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Prevalence of Post-Operative Atrial Fibrillation Following Cardiac Surgery Among Asian Population and Preferred Treatment Modalities: A Systemic Review

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Abstract

Background: Postoperative atrial fibrillation (POAF) is a common complication following cardiac surgery, with reported incidences varying widely. Despite numerous studies, the true prevalence and optimal management strategies remain unclear. This systematic review aims to investigate the prevalence and management techniques of POAF followed in the Asian population post-cardiac surgery.

Methods: A comprehensive search was conducted using PRISMA criteria across multiple databases. Cohort studies and randomized controlled trials published between 2000 and 2023 were included. Data on study characteristics, prevalence, and treatment modalities were extracted and assessed for quality using standardized tools.

Results: Out of 1849 identified studies, 23 met the eligibility criteria, all conducted in Asian countries. The prevalence of POAF ranged from 10 % to 58 % among cardiac surgery patients in individual studies, translating to a calculated mean value of 24.46 % POAF cases in all accumulated eligible studies for prevalence in the Asian population, which is high in comparison to the very few studies taken in the review and its population under study. The prevalence of POAF in the Asian population was calculated to be 20.95%. Various risk factors including age, comorbidities, and surgical techniques were associated with POAF development. Treatment modalities such as antiarrhythmics and anticoagulants showed varying efficacy, with dexmedetomidine demonstrating potential preventive effects. Gender disparities and comorbidities like hypertension and diabetes were identified as significant risk factors for POAF. Studies highlighted the higher recurrence rates in cardiac surgery compared to non-cardiac surgery patients. Additionally, the association between POAF and adverse outcomes such as stroke and mortality underscores the importance of effective management strategies.

Conclusion: Despite limitations in study design and sample sizes, this review provides valuable insights into the prevalence and management of POAF in Asian cardiac surgery patients. Tailored approaches incorporating antiarrhythmics, anticoagulation, and lifestyle modifications may help mitigate the burden

of POAF and improve patient outcomes. Further research is warranted to elucidate optimal management strategies and address existing gaps in knowledge.

Keywords: Postoperative, cardiac surgery, Atrial fibrillation, Asia

1. Introduction

Post-operative atrial fibrillation (POAF) is the most common arrhythmia after cardiac surgery. The true incidence of POAF following cardiac surgery is unclear. The reported incidence ranges from 10-65% depending on patient profile, type of surgery method of arrhythmia surveillance, and definition of arrhythmia.[8,9,10,11] Atrial fibrillation (AF) is a common complication of cardiac surgery, with an increasing incidence. Post-operative AF results in many complications and increased healthcare resources. The reported prevalence and incidence of AF after cardiac surgery varies among different studies, depending on population profile, type of surgery, arrhythmia definition and detection methods, and design of study. The incidence of postoperative AF is much higher when compared with the general population, even among older patients and non-cardiac surgery patients.[1] POAF normally develops between days 2 and 4 after surgery. The maximum incidence of POAF was usually seen on postoperative day 2. Ninety per cent of the patients who develop POAF do so by day 4 after surgery and 94% by the end of day 6.[6,7] The precise pathophysiology of POAF after heart surgery is not known. Multiple baselines and intraoperative risk factors have been associated with POAF, such as age, history of hypertension, obesity, diabetes mellitus, inflammation, and longer pump and cross-clamp times.[2,3-5] Stroke is the most important clinical outcome of POAF. It also significantly affects the prognosis.[12] Female gender has been reported as a risk factor in several cardiovascular diseases, namely with regard to mortality and postoperative complications, including increased hospital stay and in-hospital morbidity such as postoperative atrial fibrillation POAF.[13,14] Post-operative atrial fibrillation(POAF) is often precipitated by adrenergic stimulation and local or systemic inflammation affecting a susceptible atrium in the perioperative period. It affects approximately 30-60% of patients undergoing cardiac surgery(CS) and 5-10% undergoing non-cardiac surgery(NCS).[15,16]

This systematic review investigates and summarizes the prevalence, outcome and management of POAF following cardiac surgery.

2. Methods

2.1. Criteria for inclusion and exclusio

Articles published in English, cohort studies, randomized controlled trials, management techniques in cardiac surgery for postoperative atrial fibrillation, and other studies that were dated between 2000 and 2023 were all considered for inclusion in the selection process. Reviews, abstracts, non-English literature, meta-analyses, case reports, cohort studies conducted outside of Asia, and reviews were excluded.

2.1.1. Study characteristics

The systematic review identified and analyzed a total of 23 studies conducted in Asian countries, including Japan, Turkey, Iran, Pakistan, India, China, Russia, Korea, and Israel. These studies comprised diverse sample sizes, ranging from less than 100 participants to over 1000 participants, with the majority falling between 100 and 1000. The review encompassed a variety ofstudy designs, including cohort studies and randomized controlled trials, conducted over different periods between 2000 and 2023. Study

characteristics were evaluated to compare prevalence rates, treatment modalities, and outcomes of POAF among Asian populations undergoing cardiac surgery.

2.1.2. Participant types

The systematic review included studies focus ing on participants who underwent cardiac surgery, particularly within Asian populations. Studies encompassed diverse demographics, including various age groups, genders, and comorbidities such as hypertension, obesity, and diabetes mellitus. Participants ranged from those with no history of cardiac disease to those with complex cardiac conditions requiring surgical intervention. Notably, the review examined both on-pump and off-pump coronary artery bypass grafting (CABG) procedures, encompassing a broad spectrum of patients undergoing cardiac surgery in Asian countries.

2.1.3. Intervention types and controls

The review assessed various intervention types and controls aimed at managing postoperative atrial fibrillation (POAF) following cardiac surgery. Interventions included pharmacological treatments such as antiarrhythmic medications, anticoagulation therapy, and dexmedetomidine administration. Additionally, lifestyle modifications and targeted interventions based on identified risk factors were considered. Control groups encompassed standard postoperative care protocols without specific interventions for POAF prevention.

Studies compared the efficacy and safety of different interventions, often employing randomized controlled trials (RCTs) and cohort studies to evaluate outcomes.

2.1.4. Outcomes measures

The primary outcome measures ofthe systematic review focused on examining the incidence, consequences, and treatment outcomes of POAF following cardiac surgery, particularly among Asian populations. Keysecondary outcome measures included comparative studies of various therapy methods used to manage POAF. Outcome assessments encompassed the prevalence of POAF, recurrence rates, mortality, stroke incidence, and the efficacy of different treatment modalities. Additionally, the review evaluated the impact of individual risk factors, intervention strategies, and patient demographics on POAF outcomes to inform tailored management approaches.

2.2. Literature searches and data selection

Four investigators independently searched Pubmed, Google Scholar, Embase, and Cochrane; the remaining members resolved the results. "Post-operative atrial fibrillation following cardiac surgery" was the search keyword we used in our study. The titles and abstracts of the papers were used to initially filter them; the screened articles were then chosen using the inclusion and exclusion criteria. Four investigators worked independently on this process, with the other three investigators resolving any differences. We can further narrow them by adding our selection criteria to an AI-powered program named "Rayyan" after importing all of the articles.

2.4. Data extraction

Three review authors independently gathered pertinent study features and outcomes from the included studies. The following data were taken from each study: study kind, study period, and year of publication.

2.5. Quality/risk of bias assessment of included studies

The findings of all the research taken into consideration in this review could be analyzed since the two

reviewers used a thematic approach to synthesize and filter the results of the publications included. The reviewers looked at the titles and abstracts on their own. Related research' whole texts were located and examined. Relevant information was taken out of the research, and using the proper quality evaluation instruments, the risk of bias was evaluated. Two reviewers examined the rob evaluation on their own. Using the Critical Appraisal Skills Programme, the included studies' quality and ROB were evaluated (CASP). Following the identification of the research design and reading of the articles, the CASP tool was used to score the articles, which ranged from 0 to 2.

2.6. Data analysis

Data analysis involved a comprehensive synthesis of findings from the included studies, utilizing both quantitative and qualitative approaches. The review assessed the quality and risk of bias of individual studies using standardized evaluation tools, ensuring robustness and reliability of the findings. Furthermore, sensitivity analyses and subgroup analyses were conducted to explore potential sources of heterogeneity and variability in study outcomes.

3. Results

3.1. Study characteristics

We identified 1849 studies meeting our search criteria. After excluding 82 duplicates, 33 were marked as ineligible by automation tools, 1338 records were removed for other reasons, 396 were evaluated and 23 total studies were included in this review.

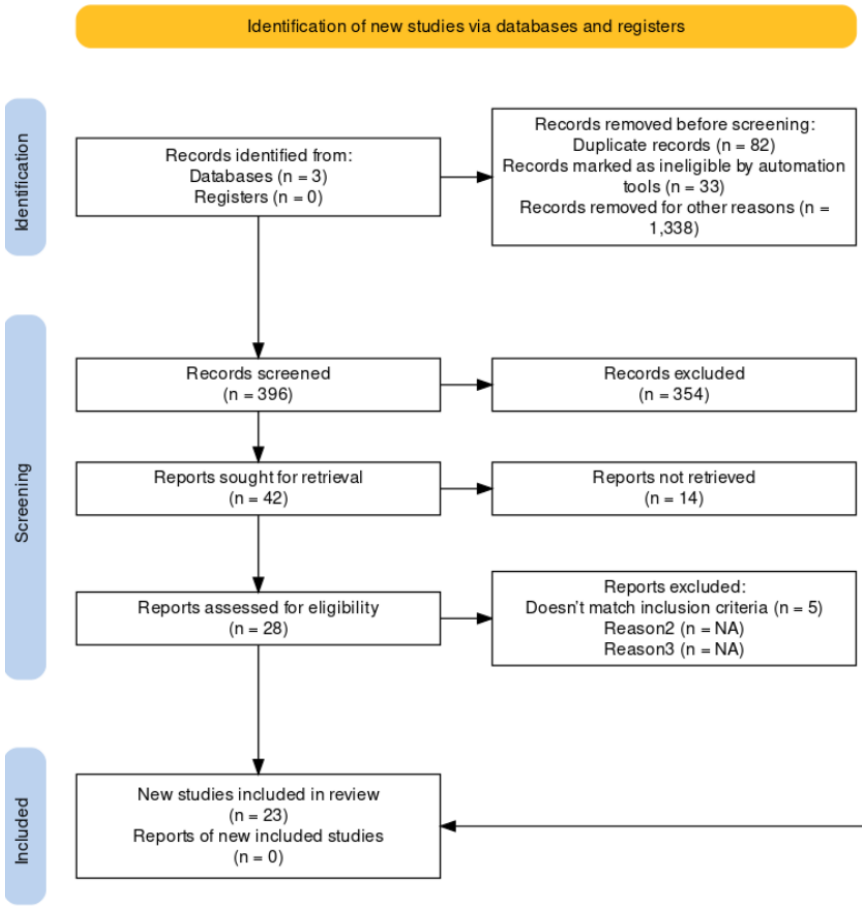


Figure 1: Prisma sheet for study selection

All 23 studies that were included in this systematic review were studies conducted in Asia. The countries included were Japan (6), Turkey (6), Iran (3), Pakistan (2), India (2), China (1), Russia (1), Korea (1), Israel(1). The sample size was less than 100 in 4 studies, between 100 and 1000 in 15, and more than 1000 in 4. The data was extracted from the articles and all the information was used to compare the various treatment modalities for post-operative atrial fibrillation and its prevalence in Asian countries.

Sr.no	Country	Number of Patients Included in the Study
1	Japan	954
2	Turkey	5462
3	Iran	1790
4	Pakistan	192
5	India	1718
6	China	88
7	Russia	100
8	Korea	1664
9	Israel	161
	Mean	1347.66

Table 1 Characteristics of the studies included in the systematic review.

no	First author	Year	Type of Study	N	Duration of study	Country	Interventions	Outcomes	Results
1	Sezai A	2021	Observational	135	na	Japan	Total groups - 3 apixaban (n = 31), edoxaban (n = 87), rivaroxaban (n = 17)	DOAC as anticoagulation therapy for the early intervention of POAF following cardiac surgery is associated with a low incidence of major bleeding.	Results indicate that the safety and efficacy of apixaban and edoxaban are better than rivaroxaban.
2	Fragão-Marques M	2020	Comparative	379	4 years	Japan	Total groups - 2 Male and female	In severe aortic stenosis, factors associated with POAF and its impact on mortality differed between genders, with an increased risk of	POAF was linked to an increased risk of death in men but not in women.

								death observed only in men.	
3	Ayoub K	2018	Retrospective Study	112	4 years	Pakistan	Total groups - 2 For each group - 61 cardiac; 51 non-cardiac	The risk of recurrent AF and ischemic stroke is not different between POAF after CS or NCS.	AF recurrence rate within 30 days after hospital discharge was higher in CS compared with NCS (10% vs 0%, p =0.03). Kaplan Meier analysis showed a trend towards higher recurrence in NCS compared with CS (HR 2.8; 95% CI 0.78-10.6, log-rank p =0.03).In long-term follow-up, CVA was numerically more common in patients with POAF after CS compared with NCS(10% vs 2%) though this difference was non-significant(HR 3.1; 95% CI

									0.72-13.3; log rank p =0.26).
4	Sezai A	2015	RCT	60	na	Japan	Total groups - 2 Lanidiol group and control group	Low-dose infusion of landiolol hydrochloride prevented atrial fibrillation after cardiac surgery in patients with cardiac dysfunction and was safe, with no effect on blood pressure. This intravenous β-blocker seems useful for perioperative management of cardiac surgical patients with left ventricular dysfunction.	Atrial fibrillation occurred in 3 patients (10%) in the landiolol group versus 12 (40%) in the control group, and its frequency was significantly lower in the landiolol group (P = .002).
5	Khan, H	2021	Descriptive cross-sectional	80	5 months	Pakistan	Study conducted on 80 cardiac patients who underwent CABG surgery.	Frequency of POAF is moderately high with advanced age. Hypertension, obesity, and BMI play pivotal roles in the development of POAF with prolonged bypass time and Aortic Cross-clamp time	The frequency of POAF calculated is 47 (58.75%). Majority of the patients who developed POAF presented with a history of hypertension and diabetes mellitus i.e.27.50% with male predominance i.e. 70% with

									the mean of variables, age=60.19 ± 9.3 years, body mass index=28.27 ± 4.2 kg/m2, CPB time = 156 ± 39.7 min, aortic cross-clamp time=100 ± 27.2 min, ejection fraction v(EF) = 47.2 ± 10.7%, heart rate = 117.8 ± 21 beats per minute and serum lactate levels = 3.7 ± 1.54 mmol/lit.
6	Arslan G	2021	Retrospective analysis	3197	5 years	Turkey	Total groups - 2 For each group - 1816 males and 1381 females	Recommended using off-pump CABG in select cases to minimize the risk of POAF.	Study results suggest that on-pump CABG under CPB is correlated with POAF.
7	Hossaini Alhashemi, S.	2022	RCT	234	9 months	Iran	Soft gelatin capsules containing 80 mg nanocurcumin with the brand name SinaCurcumin ™ were prescribed to patients in the intervention	It seems that perioperative treatment with 240 mg SinaCurcumin™ (80 mg, three times per day) did not prevent POAF after CABG surgery.	Postoperative AF developed in twenty-five patients (11%). The incidence of POAF was 9.5% and 11.5% in SinaCurcumin ™ and placebo

							group. They received 240 mg nanocurcumin capsules daily (80 mg, three times a day), starting from three days before the surgery and on the first four postoperative days.		groups, respectively. Although the occurrence was lower in the treatment group, no significant differences between the groups were observed in this regard (p=0.62)
8	Borde, D	2014	Retrospective observational	729	18 months	India	729 patients undergoing CABG on cardiopulmonary bypass (CPB) were enrolled. Patients were followed in the postoperative period for POAF. A multiple regression analysis was run to predict POAF from various variables.	The main finding of this study was that the CHA2DS2 -VASc score is useful in predicting POAF after CABG. This scoring system is simple and convenient to use in the preoperative period to alert the clinician	POAF occurred in 95 (13%) patients. The patients with POAF had higher CHA 2 DS 2 -VASc scores than those without POAF (4.09 ± 0.90 vs. 2.31 ± 1.21; P < 0.001). The POAF rates after cardiac surgery increased with increasing CHA 2 DS 2 -VASc scores
9	Fujiwara, M	2014	Randomized Control Trial	88	4 years	Japan	A total of 88 patients undergoing isolated OPCAB were enrolled. They were examined preoperatively	Increased PA-TDI duration may be an independent predictor of AF after OPCAB. Triage of patients at high risk of	Atrial fibrillation after heart bypass surgery (OPCAB) found 40% of patients

							on transthoracic echocardiography with tissue Doppler evaluations and monitored postoperatively with continuous electrocardiographic telemetry for 7 days.	developing POAF may lead to the prevention of POAF, shortening of hospital stay, and improvement of prognosis.	developed the condition post-surgery. Those with lower BMI and larger left atrial volume pre-surgery were more likely to experience atrial fibrillation. PA-TDI duration emerged as the strongest predictor for atrial fibrillation after surgery. This can help identify high-risk patients for targeted preventive measures.
10	Lee SH	2017	Comparative Study	1664	na	Korea	A gender-based comparison of long-term (>1 year) newly developed atrial fibrillation (LTAF) and mortality between 1664 (480 females) consecutive patients with (POAF) and without POAF (no-POAF) who	Study highlights although POAF was related to ITAF in both gender cumulative survival free of ITAF was poorer among female than male	This study followed patients for nearly 4 years after heart bypass surgery to see if developing atrial fibrillation shortly after surgery (POAF) affected their long-term

							had undergone CABG was performed.		health. They found that POAF increased the risk of developing long-term atrial fibrillation (LTAF) in both men and women. However, women who experienced POAF were much more likely to develop LTAF and even die in the long term compared to men who had POAF.
11	Tosello F	2015	Cohort Study	176	na	Japan	The subject group consists of 176 patients with 119 male and 57 female.	There were higher than expected occurrences of MT-POAF in patients treated with BAVR, particularly in overweight patients	In the 176 patients of the subject group 49(27.8%) had early POAF and this incidence barely declined during mid-term follow-up, with 36(20.4%) affected at this time point.57% was free of AF at any time

									Whereas 11.9% developed early POAF and maintained it during mid-term follow-up
12	Kara H	2019	RCT	116	na	Japan	Total groups- 2 For each group = who received oral vitamin D (n=58) and those who did not (n=58)	This study with sufficient Sample size, preoperative short term high dose vitamin D supplementation was found to be significantly preventing occurrence of POAF in patient with vitamin D insufficiency and deficiency who underwent CABG surgery	The ratio of POAF occurrence found in the treatment and control group were 12.07% and 27.59% respectively. Vitamin D treatment was found to reduce the risk of POAF development by 0.24 times (p=0.034)
13	Haghjoo M	2012	cohort	989	na	India	A total of 302 patients were included in the study. Of these patients, 216 (71.5%) were male and 86 (28.5%) were female. The mean age was 58.5±10 years	Post operative atrial fibrillation strongly predicts higher long-term mortality and morbidity following coronary artery bypass graft	Atrial fibrillation developed after CABG in 156 patients (15.8%). Patients with POAF were generally older (p=0.001) and presented more often comorbidities including

									congestive cardiac failures (p=0.001) hypertension (p=0.001) peripheral vascular disease (p=0.001) hyperlipidemia (p=0.009) renal failure(p=0.001). Five year mortality was observed in 23 patients (2.3%). Patients with POAF had a 5-year higher mortality rate than those without POAF.
14	Iliescu AC	2018	Cross sectional	1191	14 years	Turkey	Total groups-2 The POAF group (342 patients 28.7%) Sinus rhythm group (849 patients 71.3%)	1191 patients requiring isolated surgical aortic valve replacement were observed for Atrial Fibrilliation in the early post-operative period	The study found that 28.71% of cardiac surgery patients developed atrial fibrillation (AF). They identified six risk factors for AF, including advanced age, higher body mass index,

									tricuspid regurgitation, prolonged ventilation, longer ICU stay, and a dilated left atrium (LA). Their predictive model accurately detected AF in 64.7% of cases with moderate discriminative power. Additionally, a CHAID model revealed age as the most significant predictor, with patients over 68 years at higher risk, while other factors varied in importance across different risk groups.
15	Hashemzadeh K	2013	Prospective cohort study	1254	4 years	Iran	The study population consisted of 1254 patients and 864 (68.9%) were male and 390 (31.1%) female, and the	The study observes the patients for the development of POAF and uses multivariate logistic analysis to identify the	In this study, 13.6% of the study population experienced postoperative atrial fibrillation

							average age was 55.1±15.7 years.	risk factors associated with patient outcomes	(POAF), predominantly within the initial two days post-surgery. Multivariate analysis revealed several preoperative and intraoperative risk factors for POAF, including age over 50, smoking history, left ventricular hypertrophy, renal dysfunction, and intraoperative variables such as inotrope usage, valve surgery, longer cardiopulmonary and cross-clamp times, and postoperative inotropic agent administration.
16	Tekkesin AI	2017	Cohort Study	311	5 months	Turkey	Total groups -(2) POAF + POAF-	The use of monocyte to HDL ratio to	Multivariate Cox proportional

								predict postoperative atrial fibrillation after aortocoronary bypass graft surgery	hazards regression analysis revealed that M/H ratio (odds ratio [OR], 51.814; 95% confidence interval [CI], 11.479–233.865; p<0.01) and serum HDL level (OR,1.874; % 95 CI, 1.402–2.505; p<0.01) were independent predictors of POAF in patients after CABG surgery. In receiver operating characteristic curve analysis of M/H ratio, the area under curve was found to be 0.844.
17	Selcuk M	2021	RetrospectiveCohort study	391	3 years	Turkey	Total groups -(2) POAF + POAF-	To study the utility of SII as a predictive biomarker for identifying patients at risk of developing POAF after CABG surgery,	This study revealed that Systemic Inflammatory Index was an independent predictor of PoAF in patients who

								aiding in early detection and management.	were operated on for isolated CABG. Multivariate logistic regression analysis revealed that the SII was an independent predictor of PoAF (Odds ratio: 1.002 95% confidence interval: (1.001-1.002), p<0.01).
18	Çetin M	2012	Prospective Observational Study	272	1 yr, 11 months	Turkey	The patients were divided in two groups with post-op atrial fibrillation (AF) and non-AF.	Fragmented QRS may predict postoperative atrial fibrillation in patients undergoing isolated coronary artery bypass graft surgery	new-onset POAF was independently related to the presence and number of fQRS in patients undergoing CABG surgery.
19	Mingalimova AR	2021	Retrospective, observational study	100	2 years	Russia	2 groups - Those with POAF in early post-operative period and those without POAF	To analyze the role of atherosclerotic coronary arteries lesions in development of new-onset atrial fibrillation after coronary artery bypass surgery	The development of AF following coronary bypass surgery was not associated with features of coronary atherosclerotic lesions

20	Konstantino Y	2016	Cohort Study, Observational	161	1 year	Israel	2 groups patients with or without POAF	Long-Term Atrial Fibrillation and Stroke after Postoperative Atrial Fibrillation Following Coronary Artery Bypass Graft Surgery	Approximately half of the patients experienced prior myocardial infarction, and 14% had left ventricular ejection fraction < 40%. Postoperative AF (POAF) occurred in 27% of the patients. Patients were older and had larger left atrium diameters. POAF was strongly correlated with late AF (OR 4.34, 95%CI 1.44-13.1, P = 0.01) during a mean follow-up of 8.5 years.
21	Liu X	2016	Randomized controlled trial	88	1 year	China	2 groups- cardiac surgery patients were randomized to receive either dexmedetomidine (0.2–1.5 μg/kg/h) or propofol (0.3–3 mg/kg/h) open-label titrated to a	To find out if Dexmedetomidine sedation reduces atrial fibrillation after cardiac surgery compared to propofol	The absolute risk reduction for AF was 22.8 % in patients following cardiac surgery, with a number needed to treat 4.4,

							target Richmond agitation-sedation scale of 0 to -3.		suggesting that dexmedetomidine administration during the early postoperative period could prevent one case of AF for every five patients.
22	Majid Haghjoo	2008	Prospective Cohort Study	302	1 year	Iran	2 groups- AF group and Non- AF group	To find the predictors of Postoperative Atrial Fibrillation after Coronary Artery Bypass Graft Surgery	By univariate analysis, older age, P-wave abnormality in ECG, presence of mitral regurgitation, larger left atrium (LA), left main coronary artery involvement, failure to graft right coronary artery (RCA), and adrenergic use in ICU were significantly associated with occurrence of post-CABG AF (all P< 0.05). However, in the logistic regression

									model, age (OR: 1.067, 95%CI: 1.02-1.116, P=0.005), LA dimension (OR: 1.102, 95%CI: 1.017-1.1936, P=0.017), P-wave morphology (OR: 12.07, 95%CI: 3.35-48.22, P=0.0001), failure to graft RCA (OR: 3.57, 95%CI: 1.20-10.64, P=0.022), and postoperative adrenergic use (OR: 0.35, 95%CI: 0.13-0.93, P=0.036) remained independently predictive of postoperative AF.
23	Ak K	2005	Cross-sectional study	100	na	Turkey	Right atrial tissue from all patients was sampled before cardiopulmonary bypass. Right atrial tissue samples from the atrial fibrillation group were	To determine histopathologic risk factors for postoperative atrial fibrillation in cardiac surgery	Myolysis and increased apoptotic pattern in right atrial myocardium are significant predictors for the development of

							compared with samples belonging to the patients who remained in sinus rhythm postoperatively.		postoperative atrial fibrillation.

3.2. Quality/risk of bias of included studies

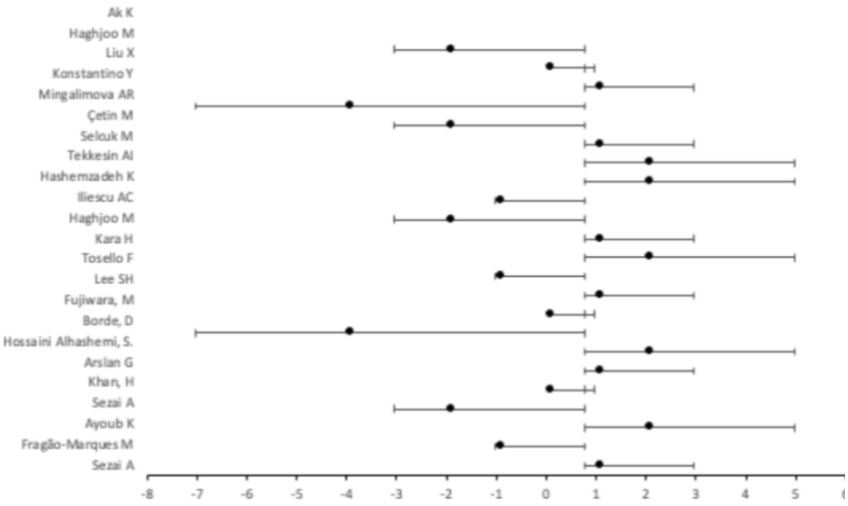
The Overall risk of the included studies were found to be low. Table 2 shows the RoB assessments of individual studies. The mean RoB score was calculated to be 20.1. The mean difference of each study was calculated. Konstantino Y(20) was found to have the lowest mean difference of -3.9 and the highest RoB score of 24.

Table 2: ROB using ROBIS tool

Sl No	Author	ROB score	Total Mean Difference
1	Sezai A	19	1.1
2	Fragão-Marques M	21	-0.9
3	Ayoub K	18	2.1
4	Sezai A	22	-1.9
5	Khan, H	20	0.1
6	Arslan G	19	1.1
7	Hossaini Alhashemi, S.	18	2.1
8	Borde, D	24	-3.9
9	Fujiwara, M	20	0.1
10	Lee SH	19	1.1
11	Tosello F	21	-0.9
12	Kara H	18	2.1
13	Haghjoo M	19	1.1
14	Iliescu AC	22	-1.9
15	Hashemzadeh K	21	-0.9
16	Tekkesin AI	18	2.1
17	Selcuk M	18	2.1
18	Çetin M	19	1.1
19	Mingalimova AR	22	-1.9
20	Konstantino Y	24	-3.9
21	Liu X	19	1.1

22	Haghjoo M	20	0.1
23	Ak K	22	-1.9
	Mean	20.1	

Forest plot of mean difference



Tabulation of mean difference and confidence intervals

Alpha	0.05
Standard deviation	1.86606898
Population size	23
Confidence interval	0.7626264557

Study	Mean difference	CI +	CI-
Sezai A	1.1	1.862626456	0.3373735443
Fragão-Marques M	-0.9	-0.1373735443	-1.662626456
Ayoub K	2.1	2.862626456	1.337373544
Sezai A	-1.9	-1.137373544	-2.662626456
Khan, H	0.1	0.8626264557	-0.6626264557
Arslan G	1.1	1.862626456	0.3373735443
Hossaini Alhashemi, S.	2.1	2.862626456	1.337373544
Borde, D	-3.9	-3.137373544	-4.662626456
Fujiwara, M	0.1	0.8626264557	-0.6626264557
Lee SH	1.1	1.862626456	0.3373735443
Tosello F	-0.9	-0.1373735443	-1.662626456
Kara H	2.1	2.862626456	1.337373544
Haghjoo M	1.1	1.862626456	0.3373735443

Iliescu AC	-1.9	-1.137373544	-2.662626456
Hashemzadeh K	-0.9	-0.1373735443	-1.662626456
Tekkesin AI	2.1	2.862626456	1.337373544
Selcuk M	2.1	2.862626456	1.337373544
Çetin M	1.1	1.862626456	0.3373735443
Mingalimova AR	-1.9	-1.137373544	-2.662626456
Konstantino Y	-3.9	-3.137373544	-4.662626456
Liu X	1.1	1.862626456	0.3373735443
Haghjoo M	0.1	0.8626264557	-0.6626264557
Ak K	-1.9	-1.137373544	-2.662626456

3.3. Intervention effects

PREVALENCE OF PoAF in Asian population

The reported prevalence of AF in Asia Pacific countries varies from 0.49% to 5.4%.PoAF occurs after 25-50% of cardiac surgeries.

Study	Total population in study	number of cases of PoAF	% PoAF
Sezai A	311	71	22.80%
Fragão-Marques M	379	156.148	41.20%
Ayoub K	112	11.2	10%
Sezai A	60	15	25%
Khan, H	80	47	58.75%
Arslan G	3197	634.9242	19.86%
Hossaini Alhashemi, S.	234	25.74	11%
Borde, D	729	94.77	13%
Fujiwara, M	88	35.024	39.80%
Lee SH	1664	403.8528	24.27%
Tosello F	176	84.9904	48.29%
Kara H	116	22.968	19.80%
Haghjoo M	989	156.262	15.80%
Iliescu AC	1191	341.9361	28.71%
Hashemzadeh K	1254	170.544	13.60%
Tekkesin AI	311	70.908	22.80%
Selcuk M	391	93.84	24%
Çetin M	272	62.016	22.80%
Mingalimova AR	100	20	20%
Konstantino Y	161	43.47	27%
Liu X	88	22	25%
Haghjoo M	302	46	15%

Ak K	100	14	14%
Total	12616	2643.5935	

The population of the world 2024 is 8118835999. And the prevalence of PoAF in the Asian population was calculated to be 20.95429217 %. The mean of the percentages of POAF cases in the included studies was calculated to be 24.46%.

4. Discussion

In this systematic review we studied the prevalence and comparative study of preferred treatment methods from 23 eligible studies. In the study conducted by Fragão-Marques M regarding gender disparity, POAF has an increased risk in men than in women.[18] AF recurrence within 30 days after discharge from the hospital is higher in CS compared with NCS (10% vs 0%, p =0.03).Kaplan Meier analysis showed a trend towards higher recurrence in NCS compared with CS (HR 2.8; 95% CI 0.78-10.6, log-rank p =0.03).[19] While looking at the long-term effects and cerebrovascular accidents, CVA is more common in in-patients with POAF after CS compared with NCS. AF occurred in 10% of patients on landiolol than the 40% in the control group.[32] On anticoagulant efficacy, apixaban and edoxaban exhibit higher safety and efficacy than rivaroxaban.[17] The majority of the patients who developed POAF presented with a history of hypertension and diabetes mellitus (27.50%), with male predominance (70%) with the mean of variables, age=60.19 ± 9.3 years, body mass index=28.27 ± 4.2 kg/m2, CPB time = 156 ± 39.7 min, aortic cross-clamp time=100 ± 27.2 min, ejection fraction v(EF) = 47.2 ± 10.7%, heart rate = 117.8 ± 21 beats per minute and serum lactate levels = 3.7 ± 1.54 mmol/lit.[34] Arslan G's study results suggest that on-pump CABG under CPB is correlated with POAF.[35] Postoperative AF was developed in twenty-five patients (11%). The incidence of POAF was 9.5% and 11.5% in SinaCurcumin™ and placebo groups, respectively. Although the occurrence was lower in the treatment group, no significant differences between the groups were observed in this regard (p=0.62).[20] Patients with POAF have higher CHA2DS2-VASc scores than those without (4.09 ± 0.90 vs. 2.31 ± 1.21; P < 0.001). The POAF rates after cardiac surgery increased with increasing CHA 2 DS 2 -VASc scores.[21] In the cohort study by Tosello F, out of 176 patients of the subject group, 49(27.8%) had early POAF and this incidence barely declined during mid-term follow-up, with 36(20.4%) affected at this time point.57% were free of AF at any time, whereas 11.9% developed early POAF and maintained it during mid-term follow-up.[24] The ratio of POAF occurrence found in the treatment and control group were 12.07% and 27.59% respectively. Vitamin D treatment was found to reduce the risk of POAF development by 0.24 times (p=0.034).[25] Haghjoo M's study showed us that atrial fibrillation developed after CABG in 156 patients (15.8%)and patients with POAF were generally older (p=0.001) and presented more often comorbidities including congestive cardiac failures (p=0.001) hypertension (p=0.001) peripheral vascular disease (p=0.001) hyperlipidemia (p=0.009) renal failure(p=0.001) and five-year mortality was observed in 23 patients (2.3%), with those with POAF having a higher five-year mortality rate than those without.[26] Multivariate Cox proportional hazards regression analysis revealed that M/H ratio (odds ratio [OR], 51.814; 95% confidence interval [CI], 11.479–233.865; p<0.01) and serum HDL level (OR,1.874; %95 CI, 1.402–2.505; p<0.01) were independent predictors of POAF in patients after CABG surgery. In the receiver operating characteristic curve analysis of the M/H ratio, the area under the curve was found to be 0.844.[28] A study by Selcuk M showed us that the Systemic Inflammatory Index was an independent predictor of PoAF in patients who were operated on for isolated CABG. Multivariate logistic regression analysis revealed that the SII was an independent predictor of

PoAF (Odds ratio: 1.002 95% confidence interval: (1.001-1.002), p<0.01).[29] New-onset POAF was independently related to the presence and number of fQRS in patients undergoing CABG surgery.[30] Research by Konstantino Y had 2 groups of patients with and without POAF, approximately half of the patients experienced prior myocardial infarction, and 14% had left ventricular ejection fraction < 40%.[31] In a randomized controlled study by Liu X consisting of the administration of dexmedetomidine, the absolute risk reduction for AF was 22.8 % in patients following cardiac surgery, with a number needed to treat 4.4, suggesting that dexmedetomidine administration during the early postoperative period could prevent one case of AF for every five patients.[38] By univariate analysis, older age, P-wave abnormality in ECG, presence of mitral regurgitation, larger left atrium (LA), left main coronary artery involvement, failure to graft right coronary artery (RCA), and adrenergic use in ICU were significantly associated with occurrence of post-CABG AF (all P< 0.05). However, in the logistic regression model, age (OR: 1.067, 95%CI: 1.02-1.116, P=0.005), LA dimension (OR: 1.102, 95%CI: 1.017-1.1936, P=0.017), P-wave morphology (OR: 12.07, 95%CI: 3.35-48.22, P=0.0001), failure to graft RCA (OR: 3.57, 95%CI: 1.20-10.64, P=0.022), and postoperative adrenergic use (OR: 0.35, 95%CI: 0.13-0.93, P=0.036) remained independently predictive of postoperative AF.[36] Ak K presented a study where myolysis and increased apoptotic pattern were observed in right atrial myocardium which are significant predictors for the development of postoperative atrial fibrillation.[37] Our study has shown that the prevalence of AF in Asia Pacific countries ranges from 0.49% to 5.4%, with PoAF occurring after 25-50% of cardiac surgeries, with a calculated 20.95429217 % prevalence in the Asian population. Taking into account all this information, the preferred treatment modality may involve a combination of interventions along with individual patient characteristics. Management strategies could include antiarrhythmic medications, anticoagulation therapy, lifestyle modifications and possibly targeted interventions based on identified risk factors.

Limitations:

This study must be interpreted considering its limitations. Our systematic review identified the best available evidence comparing outcomes of the prevalence of Poaf following cardiac surgery among the Asian population and a comparative study on the preferred treatment modalities. Poaf assessment methods were non-randomized in all studies creating the possibility for biases and confounding. Additionally, the Sample size was less than 100 in 4 studies, between 100 and 1000 in 15, and more than 1000 in 4.

The overall risk was found to be low. The mean difference of each study using the ROBIS tool ROB score was calculated. Konstanino Y(20) was found to have the lowest mean difference of -3.9 and the highest RoB score of 24. Postoperative Af was developed in twenty-five patients (11%). Af occurred in 10% of patients on landiolol than the 40% control group. On anticoagulant efficacy apixaban and edoxaban exhibit higher safety and efficacy compared to rivaroxaban. Although the occurrence was lower in the treatment group no significant differences between the groups were observed in this regard (p=0.62). Dexmedetomidine administration during the early postoperative period could prevent one case of af for every five patients.

Moreover, the population of the world in 2024 is 8118835999 and the prevalence of Poaf in the Asian population was calculated to be 20.95429217 %. The poaf rates after cardiac surgery increased in most studies hence a definite preventive strategy could not be identified instead a tailored intervention specific to the individual is deemed fit.

Strengths:
The systematic review conducted on postoperative atrial fibrillation (POAF) following cardiac surgery offers several strengths. A comprehensive evaluation of available evidence provides a comprehensive overview of the topic. Secondly, on employing rigorous methodologies to minimize bias and enhance the reliability of the work in the research field. Meticulous syntheses of findings from multiple studies provided results that have valuable insights for clinicians, researchers, and policymakers, aiding in informed decision-making regarding POAF management strategies.

Conclusion:
In conclusion, this systematic review highlights a significant prevalence of postoperative atrial fibrillation (POAF) among the Asian population. The preferred technique has been summarized as multi-intervention based on population demographics and addressing individual risk factors. These findings underscore the importance of tailored interventions and the increased need for surveillance for POAF within Asian patients undergoing cardiac surgery.

Author contributions
Conceptualization: KSanvi
Methodology: YM,RM, AP
Software: PP, AP, KSanvi
Validation: KSanvi, AP
Formal analysis: KS, PP
Investigation: AP, YM, RM
Resources: KSanvi
Data curation: KSanvi, AP
Writing – Original Draft: PP, KS, RM
Writing – Review & Editing: KSanvi, YM, AP
Visualization: KSanvi, RM, AP
Supervision: KSanvi
Project administration: KSanvi

Conflict of interest
The authors declare that they have no conflicts of interest.

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Ethical statement
This systemic review doesn't require ethical approval since study pose no ethical issues and risk of ethical conduct is none.

Data availability
The data that support the findings of this study are available from the corresponding author upon reasonable request.

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