Prevalence of Preoperative Anxiety and Associated Factors Among Surgical Patients: Systematic Review and Meta-Analysis in Ethiopia

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ABSTRACT

BACKGROUND: Preoperative anxiety is commonly characterized as a feeling of tension, apprehension, nervousness, distressing fear, and emotional discomfort preceding surgery. Different studies across the countries indicated an inconsistent prevalence of preoperative anxiety and its associated factors. Therefore, this study aimed to determine the pooled prevalence of preoperative anxiety and associated factors among surgical patients in Ethiopia.

METHODS: In this study, all observational study designs conducted in Ethiopia were included while studies that did not report our main outcome of interest or did not meet the quality criteria by Joanna Briggs Institute (JBI) critical appraisal techniques were excluded. Electronic databases (PubMed, SCOPUS, Web of Science Core Collection, CAB Abstract, EMBASE, and CINHAL (EBSCO)), Google Scholar, and lists of references were used to search works of literature in Ethiopia. STATA version 17 was used for analysis, and the odds ratios of the outcome variable were determined using the random-effects model. Computing values assessed heterogeneity among the studies for I^2 and P-values. Also, sensitivity analysis and funnel plot were done to assess the stability of pooled values to outliers and publication bias respectively.

RESULTS: A total of 10 studies were included with a total of 3054 participants. The pooled prevalence of preoperative anxiety among surgical patients in Ethiopia was 60% (95% CI: 55-66, $P < .001$, $I^2 = 90.00\%$). The overall prevalence among non-obstetric patients was 59% (95% CI: 53-66) while among obstetric 66% (95% CI: 62-69). Fear of complication (AOR = 2.32, 95% CI: 1.23, 3.41, $P = .62$, $I^2 = 0.00\%$), postoperative pain (AOR = 1.92, 95% CI: 1.29, 2.56, $P = .37$, $I^2 = 0.00\%$), and fear of death (AOR = 2.27, 95% CI: 1.53, 3.00, $P = .70$, $I^2 = 0.00\%$) were significantly associated with preoperative anxiety.

CONCLUSION: This study revealed a high pooled prevalence of preoperative anxiety among surgical patients in Ethiopia. The findings showed that fear of complication, postoperative pain, and fear of death were significantly associated with preoperative anxiety. This implies that a multidisciplinary approach involving various healthcare professionals is essential to optimize patient care and outcomes by addressing postoperative pain through pain management, counselling on fear of death, and complications to reduce the level of preoperative anxiety.

KEYWORDS: Preoperative anxiety, pooled prevalence, surgical patients, systematic review, meta-analysis, Ethiopia

Introduction

Preoperative anxiety is commonly characterized as a feeling of tension, apprehension, nervousness, distressing fear, and emotional discomfort preceding surgery.[1,2] It results from anticipating danger or threatening events following the surgical procedure.[3] Anxiety is the worst aspect of the perioperative period for most surgical patients.[3,4] It was reported that 48% of surgery patients worldwide had preoperative anxiety.[5] Similarly, it was discovered that 55.7% of surgical patients in low- and middle-income nations experienced anxiety.[6] The prevalence of preoperative anxiety in Ethiopia ranged from 47% to 75.44%.[7,8] Subgroup analysis done in previous systematic review and meta-analysis on anxiety among medical and surgical patients explored that anxiety among surgical patients was 55.7% in Ethiopia.

Preoperative anxiety may negatively affect surgery outcomes. Preoperative anxiety results in various physiological responses due to the activation of the sympathetic nervous system, such as tachycardia, elevated blood pressure, and constriction of arterial vessels.[9] These responses can lead to reduced blood flow to wounds that cause delaying of healing, contributing to chronic pain since preoperative anxiety can induce chronic pain by reducing postoperative pain tolerance, diminish treatment efficiency, damage patients' physical and mental

health through activating astrocytes in the anterior cingulate cortex region, and depression.[10] Preoperative anxiety can lead to increased requirements for anaesthesia, delayed awakening, delayed wound healing, a higher risk of infection, and direct or indirect cost implications[11,12]

It is recognized that a significant majority of individuals awaiting surgery undergo this emotional state, which is widely acknowledged as a natural and expected response.[13,14] Evidence indicates that high preoperative anxiety is associated with elevated post-operative pain.[15] Managing preoperative anxiety poses a significant challenge in the preoperative care of patients.

The most common cause of preoperative anxiety was fear of death, unexpected results of the operation, and post-operative pain.[7,16] Different factors like strong social support,[7] sex, type of surgery,[7] histories of cancer, smoking, psychiatric disorder, negative future perception,[17] age, residence,[16,18,19] income, fear of recovery, fear of dependency, fear of disability,[16] emergency surgery,[18] no previous surgical or anaesthesia history, primiparous, and being a farmer were significantly associated with preoperative anxiety.[19]

A wide variety of methods, such as premedication, patient education, the presence of family, and behavioural therapy, are employed by health professionals to manage preoperative anxiety.[20] There is increasing evidence indicating preoperative psychological intervention and improvement of postoperative pain experiences.[21]

Different studies across the countries indicated an inconsistent prevalence of preoperative anxiety and its associated factors among only surgical patients. Previously done systematic reviews and meta-analyses didn't explore pooled prevalence and determinants of preoperative anxiety rather it was done by including studies either done on medical or surgical patients. Having a national pooled prevalence of preoperative anxiety among only surgical patients helps with generalizability and understanding level of the problem which interns help for intervention initiatives. Therefore, this study aimed to determine the pooled prevalence of preoperative anxiety and associated factors among surgical patients in Ethiopia.

Methods

Study protocol and registration

This systematic review and meta-analysis was conducted to determine the overall burden of preoperative anxiety among surgical patients in Ethiopia. Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA 2020) guidelines were used to report the findings.[22] Furthermore, the Meta-analysis of Observational Studies in Epidemiology (MOOSE) guidelines was utilized to conduct and report the meta-analysis.[23] The review was registered on the PROSPERO with CRD42023480919.

Eligibility criteria

This review included all observational study designs conducted in Ethiopia. Moreover, all observational studies with the primary objective to determine preoperative anxiety and its determinants among surgical patients were considered for inclusion. Similarly, studies that were both published and unpublished in the English language were retrieved, regardless of the year of publication, and included in the review process. On the other hand, we removed experimental research, reviews, commentary, editorials, and studies that did not report our main outcome of interest, did not meet the quality criteria or had a poor-quality score on the Joanna Briggs Institute (JBI) critical appraisal techniques.

Search strategy

We looked through electronic databases such as CINHAL (EBSCO), CAB Abstract, Web of Science Core Collection, PubMed, EMBASE, and SCOPUS to find research done in Ethiopia. Similarly, pertinent non-electronic sources were looked through Google Scholar, the Google search engine, University repositories, the Ministry of Health of Ethiopia's web pages, and field experts were contacted.

The search strings have emerged from the following keywords (Preoperative anxiety, anxiety before surgical, associated factors, determinants, predictors, Ethiopia). The search strings were changed to match the database's unique requirements, so suitable studies were found. The combinations of Boolean logic operators (AND, OR, NOT), free keywords, and MeSH (medical sub-headings) were extensively used in the search process. For instance, PubMed search: ((((((Preoperative) OR (Before operation)) AND (Anxiety)) AND (Associated factors)) OR (Predictors)) AND (Surgical patients)) AND (Ethiopia). We also looked through the reference lists of pertinent research to find any sources that the database search might have overlooked. The other search strategies were outlined (Additional File 1).

Study selection

Originally, exact duplicates were eliminated from all of the articles that were retrieved from the chosen databases and exported to the EndNote X8 version library. Then, the EndNote library was shared among 2 reviewers (ML and UJ) and the articles were screened separately using their title and abstract. Any differences between the first 2 reviewers were resolved through discussion with other reviewers (NA and BB), and the full text was reviewed after a consensus was obtained. Every evaluated manuscript that met the requirements for inclusion was included in the final review. The PRISMA statement flow diagram was used to display the entire research selection process (Figure 1).

Data extraction

After the selection of eligible studies, 3 authors (NA, ML, and UJ) extracted data by the following columns: first author name, publication year, region, sample size, event, population, and
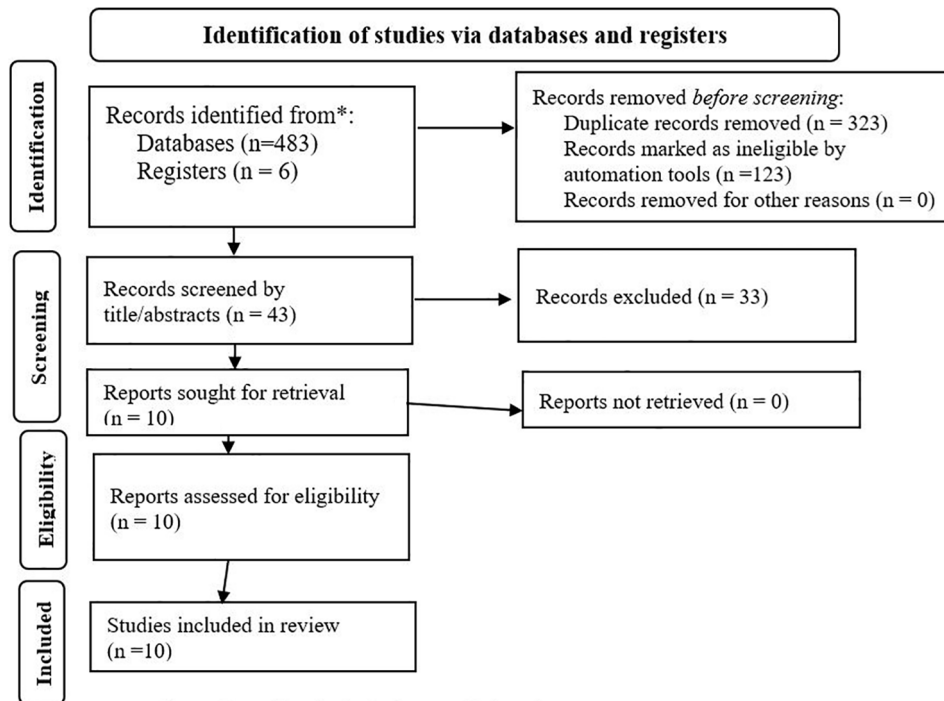
Figure 1. PRISMA presentation for preoperative anxiety among surgical patients in Ethiopia, 2024.
Abbreviations: n: number of studies included at each level.

prevalence of preoperative anxiety independently by using a pre-established Microsoft Excel 2010 template. The accuracy of the extracted data was assured by comparing the results of the independently extracted data.

Quality and risk of bias assessment

The quality of the retained articles was appraised independently by the 3 reviewers (ML, UJ, and NA) using an adapted version of the Joanna Briggs Institute (JBI) critical appraisal techniques,[24] since all of the articles that fulfilled the inclusion criteria were observational studies. The final decision was made based on the authors' assessment's mean score. By consensus, the disagreements over which studies should be included were settled. The included studies were rated as high, moderate, or poor quality based on how well they met each tool's criteria. A score of 80% or above for high quality, 60% to 80% for moderate quality, and 60% or lower for low quality. The review contained articles that ranged in quality from excellent to moderate. This critical appraisal was carried out to lower the possibility of biases and evaluate the studies' external validity (generalizability) and internal validity (systematic error). Quality scores for each article included published and unpublished studies. The authors critically assessed the articles based on the clear objectives, eligibility criteria, and quality of the article, and data extraction was done carefully to reduce bias (Additional File 2).

Outcome measures and statistical analysis

The primary outcome variable of this review was preoperative anxiety among surgical patients which was measured based on the score of S-STAI (State-Trait Anxiety Inventory). Anxiety is a state of feeling of dread or apprehension of the respondents with an STAI score of 44 and above. The prevalence of preoperative anxiety among surgical patients reported in different studies was presented by pooling the preoperative anxiety among surgical patients reported in the included articles. The random effect meta-analysis model was used to account for the study-specific true effects across the included studies. The reported proportion of pooled prevalence of preoperative anxiety among surgical patients was presented using a random-effects model. Meta-analyses were done to identify the determinants of preoperative anxiety among surgical patients using independent variables such as fear of complication, fear of mistake, fear of death, fear of post-pain, parental educational level, social support, and pain experienced by odds ratio.

STATA 17 was used to do statistical analysis and data synthesis. Preoperative anxiety among surgical patients in Ethiopia was depicted using forest plots. Additionally, subgroup analyses were carried out based on several study parameters, including the type of cases and the year of publication. Sensitivity analyses were also performed to evaluate the pooled values' stability against outliers.

Using Egger's Regression Test and visual inspection of a funnel plot, the authors assessed for potential publication bias. Heterogeneity was also detected using I^2 statistics with a P-value of less than .10. Similarly, findings of 25%, 50%, and 75% for the I^2 test statistics have been characterized as low, moderate, and considerable heterogeneity, respectively. The review's findings were reported per PRISMA 2020 principles and presented in the form of a narrative synthesis.[25]

Results

Characteristics of included studies

A total of 489 articles were found by all searching methods. Exact duplicates (446 papers) were removed once all papers were exported to the Endnote library. In addition, after reviewing the titles and abstracts 33 unrelated papers were excluded. Then, 10 papers were retrieved for detailed examination. Finally, implementing JBI critical appraisal techniques, the entire texts of the remaining 10 publications (10) were chosen for the methodological quality assessment. The average quality assessment of articles included by JBI appraisal techniques was 97.5%. The PRISMA statement flow diagram was used to display the entire research selection process (Figure 1).

This systematic review and meta-analysis included 10 cross-sectional studies with a total of 3054 surgical patients to determine the overall preoperative anxiety among surgical patients in Ethiopia. The prevalence of preoperative anxiety included in the reviews ranged from 47% to 75.44%.[7,8] Among the included studies, 9 were from Amhara, and 1 was from Oromia (Table 1).

Prevalence of preoperative anxiety among surgical patients

The study findings showed that the pooled prevalence of preoperative anxiety among surgical patients in Ethiopia was 60% (95% CI: 55-66, $P < .001$, $I^2 = 90.00$; Figure 2).

Sub-group analysis

To address the substantial heterogeneity, the prevalence of preoperative anxiety was analyzed in greater detail, stratified by the year of publication and the study populations. The overall prevalence among non-obstetric patients was 59% (95% CI: 53-66, $P < .001$, $I^2 = 90.74$). But the prevalence of anxiety was higher among obstetric 66% (95% CI: 62-69, $P < .001$, $I^2 = —$; Figure 3).

Further sub-analysis was performed by year of publication and showed that the prevalence of preoperative anxiety before 2020 was 59% (95% CI: 49-69, $P = .001$, $I^2 = 92.09$) and from 2020 onward was 61% (95% CI: 54-68, $P = .001$, $I^2 = 89.70$; Figure 4).

Factors associated with preoperative anxiety

The pooled associated factors with preoperative anxiety among surgical patients were 2.03 (95% CI: 1.61, 2.45, $I^2 = 17.25\%$, $P = .3$). From the listed associated factors, fear of complication (AOR = 2.32, 95% CI: 1.23, 3.41, $P = .62$), postoperative pain (AOR = 1.92, 95% CI: 1.29, 2.56, $P = .37$), and fear of death (AOR = 2.27, 95% CI: 1.53, 3.00, $P = .70$) were significantly associated with preoperative anxiety. The pooled odds ratio showed that patients who had a fear of complication were 2.32 times (AOR = 2.32, 95% CI: 1.23, 3.41, $P = .62$) more likely to develop preoperative anxiety than those who had no fear of complication. The pooled odds ratio showed that patients who had postoperative pain were 1.92 times (AOR = 1.92, 95% CI: 1.29, 2.56, $P = .37$), more likely to develop preoperative anxiety than those who had not postoperative pain. The pooled odds ratio showed that patients who had a fear of death were 2.27 times (AOR = 2.27, 95% CI: 1.53, 3.00, $P = .70$), more likely to develop preoperative anxiety than those who had no fear of death (Figure 5).

Publication bias

To observe publication bias, the Egger regression test revealed no evidence of publication bias among the included studies ($P = .905$). In addition, a visual inspection of the funnel plot was done and presented in Figure 6.

Multivariate meta-regression

Both univariate and multivariate meta-regression were conducted to identify the source of heterogeneity as there was a significant heterogeneity among studies observed. Accordingly, we found no significant variable which can explain the heterogeneity. There was no statistically significant study level covariate: sample size and publication year of included studies. Therefore, the heterogeneity can be explained by other factors not included in this review (Figures 7 and 8).

Sensitivity analysis

Sensitivity analysis was performed, removing each study one by one, to assess the impact of each on the pooled prevalence of preoperative anxiety among surgical patients. We can conclude that this meta-analysis result is not sensitive because the omitted studies didn't show a significant effect on the pooled estimated prevalence, according to the results (Figure 9).

Discussion

Preoperative anxiety, also known as POA, is a state of discomfort or tension that affects the patient psychologically, physiologically, and behaviorally before surgery. It is caused by a potential threat or challenge to reality that may alter hemodynamics.[31] The present study involved a systematic review and meta-analysis of 11 primary studies conducted in Ethiopia. The aim was to determine the pooled prevalence and factors associated with preoperative anxiety among surgical patients undergoing surgery.

The pooled prevalence of preoperative anxiety among surgical patients in Ethiopia was 60% with a 95% CI (55%-66%). This meta-analysis showed that fear of complication, postoperative pain, and fear of death were significantly associated with preoperative anxiety. This finding aligned with a meta-analysis conducted in low and middle-income countries (55.7%).[6] The pooled estimate in this review was higher than the global prevalence reported in another review which is

Table 1. General characteristics of studies included in the systematic reviews and meta-analysis in Ethiopia, 2023.

AUTHORS	PUBLICATION YEAR	REGION	STUDY SETTING & DESIGN	SAMPLE SIZE	EVENT	POPULATION	DETERMINANTS OF PREOPERATIVE ANXIETY
Bedaso and Ayalew[7]	2019	Amhara	IBCS	402	189	adult patient	Had unexpected result (AOR: 3.03; 95% CI: 1.7, 5.19, P-value: 0.001), Had fear of harm from doctors /nurse mistake (AOR: 5.03; 95% CI: 2.85, 8.8, P-value: 0.001), Needed blood transfusion (AOR: 2.7; 95% CI: 1.65, 4.62, P-value: 0.001), Unable to recover (AOR: 2.96; 95% CI: 1.8, 4.87, P-value-0.000), Had fear of complication (COR: 1.46; 95% CI: 0.80, 0.26), and Had fear of death (COR:1.3; 95% CI: 0.71,2.49).
Getahun et al[8]	2020	Amhara	IBCS	173	130	Pediatrics	Age 2 to 6y (AOR: 3.83; 95% CI: 1.58, 9.30), previous surgery and anesthesia (AOR: 6.73, 95% CI: 1.25, 36.19), outpatient surgery (AOR: 5.16, 95% CI: 1.32, 20.23) and parental anxiety (AOR: 3.26, 95% CI: 0.75, 4.09), Had hx of previous female (AOR: 1.76, 95% CI: 0.75, 4.09), Had hx of previous hospital admission (AOR: 0.36; 95% CI: 0.09-1.47)
Mulugeta et al[26]	2018	Amhara	IBCS	353	214	Adult patient	Female patients (AOR 2.19 (95% CI: 1.29, 3.71), patients who lack preoperative information (AOR: 2.03; 95% CI: 1.22, 3.39), and no preoperative information provision (AOR: 3.05; 95% CI: (1.57, 5.95).
Nigussie et al[27]	2014	Oromia	IBCS	239	168	Adult	
Shewangzaw Engda et al[28]	2022	Amhara	IBCS	330	177	Adult	Being female (AOR: 3.2; 95% CI: 2.19, 3.71, P-value: 0.000), illiterate (AOR: 4.1; 95% CI: 2.01, 15.39, P-value: 0.000), fear of death (AOR: 2.12; 95% CI: 1.30, 3.44, P-value: 0.002), results of operation (AOR: 2.60; 95% CI: 1.75, 4.18, P-value: 0.000), postoperative pain (AOR: 2.35; 95% CI: 1.37, 4.02, P-value: 0.002), and surgical complication (AOR: 1.9; 95% CI: 1.03, 12.13, P-value: 0.000)
Woldegerima Berhe et al[18]	2022	Amhara	IBCS	400	237	Adult	Age ≥ 60y (AOR: 5.7, CI: 1.6-20.4, P: 0.007); emergency surgery (AOR: 2.5, CI: 1.3-4.7, P: 0.005); preoperative pain (AOR: 2.6, CI: 1.2-5.4, P: 0.005); and rural residency (AOR: 1.8, CI: 1.1-2.9, P: 0.031)
Woldegerima et al[16]	2018	Amhara	IBCS	178	106	Adult	Age 18 to 30 y (AOR: 6.92, 95% CI: 1.39, 33.82), age 31 to 45y (AOR: 5.72, 95% CI: 1.61–20.28), no income (AOR: 3.21, 95% CI: 1.01-10.27), low income (AOR: 3.06, 95% CI: 1.18-7.93), rural residency (AOR: 0.38, 95% CI: 0.16, 0.89), fear of death (AOR: 2.40, 95% CI: 1.08-5.32), family concern (AOR: 2.15, 95% CI: 1.03-4.50), fear of dependency (AOR: 2.75, 95% CI: 1.57–7.20) and fear of disability (AOR: 2.75, 95% CI: 1.22-6.21).

(continued)

Table 1. (continued)

AUTHORS	PUBLICATION YEAR	REGION	STUDY SETTING & DESIGN	SAMPLE SIZE	EVENT	POPULATION	DETERMINANTS OF PREOPERATIVE ANXIETY
Wondmieneh[29]	2020	Amhara	IBCS	211	102	Adult	Being 31 to 45 aged adult (AOR=0.36; 95% CI=0.17, 0.78, P-value: 0.01), having moderate social support (AOR=0.46; 95% CI=0.22, 0.96, P-value:0.04), strong social support (AOR=0.04; 95% CI=0.02, 0.08, P-value: 0.001), being single (AOR=0.19; 95% CI=0.04, 0.89, P-value: 0.03), listening to music (AOR=0.37; 95% CI=0.18, 0.74, P-value: 0.005), finding social and religious support (AOR=0.15; 95% CI=0.07, 0.33, P-value: 0.001), orthopedic surgery (AOR=0.21; 95% CI=0.10, 0.43, P-value: 0.001), and having fear of death (AOR=1.16; 95% CI=0.64, 2.09).; 95% CI:
Fentie et al[19]	2022	Amhara	IBCS	392	266	Obstetrics	Participants from rural areas (AOR=2.65; 95% CI: 1.27-5.53, P-value: 0.01), farmers (AOR=2.35; 95% CI: 1.02-5.40, P-value: 0.044), participants with no previous surgical and anaesthesia history (AOR=2.91; 95% CI: 1.69-5.01, P-value: 0.000), and primi-parous women [AOR=1.69; 95% CI: 1.01-2.83, P-value: 0.047).
Ferede et al[30]	2022	Amhara	IBCS	376	237	Obstetrics	Patients' age of less than 30 years (AOR: 2.2; 95% CI: 1.85, 7.32; p-value < .0001), level of education (AOR: 2.5; 95% CI: 2.11, 6.73, p-value: 0.0032), and no previous anaesthesia and surgery exposure (AOR: 0.39; 95% CI: 0.27, 0.82, p-value: 0.002).

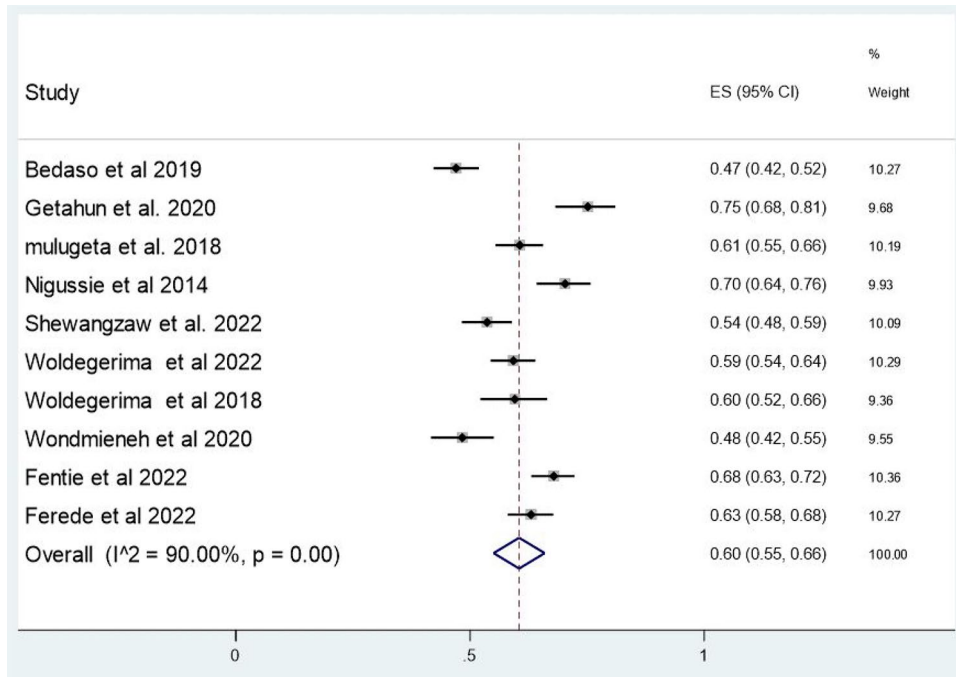IBCS: Institutional-based cross-sectional study.

Figure 2. Forest plot of the overall prevalence of preoperative anxiety among surgical patients in Ethiopia, 2024.
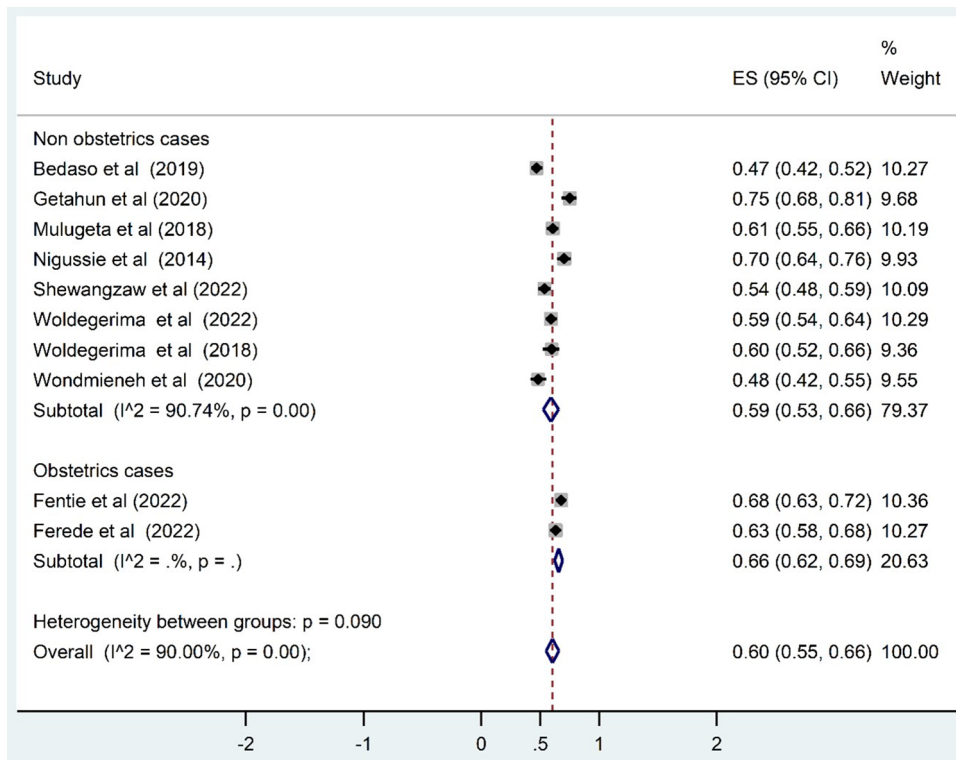

Figure 3. Forest plot that shows the sub-analysis prevalence of preoperative anxiety by study population among surgical patients in Ethiopia, 2024.

48%.[32] However, the pooled estimate in this review was lower than the pooled prevalence of preoperative anxiety in Sri Lanka at 77%[33] and in Rwanda at 72.8%.[34] Several factors, including socioeconomic conditions, healthcare infrastructure, patient experience, availability of psychosocial support, and communication effectiveness could explain this discrepancy. This implies the need for comprehensive preoperative assessment, better patient counselling to provide detailed information, and stronger psychosocial support systems to reduce anxiety.
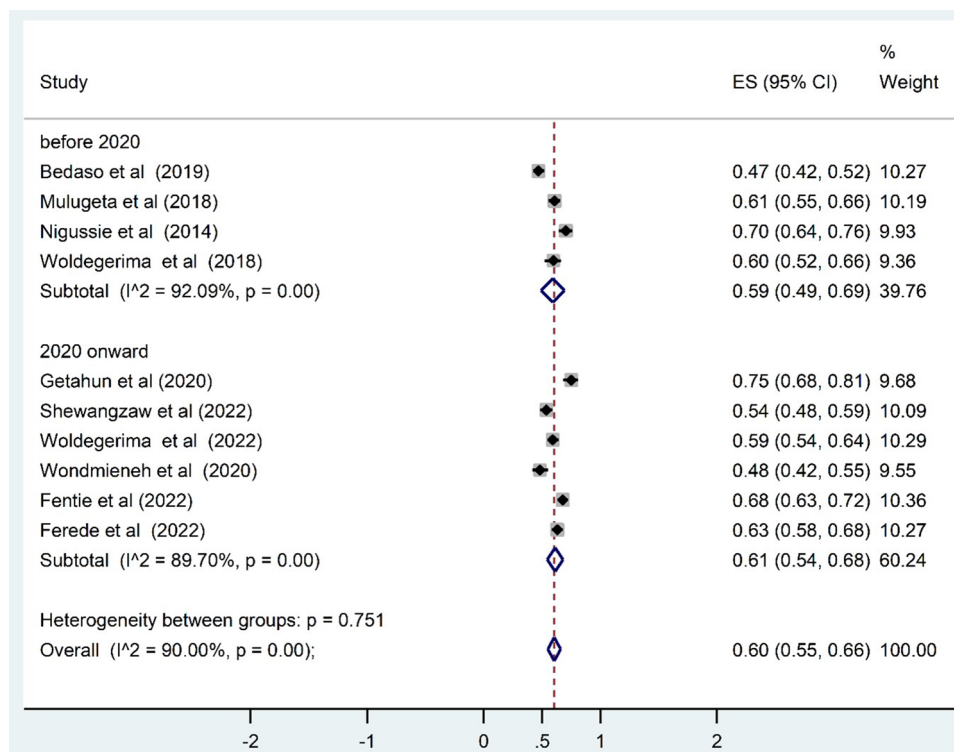
Figure 4. Forest plot that shows the sub-analysis prevalence of preoperative anxiety by year of publication among surgical patients in Ethiopia, 2024.

The subgroup analysis shows variation in the prevalence of preoperative anxiety among patients undergoing different types of surgery. Subgroup analysis findings showed that the prevalence of preoperative anxiety about two-thirds of obstetric patients had anxiety which was a higher prevalence than the patients who had undergone non-obstetric surgeries indicating that obstetric surgeries induce more anxiety. Factors for these discrepancies include the nature of obstetric surgery, which results in a higher emotional and psychological burden to the risks associated with both mother and child.[35] Societal expectations and culture surrounding childbirth can increase stress and anxiety for obstetric patients.[36,37] Additionally, according to the report of many studies, pregnancy by itself induces anxiety so preoperative anxiety is a double burden for obstetric patients.[38,39] This implies a need for targeted interventions, psychological support, family involvement, and policy changes to address the unique emotional and psychological needs.

Further analysis was done according to the year of publication of the reviewed studies, and the pooled prevalence of preoperative anxiety in the past 4 years had been slightly increased. This could be because the study's instruments were not all the same. Most notably, when DASS was used to measure preoperative anxiety in patients instead of the Amsterdam Preoperative Anxiety and Information Scale (APAIS), the prevalence of preoperative anxiety among surgical patients was marginally higher

in those studies. The differences in those measures' psychometric qualities could be the cause of the disparity. It also highlights the importance of selecting or developing measurement tools that balance sensitivity and specificity for preoperative anxiety, informing better-targeted interventions.

Additionally, compared to their counterparts, patients who were afraid of dying and complications had higher levels of preoperative anxiety. This could be due to perceived risk related to surgery, the perceived loss of control during surgery, and previous negative experiences with surgical outcomes, whether personal or through others' stories, which can heighten fear and anxiety.[40-43] Anticipation of potential complications or mortality can exacerbate anxiety, leading to heightened stress among patients.[44]

Similarly, this study found that preoperative anxiety was higher in patients who had postoperative pain. Anxiety can lead to a heightened physiological response, including increased heart rate and blood pressure, making patients more susceptible to pain or more likely to perceive it intensely after surgery.[44,45] Patients with higher levels of preoperative anxiety often experience various physiological and psychological health distortions, such as an increased need for anaesthesia and insomnia. These health issues can contribute to heightened sensitivity to pain and poor pain management postoperatively. The research reported high preoperative anxiety increased the
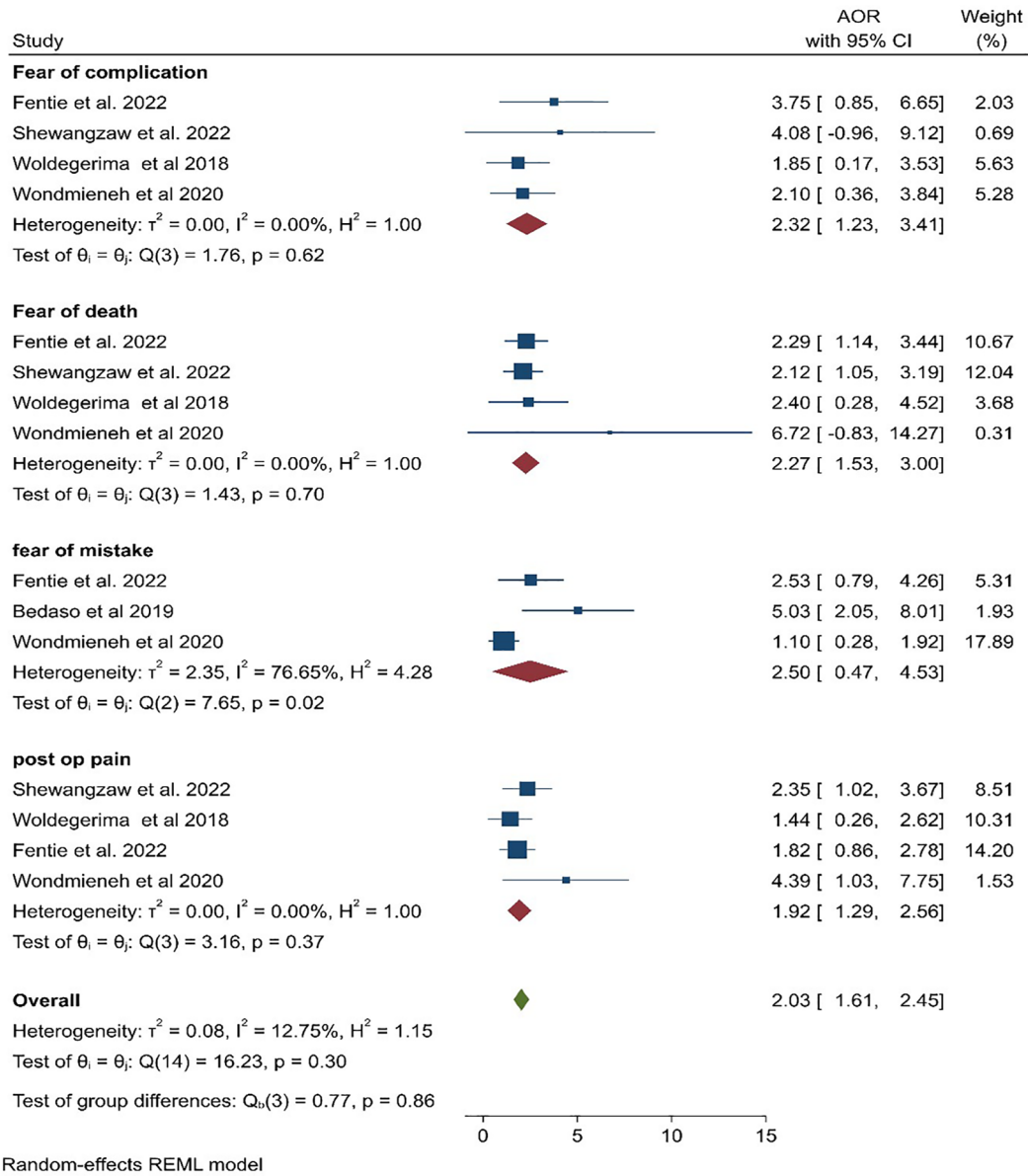
Figure 5. Forest plot for factors associated with preoperative anxiety among surgical patients in Ethiopia, 2024.
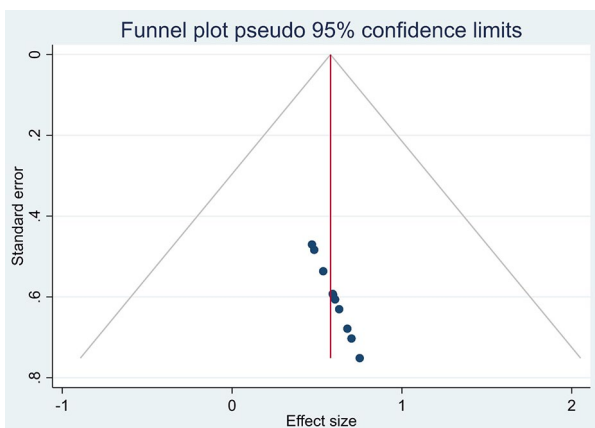

Figure 6. Funnel plot that shows publication bias among included study.

immediate postoperative pain[15] and reduced sleep quality which lowers pain thresholds and increases pain perception, exacerbating postoperative pain.[46,47] By understanding and addressing the connection between preoperative anxiety and postoperative pain, healthcare providers can develop targeted interventions to improve patient care, reduce preoperative anxiety, and facilitate better postoperative recovery and pain management.

The limitations of this study were that even though the pooled prevalence of POA among surgical patients is pertinent, it's important to note that this systematic review and meta-analysis included studies across all types of surgery. This broad inclusion may have diluted the prevalence of POA among emergency surgery patients and inflated it for those

_ES	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
Samplesize	-.000228	.0003954	-0.58	0.582	-.0011631	.000707
Publicationyear	-.0026832	.0143912	-0.19	0.857	-.0367129	.0313465
_cons	6.094177	29.01009	0.21	0.840	-62.50379	74.69215

_ES	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
Samplesize	-.000228	.0003954	-0.58	0.582	-.0011631	.000707
Publicationyear	-.0026832	.0143912	-0.19	0.857	-.0367129	.0313465
_cons	6.094177	29.01009	0.21	0.840	-62.50379	74.69215

Figure 7. Meta-regression analysis to check heterogeneity on preoperative anxiety among surgical patients in Ethiopia, 2024.
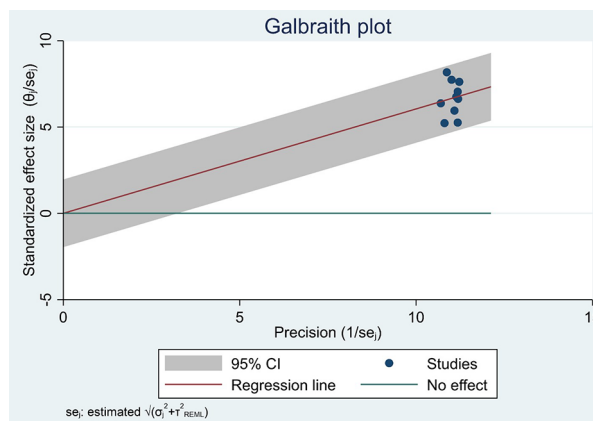

Figure 8. Meta-regression analysis by Galbraith plot to check heterogeneity on preoperative anxiety among surgical patients in Ethiopia, 2024.

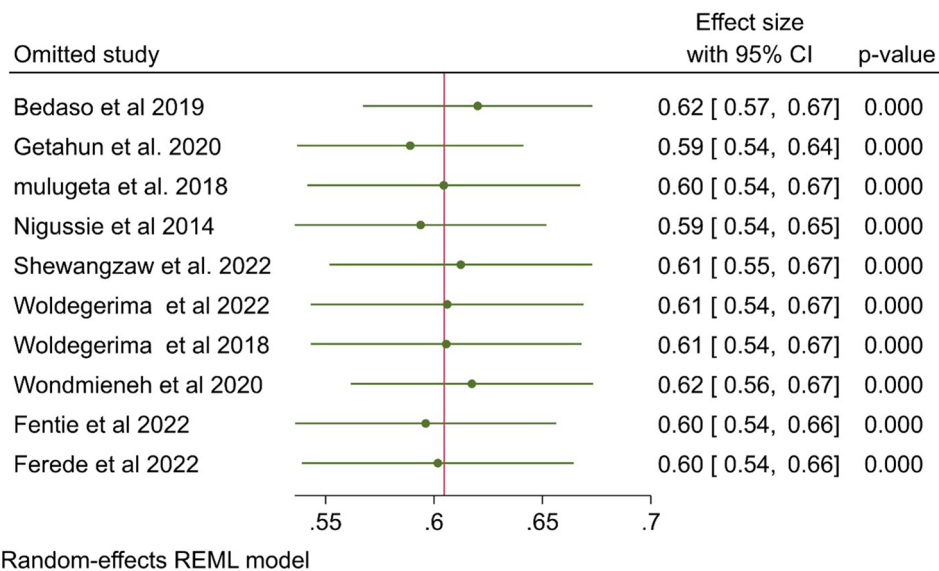| Omitted study		Effect size with 95% CI	p-value
Bedaso et al 2019		0.62 [0.57, 0.67]	0.000
Getahun et al. 2020		0.59 [0.54, 0.64]	0.000
mulugeta et al. 2018		0.60 [0.54, 0.67]	0.000
Nigussie et al 2014		0.59 [0.54, 0.65]	0.000
Shewangzaw et al. 2022		0.61 [0.55, 0.67]	0.000
Woldegerima et al 2022		0.61 [0.54, 0.67]	0.000
Woldegerima et al 2018		0.61 [0.54, 0.67]	0.000
Wondmieneh et al 2020		0.62 [0.56, 0.67]	0.000
Fentie et al 2022		0.60 [0.54, 0.66]	0.000
Ferede et al 2022		0.60 [0.54, 0.66]	0.000

Random-effects REML model

Figure 9. Sensitivity analysis of preoperative anxiety among surgical patients in Ethiopia, 2024.

undergoing elective procedures. Moreover, the review included all studies among surgical patients without excluding any age category, limiting a more nuanced understanding of POA across different patient groups.

Conclusion

This study revealed a high pooled prevalence of preoperative anxiety among surgical patients in Ethiopia. The findings showed that fear of complication, postoperative pain, and fear

of death were significantly associated with preoperative anxiety. This implies that a multidisciplinary approach involving various healthcare professionals is essential to optimize patient care and outcomes by addressing postoperative pain through pain management, counselling on fear of death, and complications to reduce the level of preoperative anxiety.

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Author Contributions

ML and UJ conceived and designed the review. ML, UJ, AN, JD, AG, SM, BB, and NA carried out the manuscript draft, and ML is the PI of the review. ML, UJ, and BB developed the search strings. The five reviewers (ML, NA, UJ, NB, and AH) screened and selected the studies. Also, NA, UJ, ML, SM, AH, NB, and BB extracted the data and evaluated the quality of the studies. ML, UJ, AN, and NA carried out the analysis and interpretation. All authors rigorously reviewed, read, and approved the final version of the manuscript.

Ethics Approval and Consent to Participate

Not applicable.

Consent for Publication

Not applicable.

Availability of Data and Materials

All related data has been presented within the manuscript. The dataset supporting the conclusions of this article is available from the corresponding author upon request.

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