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The effect of opium addiction on short-term postoperative outcomes after coronary artery bypass graft surgery: A prospective observational cohort study

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Abstract

Introduction: Opium addiction has been recently suggested as a potential risk factor for the occurrence of perioperative complications in patients undergoing coronary artery bypass graft (CABG) surgery. The aim of this study was to evaluate whether opium addiction can potentially affect patients’ short-term postoperative outcomes after CABG surgery.

Material and methods: In a prospective observational cohort study, all consecutive patients who were scheduled for first-time isolated elective on pump CABG surgery were screened during the study period for opium addiction. The study was carried out between September 2015 and November 2016 at Mazandaran Heart Center, Sari, Iran. A total number of 228 patients (110 opium addicted (OA) and 118 non-addicted (NA)) were screened and included. All patients were evaluate, in terms of short-term postoperative outcomes, until hospital discharge or death.

Results: In the OA patients, the mean amount of estimated postoperative bleeding was significantly more than NA patients (535 ± 304.75 ml vs. 463.56 ± 209.77; P = 0.04). Mean ventilation time were significantly longer in the OA patients than in the NA (9.9 days vs. 8.66 days, P = 0.02). The mean duration of postoperative hospital stay was two days longer in the OA (10.83 days vs. 8.34 days, P < 0.001). Also, the mean use of packed cell during surgery and incidence of postoperative atrial fibrillation were higher in the OA patients than NA (P = 0.005).

Conclusion: The results of our study provide strong evidence that the opium addiction should be considered as a risk factors for developing perioperative complications, including higher mean postoperative bleeding, need for intraoperative packed red blood cell transfusion, ventilation time and length of hospital stay, in patients undergoing CABG surgery.

Keywords: Coronary artery bypass, Postoperative complications, Intraoperative complications, Opium dependence

1. Introduction

In recent years the prevalence of coronary artery disease (CAD) is increasing, worldwide [1–4]. Coronary artery bypass (CABG) surgery is a treatment approaches in patients with CAD [5–7]. It is estimated that approximately 500 thousand CABG surgeries performed annually in the United States [8–10]. CABG surgery is considered as a high-risk surgery due to the nature of the surgery and the potential for perioperative complications [11–15]. Despite the all recent technological advances and improved surgical techniques, perioperative complications
remain one of the most important causes of morbidity in patients undergoing CABG surgery [12–16]. Bleeding, dysrhythmias particularly atrial fibrillation, perioperative myocardial infarction (MI), renal dysfunction and surgical site infection are among the more common complications following CABG surgery [16,17]. These complications can result in significant patients' mortality, morbidity, longer intensive care unit (ICU) and hospital stay and consequently impose additional cost on both health system and patient [12,16]. It has been shown that approximately 10% of the healthcare costs and resource utilization in patients undergoing CABG surgery is associated with the occurrence of perioperative complications [16]. Hence, recognizing patients with high risk of perioperative complications and managing them with proper prophylactic interventions will significantly reduce the associated morbidity, mortality and costs [18–21].

Opium addiction has been recently suggested as a potential risk factor for the occurrence of perioperative complications in patients undergoing CABG surgery [22]. Addiction is a social and health problem in many countries, including Iran [22–25]. It is believed that Iran experiences the 2nd most severe addiction to opioids in the world [25,26]. Although it has been shown that opioids addiction is associated with increased risk of all-cause mortality, including cardiovascular diseases and cancer [24], one reason for the high prevalence of opium use among Iranian population is the misconception among some people that opiod use could prevent or ameliorate diabetes, hypertension and cardiac diseases [27]. It has been shown that the prevalence of opioid addiction in Iranian patients undergoing CABG surgery is high, ranging from approximately 9% to 16% [28–32]. Therefore, it is important to pay special attention to the opioid addiction and its potential consequences in patients undergoing CABG [22].

Relatively few studies evaluate the relationship between opioid addiction and the occurrence of perioperative complications after cardiac surgery. However, with conflicting results, it is difficult to understand clearly the relationship between opioid addition and perioperative complications in patients undergoing CABG surgery [27,29–33]. Therefore this study aimed to investigate whether opioid addiction can potentially affect patients' short-term postoperative outcomes after CABG surgery.

2. Material and methods

After obtaining approval from the institutional Ethics Committee and informed written consent from participants, all adult patients (age, 35-75 years), with American Society of Anesthesiologists (ASA) physical status class I and II, who were scheduled for first-time isolated elective on pump CABG surgery were included in this prospective observational cohort study. The study was conducted at Mazandaran Heart Center, Sari, Iran. Patients with previous history of cardiac surgery, heart failure with ejection fraction (EF) < 30%, renal failure (serum creatinine > 1.5 mg/dL on two consecutive tests), need for more than 4 grafts, and combined CABG with cardiac valve surgery were excluded from the study.

All consecutive patients were assessed during the study period for opium addiction and were assigned to one of the two groups [opium addicted (OA) and non-addicted (NA)]. Diagnosis of opium addiction was made according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV TR) criteria; if at least 3 of 7 behavioral, cognitive and physiological effects are meet by the patients in the past 12 months. Non-addicted patients never used opium in their lives before surgery. Patients' demographic and clinical characteristics including sex, age, history of diabetes mellitus (DM), body mass index (BMI), history of hypertension (HTN), myocardial infarction (MI), cigarette smoking, and preoperative EF were recorded. In patients with opium addiction, duration and the route of opium consumption was also recorded. Moreover, prior to and on days 1 and 2 after the surgery (at 8:00 a.m. each day), from all patients the blood samples were gotten to measure the levels of hemoglobin (Hb), blood urea nitrogen (BUN), hematocrit (HCT) and creatinine (Cr).

In both two groups the protocols for anesthesia, cardiopulmonary bypass (CPB), and surgery were same. For adequate anticoagulation state during surgery, the initial dose of heparin (300 IU/kg) was given to achieve a minimum activated clotting time (ACT) of 480 seconds. After CPB weaning, heparin was reversed by full dose of protamine chloride to achieved pre-programed target of ACT (<120 seconds). Also, for all patients mild hypothermia (32°C) was employed during CPB.

After surgery, all patients transferred to the cardiac surgery intensive care unit (ICU). Intra and postoperative information including duration of surgery, time of cardiopulmonary bypass, cross-clamp time, mechanical ventilation duration and the
morphine (10 mg)-paracetamol (Apotel®- 4 gr). All patients were connected to patient-controlled intravenous analgesia with control during ICU stay, all patients were connected to an intravenous infusion of heparin (1000 IU/h) for 24 hour. For postoperative pain management, patients without significant postoperative bleeding (during the first 6 hour) received heparin infusion (1000 IU/h) for 24 hour. For postoperative pain control during ICU stay, all patients were connected to patient-controlled intravenous analgesia with morphine (10 mg)-paracetamol (Apotel®- 4 gr). All patients in two groups were monitored carefully and continuously during ICU and after being moved to the coronary care unit (CCU). If ICU nurse practitioners visually detect any suspicious rhythms on monitoring, a 12-lead electrocardiogram (ECG) was recorded and then the ECG was assessed by two independent cardiologists blinded to the groups. In postoperative period, occurrence of any dysrhythmia that represents the characteristics of atrial fibrillation and last at least 30 seconds on a rhythm strip or 12-lead ECG were considered as postoperative atrial fibrillation (POAF). All patients were evaluate until hospital discharge or death. For prevention of withdrawal syndrome postoperatively, all OA patients received their total daily doses of opium orally or via a nasogastric tube during hospitalization.

2.1. Statistical analysis

Shapiro-Wilk was used to evaluate whether data were normally distributed. Patients’ baseline demographic and clinical characteristics for two groups (opium addicted; OA and non-addicted group; NA) were tabularized as percentages, median (interquartile range) or mean ± SD. Also, chi-square or Fisher-exact test and student t-test or Mann-Whitney U test were used for categorical data in two groups. Intention-to-treat analysis was used for evaluation postoperative complications. Score of those parameters were analyzed using repeated measurement analysis of variance (ANOVA) test between two groups. P-value of less than 0.05 was considered statistically significant.

3. Results

Among 252 screened patients throughout the period of study, 11 patients declined to participate in the study and 13 patients were not to be eligible to include in the study. Finally, 228 patients were enrolled into this study (110 OA and 118 NA). The OA included 35 females (31.8%), and the mean age was 60.15 ± 9.14 years. The NA included 45 females (38.1%), and the mean age was 60.3 ± 9.32 years. Mean of BMI for the OA patients was 26.25 ± 3.95 kg/m2 and for NA patients was 25.82 ± 4.07 kg/m2. No statistically significant differences were observed between two groups in terms of patients’ demographic and clinical characteristics (Table 1).

No significant differences were seen in terms of mean preoperative ejection fraction (EF), hemoglobin, hematocrit, creatinine, and albumin levels between two groups (Table 2).

3.1. Intraoperative and postoperative outcomes

In the OA patients, the mean of postoperative bleeding volume was more than NA patients (535 ± 80.75 ml vs. 463.56 ± 91.77; P = 0.04). Mean duration of surgery was similar between two group (3.97 ± 1 hour vs.3.94 ± 0.7; P = 0.83). Mean ventilation time were significantly longer in the OA than in the NA (9.9 days vs. 8.66 days, P = 0.02). In the OA patients the mean length of postoperative hospital stay was longer compared to NA patients (10.83 days vs. 8.34 days, P < 0.001). The mean use of packed cell during surgery was higher in the OA than NA (P = 0.005). OA patients had significantly more POAF than the NA patients (P = 0.012).

| Variables                        | Group                      | P value |
|----------------------------------|----------------------------|---------|
|                                  | Opium addicted (N = 110)   | Non-addicted (N = 118) |
| Age, year, mean ± SD             | 60.15 ± 9.14               | 60.3 ± 9.32 | 0.91 |
| Sex, F/M ratio                   | 35.75                      | 45.73    | 0.33 |
| BMI, kg/m2, mean ± SD            | 26.25 ± 3.95               | 25.82 ± 4.07 | 0.42 |
| DM                               | 37 (33.61)                 | 52 (44.12) | 0.14 |
| HTN                              | 57 (52.83)                 | 57 (48.37) | 0.51 |
| Cigarette smoking                | 73 (66.42)                 | 69 (58.55) | 0.27 |
| Number of grafts, median (interquartile range) | 3 (3-4) | 3 (3-4) | 0.63 |

F/M: female/male; BMI: Body mass index; DM: Diabetes mellitus; HTN: Hypertension.
Table 2. Preoperative ejection fraction (EF), hemoglobin, hematocrit, and creatinine levels according to opium use.

| Variables                  | Group                        | P value |
|----------------------------|------------------------------|---------|
|                            | Opium addicted (N = 110)     |         |
| EF                         | 49.44 ± 7.1                  | 0.11    |
| Hb                         | 12.96 ± 1.45                 | 0.11    |
| HCT                        | 38.38 ± 4.37                 | 0.43    |
| Cr                         | 1.05 ± 0.22                  | 0.47    |
| BUN                        | 17.25 ± 4.92                 | 0.26    |
|                            | Non-addicted (N = 110)       |         |
| EF                         | 50.92 ± 6.83                 |         |
| Hb                         | 12.67 ± 1.31                 |         |
| HCT                        | 37.79 ± 3.85                 |         |
| Cr                         | 1.07 ± 0.24                  |         |
| BUN                        | 17.76 ± 5.57                 |         |

EF: Ejection Fraction; Hb: Hemoglobin; HCT: Hematocrit; Cr: Creatinine; BUN: Blood Urea Nitrogen.

Table 3. The perioperative outcomes in OA and NA patients.

| Variables                  | Group                        | P value |
|----------------------------|------------------------------|---------|
|                            | Opium addicted (N = 110)     |         |
| Duration of surgery, hour  | 3.97 ± 16                    | 0.83    |
| CPB time, min              | 66.55 ± 21.71                | 0.76    |
| Cross-clamp time, min      | 44.23 ± 15.11                | 0.11    |
| Ventilation time, hour     | 9.94 ± 4.43                  | 0.02    |
| Need to Inotropic drugs    | 6 (5.52)                     | 0.33    |
| Length of hospital stay, day | 10.83 ± 6.67               | <0.001  |
| POAF                       | 10 (9.13)                    | 0.01    |
| Other dysrhythmia          | 1 (0.91)                     | 0.49    |
| Packed cell use during surgery | 0.94 ± 0.84              | 0.005   |
| Packed cell use after surgery | 0.95 ± 1.16               | 0.13    |
| FFP use in surgery         | 0.04 ± 0.38                  | 0.13    |
| FFP use after surgery      | 0.15 ± 0.64                  | 0.48    |
| Platelet use in surgery    | 0.43 ± 1.39                  | 0.32    |
| Platelet use after surgery | 1.27 ± 2.46                  | 0.13    |
|                            | Non-addicted (N = 110)       |         |
| Duration of surgery, hour  | 3.94 ± 0.78                  |         |
| CPB time, min              | 65.76 ± 18.74                |         |
| Cross-clamp time, min      | 41.11 ± 13.89                |         |
| Ventilation time, hour     | 8.66 ± 3.27                  |         |
| Need to Inotropic drugs    | 3 (2.54)                     |         |
| Length of hospital stay, day | 8.34 ± 2.58               | <0.001  |
| POAF                       | 2 (1.76)                     |         |
| Other dysrhythmia          | 0 (0)                        |         |
| Packed cell use during surgery | 0.64 ± 0.69              |         |
| Packed cell use after surgery | 0.69 ± 0.86               |         |
| FFP use in surgery         | 0 ± 0                        |         |
| FFP use after surgery      | 0.06 ± 0.41                  |         |
| Platelet use in surgery    | 0.16 ± 0.87                  |         |
| Platelet use after surgery | 0.83 ± 1.86                  |         |

CPB: Cardiopulmonary bypass; POAF: Postoperative atrial fibrillation; FFP: Fresh frozen plasma.

Table 4. Pre-and post-operative EF, Hb, HCT, Cr, and BUN levels of each study group.

| Variables                  | Time                          | P value |
|----------------------------|-------------------------------|---------|
|                            | Before surgery                | One day after surgery | Two day after surgery | Time trend | Time * group interaction |
| EF                         | Opium addicted (N = 110)     | 49.44 ± 7.1          | 48.22 ± 6.4           | 8.43 ± 1.22 | <0.001 | 0.014 |
| Hb                         | Opium addicted (N = 110)     | 12.96 ± 1.45         | 9.5 ± 1              | 8.74 ± 0.94 | <0.001 | 0.12 |
|                            | Non-addicted (N = 110)       | 12.67 ± 1.31         | 9.5 ± 1.02           | 8.74 ± 0.94 | <0.001 | 0.12 |
| HCT                        | Opium addicted (N = 110)     | 38.38 ± 4.37         | 28.8 ± 2.8           | 26.01 ± 3.61 | <0.001 | 0.12 |
|                            | Non-addicted (N = 110)       | 37.79 ± 3.8          | 28.77 ± 3            | 26.75 ± 2.71 | <0.001 | 0.12 |
| Cr                         | Opium addicted (N = 110)     | 1.05 ± 0.22          | 1.14 ± 0.23          | 1.17 ± 0.29 | 0.08 | 0.13 |
|                            | Non-addicted (N = 110)       | 1.07 ± 0.2           | 1.11 ± 0.21          | 1.17 ± 0.26 | 0.08 | 0.13 |
| BUN                        | Opium addicted (N = 110)     | 17.25 ± 4.92         | 20.45 ± 5.93         | 25.01 ± 9.45 | <0.001 | 0.24 |
|                            | Non-addicted (N = 110)       | 17.76 ± 5.57         | 19.41 ± 6.21         | 24.16 ± 8.74 | <0.001 | 0.24 |

EF: Ejection Fraction; Hb: Hemoglobin; HCT: Hematocrit; Cr: Creatinine; BUN: Blood Urea Nitrogen.

Occurrence of other complications in OA patients was higher than NA ones, but the difference was not statistically significant (P > 0.05) (see Table 3).

Mean pre-and post-operation of EF, Hb, HCT, Cr, and BUN levels of each group has been shown in Table 4. After matching the likely effective variable (DM), the differences of Hb became statistically significant (p = 0.01) and the difference of other parameters were not statistically significant (p > 0.05). There was a statistically main effect for time (P < 0.01), indicating that regardless of the groups, the mean baseline Hb, and HCT levels was higher than their mean postoperative values and the mean of postoperative values of Cr, and BUN was higher than the baseline values. No patients in both groups needed IABP or re-operation.

4. Discussion

The results of our study revealed that opium addiction is associated with significantly higher mean postoperative bleeding, need for intraoperative packed red blood cell transfusion, ventilation time and hospital stay length in patients undergoing CABG surgery. Opium consumption is considerably higher among cardiac patients than the general population in Iran [34]. Additionally, it has been revealed that using opium is about twice as common among Iranian cardiac surgery patients compared to Western countries. Additionally, postoperative cardiac, CNS and respiratory complications are higher in opioid dependents and abusers compared to non-substance users [30]. In a study by

Table 4. Pre-and post-operative EF, Hb, HCT, Cr, and BUN levels of each study group.
Ezadi-Mood et al. has shown that the prevalence postoperative delirium after CABG surgery is higher among opium addicted patients compared to non-addicted patients [35]. The results of another study indicate that opium abuser patients who underwent CABG surgery, compared to non-opium users, had significantly higher mechanical ventilation time after surgery. Also, opium abusers had higher DPB, MAP and HR in the first and second postoperative days, compared to non-user patients [36]. Additionally, opium addiction has been suggested as a predictor of POAF after cardiac surgery; so that patients with opium use had higher rate of POAF after CABG surgery [29,37]. In another study it was found that opium addiction is a risk factor for occurrence of post MI dysrhythmias [38]. A 10 years prospective cohort study shows that opium use in patients is associated with higher mortality rate after CABG surgery [39]. Nemati et al. in their study showed that opium addiction is associated with higher bleeding in postoperative period after CABG surgery [22]. Sadeghian et al. revealed that patients with opium addiction had longer resource utilization during hospitalization following CABG surgery [32]. Also, another study revealed that opium addicted patients undergoing CABG surgery were more likely to readmitted to the hospital, due to cardiac causes, during the 6 month after surgery [31]. Despite the potential negative impact of opium addiction in patients undergoing CABG surgery, some studies suggest protective effects of opium abuse as a protective factors in these patients. In a study by Amini et al. has shown that patients with opium abuse after CABG had significantly less frequent of acute kidney injury compared to non-opium abusers [40]. Also, Maghsoudi et al. reported that the length of inotropic agents in CABG perioperative period was significantly lower in opium addicted compared to non-opium dependent patients [33]. Further studies are required to investigate the potential protective effects of opium in patients undergoing CABG surgery. There are a few limitations in this study. The short term follow-up and comparatively small sample size of the patients in this study limited it’s only indicative value and therefore further studies with larger sample size and longer follow up for assessing the longer outcomes are warranted.

5. Conclusion

The results of our study provide strong evidence that the opium addiction should be considered as a risk factors for developing perioperative complications, including higher mean postoperative bleeding, need for intraoperative packed red blood cell transfusion, ventilation time and length of hospital stay after CABG surgery.

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References

1 Lopez-Jaramillo P, Casas JP, Bautista L, Serrano NC, Morillo CA. An integrated proposal to explain the epidemic of cardiovascular disease in a developing country. From socio-economic factors to free radicals. Cardiology 2001;96(1):1–6.
2 Sanchis-Gomar F, Perez-Quilis C, Leischik R, Lucia A. Epidemiology of coronary heart disease and acute coronary syndrome. Ann Transl Med 2016;4(13):256.
3 El-Menyar A, Zubaied M, Shehab A, Bulbanat B, Albutansi N, Alenezi F, et al. Prevalence and impact of cardiovascular risk factors among patients presenting with acute coronary syndrome in the middle East. Clin Cardiol 2011;34(1):51–8.
4 Ferreira-González I. The epidemiology of coronary heart disease. Rev Esp Cardiol (Engl Ed). 2014;67(2):139–44.
5 Baradari AG, Emami Zeydi A, Araabi M, Ghafari R. Metformin as an adjunct to insulin for glycemic control in patients with type 2 diabetes after CABG surgery: a randomized double blind clinical trial. Pak J Biol Sci 2011;14(23):1047–54.
6 Ziv-Baran T, Mohr R, Yazdechi F, Loberman D. The epidemiology of coronary artery bypass graft surgery in a community hospital: A comparison between 2 periods. Medicine (Baltimore) 2019;98(13):e15095.
7 Diodato M, Chedrawy EG. Coronary artery bypass graft surgery: the past, present, and future of myocardial revascularisation. Surg Res Pract 2014;2014:726158.
8 Archbold RA, Curzen NP. Off-pump coronary artery bypass graft surgery: the incidence of postoperative arterial fibrillation. Heart 2003;89:1134–7.
9 Squiers JJ, Mack MJ. Coronary artery bypass grafting-fifty years of quality initiatives since Favaloro. Ann Cardiothorac Surg 2018;7(4):516–20.
10 Epstein AJ, Polsky D, Yang F, Yang I, Groeneveld PW. Coronary revascularization trends in the United States, 2001-2008. JAMA 2011;305(17):1769–76.
11 Ghafari R, Baradari AG, Firouzian A, Nouraei M, Araabi M, Zamani A, et al. Cognitive deficit in first-time coronary artery bypass graft patients: a randomized clinical trial of lidocaine versus procaine hydrochloride. Perfusion 2012;27(4):320–5.
12 Nearman H, Klick JC, Eisenberg P, Pesa N. Perioperative complications of cardiac surgery and postoperative care. Crit Care Clin 2014;30(3):527–55.
13 Montrief T, Koyfman A, Long B. Coronary artery bypass graft surgery complications: A review for emergency clinicians. Am J Emerg Med 2018;36(12):2289–97.
14 Safaie N, Montazerghaem H, Jedati A, Maghamipour N. In-Hospital Complications of Coronary Artery Bypass Graft Surgery in Patients Older Than 70 years. J Cardiovasc Thorac Res 2015;7(2):60–2.
15 Carvalho MR, Silva NA, Oliveira GM, Klein CH. Complications and hospital length of stay in coronary artery bypass graft surgery in public hospitals in Rio de Janeiro. Rev Bras Ter Intensiva 2011;23(3):312–20.
16 Anthony A, Sendlbach S. Postoperative complications of coronary artery bypass grafting surgery. Crit Care Nurs Clin North Am 2007;19(4):493–515.
17 Cheng DCH, Wong DT, Kustra R, Karski J, Carroll-Munro J, Tibshirani RJ, et al. Risk factors of delayed extubation,
prolonged length of stay in the intensive care unit, and mortality in patients undergoing coronary artery bypass graft with fast track cardiac anesthesia: a new cardiac risk score. J Anaesthesiol 1999;91:936.

18 Azarfarin R, Ashouri N, Totonchi Z, Bakhsheideh H, Yaghoubi A. Factors influencing prolonged ICU stay after open heart surgery. Res Cardiovasc Med 2014;3(4):e2019.

19 Shin SR, Kim WH, Kim DJ, Shin IW, Sohn JT. Prediction and Prevention of Acute Kidney Injury after Cardiac Surgery. Biomed Res Int 2016;2016:2985148.

20 Karaca M, Demirbas MI, Biceroglu S, Cevik A, Cetin Y, Arpaz M, et al. Prediction of early postoperative atrial fibrillation after cardiac surgery: is it possible? Cardiovasc J Afr 2012;23(1):34–6.

21 Strabelli TM, Stolf NA, Uip DE. Practical use of a risk assessment model for complications after cardiac surgery. Arq Bras Cardiol 2008;91(5):342–7.

22 Nemati MH, Astaneh B, Ardekani GS. Effects of opium addiction on bleeding after coronary artery bypass graft surgery: report from Iran. Gen Thorac Cardiovasc Surg 2010; 58(9):456–60.

23 Sadeghian S, Darvish S, Davoodi G, Salarifar M, Mahmoodian M, Fallah N, et al. The association of opium with coronary artery disease. Eur J Cardiovasc Prev Rehabil 2007; 14:715–7.

24 Ahmadi J, Toobaee S, Kharras M, Radmehr M. Psychiatric disorders in opioid dependants. Int J Soc Psychiatry 2003;49: 185–91.

25 Khademi H, Malekzadeh R, Pourshams A, Jafari E, Salahi R, Semnani S, et al. Opium use and mortality in Golestan Cohort Study: prospective cohort study of 50,000 adults in Iran. BMJ 2012;344:e2502.

26 Zardosht R, Hashemian M, Moghadamhosseini V, Akaber A. Substance use among non-fatally injured patients attended emergency departments in North-East of Iran Sabzevar. Life Sci J 2012;9(4):1292–7.

27 Zarghami M. Iranian Common Attitude toward Opium Consumption. Iran J Psychiatry Behav Sci 2015;9(2);e2074.

28 Abdollahi MH, Forouzan SKH, Zahreh S. Demographic characteristics of opioid addiction in patients undergoing Coronary Artery Bypass graft. Tehran Univ Med J 2007;64(10):54–9.

29 Salzi F, Zokaei AH, Moloudi AR. Predictors of atrial fibrillation following coronary artery bypass grafting. Clin Med Insights Cardiol 2011;5:67–75.

30 Azarasa M, Azarfarin R, Changizi A, Alizadehasl A. Substance use among Iranian cardiac surgery patients and its effects on short-term outcome. Anesth Analg 2009;109(5):1553–9.

31 Safaii N, Kazemi B. Effect of opium use on short-term outcome in patients undergoing coronary artery bypass surgery. Gen Thorac Cardiovasc Surg 2010;58(2):62–7.

32 Sadeghian S, Karimi A, Dowlatshahi S, Ahmadi SH, Davoodi S, Marzban M, et al. The association of opium dependence and postoperative complications following coronary artery bypass graft surgery: a propensity-matched study. J Opioid Manag 2009;5(6):365–72.

33 Maghsoudi B, Khademi S, Akhlagh SH, Khosravi MB, Azemat S. Effect of Opium Addiction on Perioperative Needs to Inotropic Agents in Coronary Artery Bypass Surgery: a Case-control study. Shiraz E Med J 2012;13(1):5–12.

34 Najafi M. Opium and the Heart: Common Challenges in investigation. J Teh Univ Heart Ctr 2010;5(3):113–5.

35 Eizadi-Mood N, Aghadavoudi O, Najjarzadegan MR, Fard MM. Prevalence of delirium in opium users after coronary artery bypass graft surgery. Int J Prev Med 2014;5(7): 900–6.

36 Aghadavoudi O, Eizadi-Mood N, Najjarzadegan MR. Comparing cardiovascular factors in opioid abusers and non-users candidate for coronary artery bypass graft surgery. Adv Biomed Res 2015;4:12.

37 Soleimani A, Habibi MR, Hasanzadeh Kiabi F, Emami Zeydi A. Opium addiction as a novel predictor of atrial fibrillation after cardiac surgery. Int Cardiovasc Res J 2012; 6(3):96.

38 Mirzaiepour F, Dadras M, Forood A, Najafipour H, Shokoohi M. The effect of opium addiction on arrhythmia following acute myocardial infarction. Acta Med Iran 2012; 50(10):670–5.

39 Farhangi MA, Moradi F, Najafi M, Jafarabadi MA. 10-year survival in coronary artery bypass grafting surgery patients in Tehran heart center, coronary outcome measurement study: Predictive power of dietary inflammatory index and dietary antioxidant quality. Nutrition 2019;63: 64:22–8.

40 Amini S, Najafi MN, Karrari SP, Mashhadi ME, Mirzaei S, Tashnizi MA, et al. Risk factors and outcome of acute kidney injury after isolated CABG surgery: a Prospective Cohort study. Braz J Cardiovasc Surg 2019;34(1):70–5.