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Review Article

Global Prevalence Post-Sternotomy Pain Syndrome (PSPS) after Cardiac Surgery: Systematic Reviews and Meta-Analyse

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ABSTRACT

Background: One of the important types of pain is post sternotomy pain syndrome (PSPS). PSPS is defined as pain that persists for 2 months after sternotomy-open cardiac surgery without a specific cause.
Methods: In this meta-analysis study, patients undergoing cardiac surgery in which the prevalence of PSPS has been reported were included in the study. Search keywords included pain, heart surgery, prevalence, heart problems, sternotomy and post-sternotomy pain syndrome. The search was conducted by two researchers based on PICO criteria. The time range of the surge was from the beginning of the publication of articles on the outbreak of PSPS until the beginning of August 2024. Data extraction was done using the researcher's checklist and CMA software was used for data analysis.
Results: In the search that was done with the primary keywords, 108 articles were extracted, after checking the inclusion and exclusion criteria, 8 articles with a sample size of 3423 patients were included in the meta-analysis stage. The analyzed articles were between the years 2001 and 2024, and their methodology was done in different ways, including retrospective, interview, case-control and original. The age range of patients varied from 13 months to 63 years and the sample size of patients varied from 48 patients to 1395 patients. the overall prevalence of PSPS in the 8 analyzed patient articles was 33.4% (with 95% confidence interval: 22.7-46.1).
Conclusions: The prevalence of PSPS in patients worldwide was reported, and drug and non-drug measures are suggested to reduce pain after surgery.

Introduction

Cardiovascular diseases are a common disease in the world, which in addition to physical symptoms such as chest pain, shortness of breath, limitation in activities, also causes mental problems in patients. In fact, heart problems are one of the chronic and high-prevalence diseases that, due to the advances made in the medical field, have led to the hospitalization of a large number of patients [1-3]. Factors affecting cardiovascular diseases include aging, high blood pressure, body mass index, suffering from other chronic diseases such as diabetes, history of smoking, and hypercholesterolemia [4-5].

In order to improve and reduce the complications of cardiac patients, various methods will be used, including angiography, pacemaker implantation, angioplasty for coronary and cardiac surgeries [6-7]. Annually, in the world, about 2 million people undergo median

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sternotomy [8]. After heart surgery, the pain is at its most severe in the first 24 hours, and these types of pain decrease over time [9-10].

In all patients, especially patients undergoing heart surgery, pain management is in a special place. Pain after heart surgery may be caused by things including sternal retraction, chest tube or sternotomy [11-12]. One of the important types of pain is post sternotomy pain syndrome (PSPS). PSPS is defined as pain that persists for 2 months after sternotomy-open cardiac surgery without a specific cause. PSPS is an unknown disorder in terms of etiology, which is considered as a common problem [8,12].

PSPS causes the quality of life of patients to decrease due to the pain it causes. If these patients experience pain while performing everyday activities, the pain affects the social, cognitive and psychological aspects of the patient [12-13]. In addition to psychological factors, patients who undergo heart surgery due to emergency conditions are more at risk of chronic pain [14-15]. Factors such as age, gender, anxiety and depression, obesity and history of smoking are effective in aggravating this disease [14-15].

The members of the treatment team, in addition to focusing on the causes and factors affecting the development of the disease, should do their best to meet the mental and physical needs of the patients. The need for pain relief is one of the important needs of patients, and in order to relieve it, the treatment staff should have the necessary information on the prevalence of pain [16-18]. Inadequate pain control of patients after surgery can lead to complications such as lengthening the duration of hospitalization, increasing the rate of disease complications, increasing the rate of death and disability, increasing the costs of hospitalization, the occurrence of disorders in other vital organs of the body, including circulation. blood (increased oxygen consumption and tachycardia), pulmonary (pneumonia and atelectasis) and increased neurohormonal responses as well as muscle weakness in the skeletal muscle system [11-12].

Aim

This meta-analysis study was conducted with the aim of the prevalence of post-sternotomy pain syndrome (PSPS) in patients undergoing cardiac surgery in the world by systematic review and meta-analysis.

Methods

In this meta-analysis study, patients undergoing cardiac surgery in which the prevalence of PSPS has been reported were included in the study. Inclusion criteria included PSPS prevalence reports, all articles published in English worldwide, and availability of full article files. Case report articles and articles whose data were not available were excluded from the study.

Search keywords included pain, heart surgery, prevalence, heart problems, sternotomy and post-sternotomy pain syndrome. Search was done in Google Scholar, SCOPUS, EBSCO, Science Direct, PUBMED and WOS.

The search was conducted by two researchers based on PICO criteria. The time range of the surge was from the beginning of the publication of articles on the outbreak of PSPS until the beginning of August 2024. Data extraction was done using the researcher's checklist (Table 1) and CMA software was used for data analysis.

Results

In the search that was done with the primary keywords, 108 articles were extracted, after checking the inclusion and exclusion criteria, 8 articles with a sample size of 3423 patients were included in the meta-analysis stage. The analyzed articles were between the years 2001 and 2024, and their methodology was done in different ways, including retrospective, interview, case-control and original. The age range of patients varied from 13 months to 63 years and the sample size of patients varied from 48 patients to 1395 patients (Table 1).

The overall prevalence of PSPS in the 8 analyzed patient articles was 33.4% (with 95% confidence interval: 22.7-46.1) (Figure 1-2).

Table 1- Specifications of the articles

-	Author	Years	Country	Sampling method	Age, M(SD)	N	%
1	El Nasr et al [19]	2017	Egypt	Retrospective	39.77(9.44) Y	48	12.5%
2	Sudin et al [20]	2024	Malaysia	Retrospective	56(11) Y	1395	20.35%
3	Meyerson et al[21]	2001	Sweden	-	13(11) M	318	28%
4	Lahtinen et al [22]	2006	Finland	Prospective follow-up	58(7) Y	213	48%
5	Kalso et al [23]	2001	Finland	Interviewed	-	720	28%
6	Kalliomäki et al [24]	2016	Finland	-	68.7 (8.0) Y	90	15.4%
7	Rashidi et al [25]	2012	Netherlands	-	63.2(12.2) Y	186	83%

8	Costa et al [26]	2015	Brazil	Case-control	CPSP patients: 58(10.9) Y Control patients:62(12.6) Y	453	39.29%

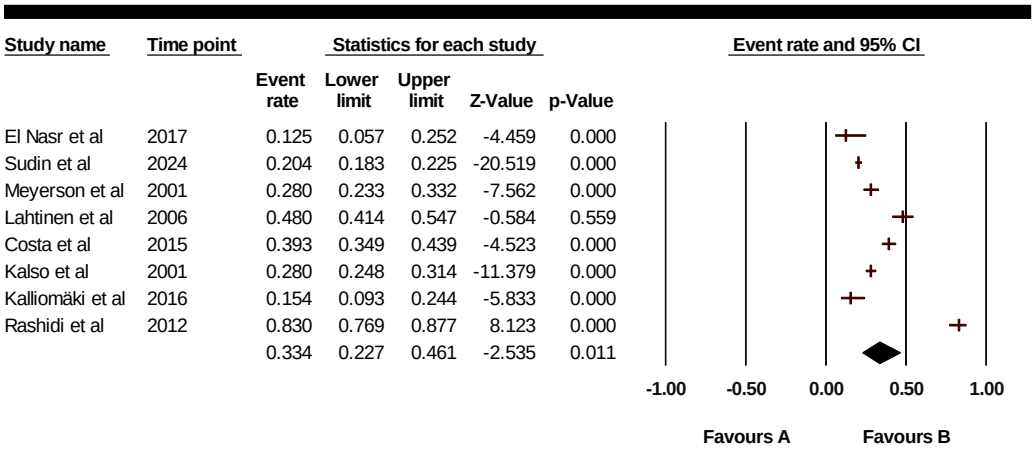

Figure 1- Prevalence of PSPS

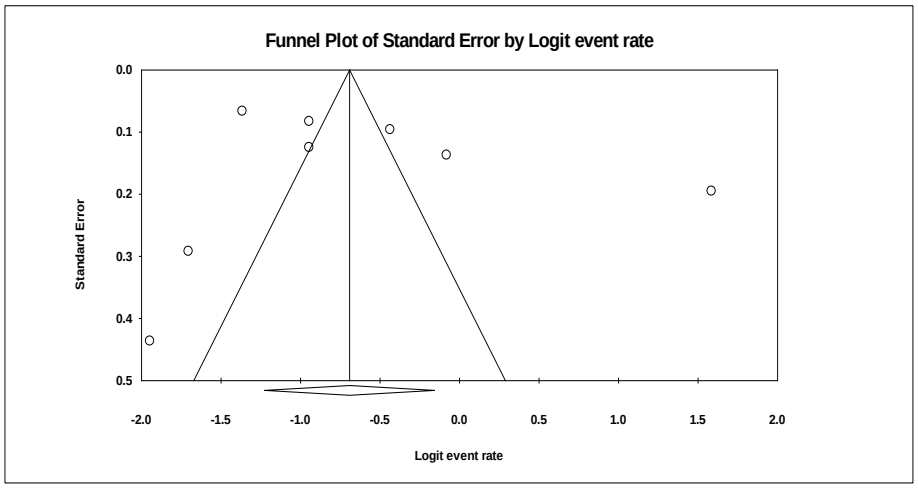

Figure 2- Funnel Plot of PSPS

Discussion

The prevalence of pain in chronic patients is high, which leads to disability in these patients [27]. According to the results of the studies, it is necessary to pay attention to the etiology, prevalence, effective factors and ways to reduce pain in patients [28-32, 42-45]. The purpose of this study was the prevalence of PSPS by meta-analysis in patients of all countries of the world.

The overall prevalence of PSPS in 8 analyzed articles with a sample size of 3423 patients was 33.4%. The prevalence of pain in different patients has been done in different methodological ways. In this study, the prevalence of pain in different parts of the body and different diseases will be compared with the results of this study.

Comparison of the results with the group under 18 years old:

In one of the studies reviewed in this meta-analysis study (study by Meyerson et al [21]), the prevalence of PSPS in the age range of 13 months was equal to 28%. While in the meta-analysis study by Karimiyarandi et al. in children and adolescents, the rate of pain in wrists/hands was reported as 6.6%, pain in shoulders as 26.9%, pain in elbows as 2.9%, and pain in knees as 6.6% [31]. In the meta-analysis study by Mandrekar et al., with a sample size of 14,743 people, the prevalence of musculoskeletal chest pain was 16%, and the prevalence in the European continent was 17% [33]. In the study of

Sposito et al., which investigated the prevalence of pain in infants, 50.3% of infants experienced pain and 32.5% of them used drug and non-drug programs for pain relief [34]. It seems that pain is experienced in different patients in this age range, but its prevalence may have differences.

Comparison of the results with the group over 18 years old:

In some of the studies included in the meta-analysis study (Rashidi et al [25] and Kalliomäki et al [24]) the patients were in pre-elderly age or in old age who had experienced pain. In the meta-analysis study of Fayaz et al., the prevalence of chronic pain increased with age. So that in the age range of 18 to 22 years, the prevalence of pain was reported to be about 14.3% and for people over 75 years old, about 62% [35]. Also, in French et al.'s study, the prevalence of neuropathic pain in patients with osteoarthritis was reported as 23% by meta-analysis [36], in the meta-analysis study by Sá et al., there were 12 articles with a sample size of 29,902 patients, the prevalence of chronic pain was 18% [37], In the meta-analysis study by Mansfield et al., it was reported that it varied from zero to 24% with a total rate of 10.6% [38].

Comparison of results with patients reported in the field of pain syndromes:

The overall prevalence of PSPS was 33.4%. In the study of Ezzati et al., the prevalence of Myofascial Pain Syndrome was investigated and it was shown that it was 88.9% and was related to the severity of disability [39]. In Berry et al.'s study, the prevalence of Symptoms of Bladder Pain was reported as 6.53% [40], in Alvarez-Nemegyei et al.'s study, the prevalence of rheumatic pain in 12,686 patients was reported as 5% [41]. The results of this study are consistent with the results of pain prevalence.

Conclusions

The prevalence of PSPS in patients worldwide was reported, and drug and non-drug measures are suggested to reduce pain after surgery.

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