revealed that 17 patients (12.3%) had inadequate hemoglobin levels; of them, 8 were in the control group (12.1%) and 9 were in the delirium group (12.5%). There was no statistically significant difference (P = 0.577) between the two patient

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groups on this measure. The Hamilton Anxiety Scale (HAS) was used to evaluate the level of worry felt by each patient. Positive anxiety was defined as a HAS score of 15 or above. Overall, 19 patients (13.8%) had a HAS score of 15 or higher, with only 5 (7.6%) in the control group and 14 (19.4%) in the delirium group. There was a statistically significant difference (P = 0.037) between the two patient groups on this measure. The MMSE questionnaire was used to assess patients for cognitive impairment. Cognitive impairment was defined as an MMSE score of 27 or above. Nineteen patients (13.8%) in the research had an MMSE score higher than 27, with three patients (4.5%) in the control group and sixteen patients (22.2%) in the delirium group. This metric showed a statistically significant difference between the two patient groups (P = 0.002). Table (1) provides a detailed explanation of all these derived values. Study participants included 127 patients (92%), of whom 62 (93.9% in the control group and 65 (90.3% in the delirium group) had CABG surgery with CPB (cardiopulmonary bypass). There was no statistically significant difference (P = 0.318) between the two patient groups on this measure.

In this analysis, surgery took 249.99 60.76 minutes, on average. Surgery took 206.99 ± 34.68 minutes on average in the control group and 289.41 ± 52.24 minutes in the delirium group. There was a statistically significant (P 0.0001) difference between the two patient groups in this respect. Six patients (9.1%) in the control group and 12 patients (16.7%) in the delirium group suffered hypoxia (PaO2 decreasing below 60 mmHg) during the surgery. There was no statistically significant difference (P = 0.143) between the two patient groups on this measure.

Of the 19 patients who needed transfusions during the surgery, 11 were in the delirium group (15.3%) and 8 were in the control group (12.1%). There was no statistically significant difference (P = 0.387) between the two patient groups on this measure. Table (2). 53 patients (38.4%) needed post-operative blood transfusion; 11 patients (16.7%) in the control group and 42 patients (58.3%) in the delirium group were transfused blood. P < 0.0001 indicates a statistically significant difference between the two patient groups on this measure. Of the 111 patients who needed postoperative sedation, 44 were in the control group (66.7%), whereas 69 were in the delirium group (95.8%). There was a statistically significant (P < 0.0001) difference between the two patient groups on this measure. Patients in this research required mechanical breathing for an average of 24.99 9.25 hours. The average for the control group was 17.61 4.46 hours, whereas the delirium group was 31.74 7.07 hours. The two patient groups differed significantly from one another in this regard (P < 0.0001). Sixty-seven patients (48.5%) needed pain medication after surgery; 16 (24.2%) in the control group and 51 (70.8%) in the delirium group. There was a statistically significant (P < 0.0001) difference between the two patient groups on this measure. Eight patients (12.1%) in the control group and twenty-six patients (36.1%) in the delirium group had their creatinine levels rise following surgery. This metric showed a statistically significant difference between the two patient groups (P = 0.001). After the procedure, atrial fibrillation occurred in 30 patients (21.7%), including 6 (9.1%) in the control group and 24 (33.3%) in the delirium group. This metric showed a statistically significant difference between the two patient groups (P = 0.001). After surgery, the average hematocrit of participants in this research was 32.91 2.75 percent. In comparison to the delirium group's mean hematocrit of 32.57 ± 2.69 percent, the control group's hematocrit was 33.27 ± 2.78percent. In this regard, there was no statistically significant difference between the two patient groups (P = 0.134). After surgery, reduced cardiac output affected 16 patients (11.6%), including 2 (3% of the control group) and 14 (19.4% of the delirium group). This metric showed a statistically significant difference between the two patient groups (P = 0.002). After surgery, 31 patients (22.5%) had hypoxia (PaO2 60 mmHg), including 9 (13.6%) in the control group and 22 (30.6%) in the delirium group. There was a statistically significant difference (P = 0.014) between the two patient cohorts on this measure. After surgery, patients' sleep was evaluated on a subjective scale. Four patients (2.9%), 89 patients (64.5%), and 45

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patients (23.6%) all rated their sleep quality as "Good," "Moderate," or "Bad." Only one patient (1.5%) in the control group rated their sleep quality as "Good," while 56 patients (84.8%), 9 patients (13.6%), and 36 patients (8.2%) in the delirium group rated their sleep quality as "Good."

There was a statistically significant ($P < 0.0001$) difference between the two patient groups on this measure. Patients' ability to move about following surgery was evaluated. In this study, 14% of patients rated their mobilization as "Good," 63% rated it as "Moderate," and 26% rated it as "Bad." In the control group, 8% of patients rated their mobilization as "Good," 75% rated it as "Moderate," and 10% rated it as "Bad." Six patients (8.3%) in the delirium group reported a "Good" mobilization state, thirty-two patients (50%) reported a "Moderate" mobilization level, and thirty-two patients (41.7%) reported a "Bad" mobilization status.

The difference between the two patient groups on this metric was statistically significant ($P < 0.0001$). Diuresis therapy was administered to 123 patients (89.1%) after surgery, while delirium was treated in 70 patients (89.1%). The two groups had a statistically substantial difference on this parameter ($P < 0.001$). Hypercarbia ($PaCO_2$ increase >= 45 mmHg) occurred in 2 patients (3% of the control group) and 12 patients (16.7% of the delirium group) after surgery. The two groups had a statistically significant difference on this parameter ($P = 0.007$). One hundred ten patients (79.7%) had postoperative complications, including 74.2% in the control group and 84.7% in the delirium group. There was no significant difference ($P = 0.094$) between the two groups on this parameter. Forty-three patients (28.5%) had post-operative cardiac complications; this included twenty-nine (13.6%) from the control group and thirty (41.7%) from the delirium group. A statistically substantial difference ($P < 0.0001$) was found between the two groups on this parameter. Among the 61 patients surveyed, 44.2% had post-operative respiratory complications; 19.2% of the control group and 58.3% of the delirium group. A statistically substantial difference ($P < 0.0001$) was found between the two groups on this parameter. After surgery, two patients (3. %) in the control group and six (8.3%) in the delirium group had neurological complications. The two groups did not differ substantially on this measure ($P = 0.167$). The control group (1.5% of patients) and the delirium group (2.8% of patients) had postoperative bleeding requiring further surgical intervention. The difference between the two groups was insignificant for this metric ($P = 0.533$). Acute infections occurred in 49 patients (35.5%) after surgery; 23 patients (34.8%) in the control group and 26 patients (36.1%) in the delirium group. The two groups did not differ substantially on this measure ($P = 0.50$). After surgery, patients were asked to rate their own degrees of discomfort. The study's subjects reported a pain level of zero for 24.6%, mild for 60.9%, and severe for 14.5%. In the control group, 18 patients reported feeling no pain at all, 64 reported feeling just mild discomfort, and 4 experienced significant pain.

In the delirium cohort, 22% of patients reported having NO PAIN, 55.6% reported having MILD PAIN, and 22.2% reported having MIDDLE PAIN. Eighty patients, including 31 (47%) in the control group and 49 (68.1%) in the delirium group, developed electrolyte imbalance after surgery. In this regard, the two patient groups differed significantly from one another ($P = 0.01$). Table (3).

Patients in this research stayed in the intensive care unit for an average of 3.33 1.67 days after surgery. Delirium patients lasted an average of 4.60 days compared to 1.95 days for the control group. The two patient groups differed significantly from one another in this regard (P 0.0001). Patients spent an average of 21.42 7.28 days in the hospital. Delirium patients lasted an average of 26.53 6.31 days, compared to the control group's 15.85 2.80 days. The two patient groups differed significantly from one another in this regard ($P < 0.0001$). Two patients (3.3%) in the control group and five patients (6.7%) in the delirium group died in the intensive care unit (ICU). In this regard, there was no statistically significant difference between the two patient groups ($P = 0.258$). Table (4).

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## Table (2): Intraoperative risk factor

| | All patients (n = 138) | Control (n = 66) | Delirium (n = 72) | P | OR |
|---|---|---|---|---|---|
| | Mean ± SD (%) | Mean ± SD (%) | Mean ± SD (%) | | |
| With CPB | 127 (92) | 62 (93.9) | 65 (90.3) | 0.318 | |
| Surgery duration, min | 249.99 (60.76) | 206.99 (34.68) | 289.41 (52.24) | <0.0001 | |
| Hypoxia (PaO2 <60 mm Hg) | 18 (13) | 6 (9.1) | 12 (16.7) | 0.143 | |
| Blood transfusion | 19 (13.8) | 8 (12.1) | 11 (15.3) | 0.387 | |

## Table (4): Out comes in patient with delirium after CABG

| | All patients (n = 138) | Control (n = 66) | Delirium (n = 72) | P |
|---|---|---|---|---|
| | Mean ± SD (%) | Mean ± SD (%) | Mean ± SD (%) | |
| Length of stay ICU days | 3.33 (1.67) | 1.95 (0.79) | 4.60 (1.18) | <0.0001 |
| Length of stay Hospital days | 21.42 (7.28) | 15.85 (2.80) | 26.53 (6.31) | <0.0001 |
| ICU mortality | 7 (5.1) | 2 (3) | 5 (6.9) | 0.258 |

## Table (1): Predictors of postoperative delirium in coronary artery bypass graft patients

| | All patients (n = 138) | Control (n = 66) | Delirium (n = 72) | P | OR |
|---|---|---|---|---|---|
| | Mean ± SD (%) | Mean ± SD (%) | Mean ± SD (%) | | |
| Age | 62.8 ± 5.98 | 60.61 ± 4.93 | 64.82 ± 6.17 | <0.0001 | |
| Male | 114 (82.6) | 54 (81.8) | 60 (83.3) | 0.495 | |
| BMI | | | | 0.046 | |
| Underweight (BMI <18.5) | 12 (8.7) | 4 (6.1) | 8 (11.1) | | |
| Normal (18.5 ≤ BMI < 25) | 47 (34.1) | 16 (24.2) | 31 (43.1) | | |
| Overweight (25 ≤ BMI < 30) | 57 (41.3) | 33 (50) | 24 (33.3) | | |
| Obesity (BMI ≥30) | 22 (15.9) | 13 (19.7) | 9 (12.5) | | |
| Hearing or language barrier | 13 (9.4) | 2 (3) | 11 (15.3) | 0.013 | 5.77 |
| Tobacco use (3 mo before operation) | 62 (44.9) | 30 (45.5) | 32 (44.4) | 0.521 | |
| Alcohol use (3 mo before operation) | 30 (21.7) | 15 (22.7) | 15 (20.8) | 0.474 | |
| Diabetes mellitus | 51 (37) | 18 (27.3) | 33 (45.8) | 0.018 | 2.256 |
| Hypertension | 89 (64.5) | 43 (65.2) | 46 (63.9) | 0.51 | |
| Predisposing cerebral disease | 24 (17.4) | 5 (7.6) | 19 (26.4) | 0.003 | 4.374 |
| Predisposing cardiac surgery | 7 (5.1) | 1 (1.5) | 6 (8.3) | 0.073 | |
| Renal dysfunction (creatinine N110 mg/dL) | 17 (12.3) | 4 (6.1) | 13 (18.1) | 0.028 | 3.415 |
| AF | 35 (25.4) | 7 (10.6) | 28 (38.9) | <0.0001 | 5.364 |
| NYHA heart function | | | | 0.131 | |
| Class I | 8 (5.8) | 6 (9.1) | 2 (2.8) | | |
| Class II | 43 (31.2) | 23 (34.8) | 20 (27.8) | | |
| Class III | 81 (58.7) | 36 (54.5) | 45 (62.5) | | |
| Class IV | 6 (4.3) | 1 (1.5) | 5 (6.9) | | |
| LVEF <50% | 39 (28.3) | 17 (25.8) | 22 (30.6) | 0.332 | |
| Anemia | 17 (12.3) | 8 (12.1) | 9 (12.5) | 0.577 | |
| Carotid artery plaque | 52 (37.7) | 26 (39.4) | 26 (26.1) | 0.412 | |
| Anxiety (HAS ≥14) | 19 (13.8) | 5 (7.6) | 14 (19.4) | 0.037 | 2.945 |
| Cognitive impairment (MMSE <27) | 19 (13.8) | 3 (4.5) | 16 (22.2) | 0.002 | 6 |

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**Table (3): Factors associated with postoperative disorientation in CABG patients**

| | All patients (n = 138) | Control (n = 66) | Delirium (n = 72) | P | OR |
|---|---|---|---|---|---|
| | Mean ± SD (%) | Mean ± SD (%) | Mean ± SD (%) | | |
| Blood transfusion | 53 (38.4) | 11 (16.7) | 42 (58.3) | <0.0001 | 7 |
| Sedation treatment | 111 (81.9) | 44 (66.7) | 69 (95.8) | <0.0001 | 11.5 |
| Duration of mechanic ventilation, h | 24.99 (9.25) | 17.61(4.46) | 31.74 (7.07) | <0.0001 | |
| Analgesia use | 67 (48.6) | 16 (24.2) | 51 (70.8) | <0.0001 | 7.589 |
| Higher creatinine | 34 (24.6) | 8 (12.1) | 26 (36.1) | 0.001 | 4.098 |
| AF | 30 (21.7) | 6 (9.1) | 24 (33.3) | 0.001 | 5 |
| HCT, % | 32.91 (2.75) | 33.27 (2.78) | 32.57 (2.69) | 0.134 | |
| Low cardiac output (CI) | 16 (11.6) | 2 (3) | 14 (19.4) | 0.002 | 7.724 |
| Hypoxia (PaO2 <60 mm Hg) | 31 (22.5) | 9 (13.6) | 22 (30.6) | 0.014 | 2.787 |
| Quality of sleep | | | | <0.0001 | |
| Good | 4 (2.9) | 1 (1.5) | 3 (4.2) | | |
| Moderate | 89 (64.5) | 56 (84.8) | 33 (45.8) | | |
| Bad | 45 (32.6) | 9 (13.6) | 36 (50) | | |
| Mobilization | | | | <0.0001 | |
| Good | 14 (10.1) | 8 (12.1) | 6 (8.3) | | |
| Average | 87 (63) | 51 (77.3) | 36 (50) | | |
| Bad | 37 (26.8) | 7 (10.6) | 30 (41.7) | | |
| Diuresis treatment | 123 (89.1) | 53 (80.3) | 70 (89.1) | 0.001 | 8.585 |
| Hypercarbia (PCO2 ≥45 mm Hg) | 14 (10.1) | 2 (3) | 12 (16.7) | 0.007 | 6.4 |
| Postoperative complication | 110 (79.7) | 49 (74.2) | 61 (84.7) | 0.094 | |
| Cardiovascular system | 39 (28.3) | 9 (13,6) | 30 (41.7) | <0.0001 | 4.524 |
| Respiratory system | 61 (44.2) | 19 (28.8) | 42 (58.3) | <0.0001 | 3.463 |
| Neurologic system | 8 (5.8) | 2 (3) | 6 (8.3) | 0.167 | |
| Reoperation for bleeding | 3 (2.2) | 1 (1.5) | 2 (2.8) | 0.533 | |
| Acute infection | 49 (35.5) | 23 (34.8) | 26 (36.1) | 0.51 | |
| Pain severity | | | | 0.27 | |
| No pain | 34 (24.6) | 18 (27.3) | 16 (22.2) | | |
| Mild level | 84 (60.9) | 44 (66.7) | 40 (55.6) | | |
| Middle level | 20 (14.5) | 4 (6.1) | 16 (22.2) | | |
| Electrolyte disturbance | 80 (58) | 31 (47) | 49 (68.1) | 0.01 | 2.405 |

## DISCUSSION

From January through May 2023, researchers at the Basra Oil Cardiac Center Hospital performed a prospective cohort study. 138 patients were prospectively observed for five months in the intensive care unit at the Basra Oil Heart Center Hospital after undergoing CABG. (1) Determine the prevalence of delirium in cardiac surgery patients; (2) Identify preoperative, intraoperative, and postoperative risk factors of delirium in the ICU after cardiac surgery; and (3) Examine the association between delirium in the ICU after cardiac surgery and hospital length of stay, length of stay in the ICU, and mortality. This is the first study to examine the prevalence of delirium and related variables among Iraqi CABG patients hospitalized in intensive care units. The study found that 52.2% of patients who underwent CABG surgery exhibited delirium, a rate higher than those previously reported in the medical literature (11-14). The thorough and careful examination of patients' cognitive abilities before and at frequent intervals following surgery likely contributed to this conclusion. Since many patients with hypoactive delirium may go undiagnosed, studies that don't use cognitive testing frequently indicate lower incidence rates (15-17). Similarly, N. Smulter et al (18) found that among consecutive patients aged 70 and more who had standard heart surgery, 55% were diagnosed with

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delirium. Notably, they conducted cognitive assessments and observed delirium for a full four days after surgery, which is longer than most previous investigations (16, 18). Additionally, the inclusion of patients aged 65 and above, as well as surgical treatments other than isolated coronary bypass, possibly affected their results. This larger sample size of patients and types of surgical procedures may have been important in explaining the outcomes of their research. In all, we looked at 42 potential risk factors for delirium, including 17 before surgery, 4 during surgery, and 21 after. The study found a total of 25 factors (9 preoperative risk factors, 1 intraoperative risk factor, and 15 postoperative risk factors) that were significantly more common in patients with delirium compared to patients without delirium (p 0.05).

Using logistic regression, 25 variables were examined between the delirious and non-delirious groups to determine risk factors for postoperative delirium. Our research found that many variables, including patient age, preoperative atrial fibrillation (AF), surgical length, postoperative sleep quality decrease, extended mechanical breathing time, and electrolyte issues, all increase the likelihood of postoperative delirium. Researchers found an association between delirium and negative results. The length of hospital stays for patients diagnosed with delirium was substantially longer than that of patients without the disorder, by an average of 10.5 days. It indicates that postoperative delirium is a major and recurring problem for CABG patients in the intensive care unit, demonstrating the need for further focus on this issue. In line with data from the general population, older patients are more likely to have delirium after cardiac surgery (19, 20). Those with delirium were, on average, 4.21 years older than those without it, according to our research. Patients aged 65 and older and patients aged 80 and older who had undergone major heart surgery were compared to assess the prevalence of delirium and related risk variables. Disoriented patients over the age of 65 were found to be an average of 1.48 years older than their non-disoriented counterparts. Delirium occurs more often as the underlying condition progresses in direct correlation with its severity. There seems to be a correlation between the severity of the underlying illness and the prevalence of delirium. Patients having coronary artery bypass grafting (CABG) may be evaluated for their health with the use of the European System for Cardiac Operative Risk Evaluation (Euro SCORE) (15, 22). According to our findings, preoperative AF diagnosis resulted in individualized medical treatment plans for patients. Medication to prevent blood clots, control heart rate, and cardioversion were all components of this treatment plan. We found that AF is a substantial risk factor for postoperative delirium, with an OR of 1.20 (95% CI, 1.11-1.30) despite these precautions. In patients with preoperative AF, delirium was present in 80% (28/35) of cases. Our findings are in line with the literature that has previously linked AF with delirium (23–25). Lower cerebral perfusion owing to reduced cardiac output in AF is considered to be the primary mechanism behind this association (24). Previous studies have indicated and proven that cognitive impairment negatively affects neurologic outcomes following surgery (26, 28). J. emphasized the necessity for focused therapies to reduce the prevalence of delirium in patients who had just had heart surgery. Kazmierski et al. conducted a research including 25 participants. Consideration of cognitive impairment resulted in an odds ratio (OR) for delirium following cardiac surgery of 6.14 (95% CI: 3.31-11.39). Despite a significantly higher prevalence of cognitive impairment (as defined by an MMSE score of less than 27) in patients with delirium compared to the control group, logistic regression analysis did not uncover risk variables of cognitive impairment as a predictor of delirium incidence in our investigation. The prevalence of anxiety was much higher in the delirium group than in the control group; however this was not identified as a risk factor for delirium. Anxiety levels higher than or equivalent to 14 on the Hamilton Anxiety Scale.

With an odds ratio (OR) of 1.04 (95% CI, 1.03-1.06), delirium during coronary artery bypass grafting (CABG) was revealed to be a significant intraoperative risk factor for prolonged surgical procedures. These results indicate that surgical operations that take longer are linked to an elevated danger of

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delirium. Mu et al. (12) found that the incidence of delirium rose by 36% for every additional hour of surgery (OR 1.360; 95% CI, 1.01-1.83), lending credence to this theory. The danger of hypoperfusion and a systemic inflammatory response is raised not just because more complex surgeries need longer operating periods, but also because they also require greater anesthetic doses and blood transfusion volumes. Poor quality of sleep, as shown by sleep disorders or sleep deprivation indicators, was a significant independent predictor of postoperative delirium., with an odds ratio (OR) of 12.35 (95% CI, 1.89-80.88). When used alone, it outperformed all other methods. Eighty percent of delirium cases in 45 patients were related to inadequate sleep.

According to research by Mattoo et al. Sleep disturbances ranging from mild to severe were present in 80% of delirium patients, with the prevalence of these problems increasing with age. Earplug usage at night, for example, has been found in a research by Van Rompaey et al. (30) to reduce confusion and postpone the onset of delirium in patients of (ICU). As part of a larger delirium management program, measures should be explored to reduce the number of nocturnal care-related disruptions. Studies have looked at how electrolyte imbalance contributes to bad neurologic outcomes. The effects of electrolyte abnormalities on postoperative delirium after lumbar surgery were investigated in a research by Fineberg et al. (31). Similar results came from our own studies of people having coronary artery bypass grafting (CABG). Delirium occurred in 49 out of 80 patients who had postoperative electrolyte imbalance. Delirium was observed to be related with longer ventilator use, lending credence to earlier hypotheses (15). An odds ratio (OR) of 1.79 (95% CI, 1.35-2.38) emerged in our multivariate analysis as an independent predictor of postoperative delirium. According to research by N. Smulter et al. (18), the probability of developing delirium rises by 20% for every extra hour of mechanical breathing. It must be emphasized, however, that this factor is very nuanced and may be a reflection of more fundamental factors like comorbidities, anesthetic management, or surgical difficulties. The best way to avoid delirium is to learn what causes it and then take steps to lessen or eliminate those risks. The study found that a number of various health problems increased the likelihood of delirium.. However, it should be noted that not all of these root problems can be rectified. Given the complexity of the problem, it is essential to use techniques like environmental regulation and behavioral adjustments as part of both prevention and therapy. In addition to assessing delirium and determining its origin, these steps are crucial. Effective delirium prevention requires a team effort amongst medical professionals such as doctors, nurses, pharmacists, and occupational therapists. Patient and family education on delirium, as well as early movement and cognitive stimulation, are important to this method.

Promoting a regular sleep-wake schedule is crucial to treat and avoid delirium. Patients' sleep schedules may be more in sync with the natural circadian rhythm by opening shades throughout the day and encouraging alertness and movement. Improvements in nighttime sleep quality have been linked to daytime chances for physical exercise and involvement. It's especially important to let patients sleep undisturbed during the night. This entails doing things like turning down the volume, keeping the temperature steady, and keeping the lights low. In the critical care unit, preventing and treating delirium may be considerably aided by the use of specific environmental control measures and behavioral modifications. The danger of delirium may be decreased and the patient's recovery facilitated by instituting a normal sleep-wake schedule and improving the patient's immediate environment. Non-pharmacological therapies are an integral part of delirium management, and healthcare teams should work together to make them a top priority (32).

In conclusion, delirium is an ordinary outcome after cardiac surgery, and it is associated with a variety of factors that might arise at any time before, during, or after the operation. Delirium after coronary artery bypass grafting (CABG) surgery was more common in individuals who were older, had a history of atrial fibrillation (AF), had a longer procedure, had less restful sleep after surgery, required

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longer periods of mechanical breathing, and had electrolyte disturbances. This study confirms that delirium is linked to unfavorable outcomes such as increased hospital and intensive care unit (ICU) lengths of stay. More has to be done to prevent and manage delirium after coronary artery bypass graft (CABG) surgery since it negatively impacts patient outcomes. The results suggest that the CAM-ICU (bewilderment Assessment Method for the Intensive Care Unit) be used consistently by nurses to evaluate their patients' degrees of mental bewilderment. Patients at risk for delirium may be identified using these tests, allowing for the implementation of preventative measures.. Using these methods, healthcare providers may reduce the likelihood of delirium occurring and its subsequent effects on patients' recoveries. It is impossible to overestimate the importance of ordinary clinical settings in the prevention and treatment of delirium. Understanding what factors contribute to the development of delirium might help reduce its incidence and improve patient outcomes. If healthcare professionals are aware of the high rate of delirium in CABG patients, they can better care for them.

## Ethical approval

Tehran University of Medical Sciences's School of Public Health's ethics committee approved the research (IR.TUMS.SPH.REC.1401.235).

## Conflicting interests

There are no conflicting interests, according to the authors.

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