Global Prevalence and determinants of preoperative anxiety among surgical patients: A systematic review and Meta-analysis

semagn Abate (mailto: semmek17@gmail.com)
Dilla University
https://orcid.org/0000-0001-5661-8537

Yigrem Chekole
Dilla University

Bivash Basu
University of Calcutta - Rajabazar Science College Campus

Research

Keywords: preoperative, Anxiety, surgery, prevalence, global

DOI: https://doi.org/10.21203/rs.3.rs-28832/v1

License: © This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License
Abstract

Background: Preoperative anxiety, otherwise managed preoperatively, can cause high rate of cardiac mortality, adverse effects during anesthetic induction and patient recovery which correlate with high postoperative pain, increased analgesic and anesthetic consumption, prolonged hospital stay, poor quality of life decrease satisfaction with perioperative care.

Objective: The systematic review and meta-analysis aimed to provide evidence on global prevalence and determinants of preoperative anxiety among surgical patients

Methods: A three stage search strategy was conducted on PubMed/Medline, Cochran, Science Direct and LILACS databases. Publication bias was checked with a funnel plot and objective diagnostic test was conducted with Egger's correlation and Begg's regression tests.

Results: The global pooled prevalence of preoperative anxiety among surgical patients was 48% (95% confidence interval (CI): 39 to 47%, 28 studies, 14652 participants. The systematic review and Meta-Analysis revealed that preoperative anxiety was approximately 4 times more likely in patients who had fear of complications, RR = 3.53(95% confidence interval (CI): 3.06 to 4.07, six studies).

Conclusion: The review revealed that approximately fifty percent of patients experienced preoperative anxiety which entails the policy makers and health care stakeholders should implement mitigating strategies to prevent and manage preoperative anxiety.

Background

Anxiety is an emotional state of fear, nervousness, and worry about threatening events associated with the physiological alertness which is accompanied by restlessness, fatigue, problems in concentration, and muscular tension (1–3). Perioperative anxiety is described as a vague, uneasy feeling in which the exact causes are often nonspecific and unknown to the individual but known to cause the body to react with undesirable hemodynamics as a consequence of sympathetic, parasympathetic and endocrine stimulation (1–9).

Anxiety can occur in any person in the acute or chronic form and can affect the perioperative anesthetic management and overall surgical outcomes by increasing anesthetic requirement, delayed awaking, hemodynamic derangements, postoperative pain, delaying in wound healing, impair immune system response, higher risk of infection (2, 4, 6, 10–21).

The prevalence of preoperative anxiety varies according to the types of surgery, gender, motives for surgery, and country which reaches persistently as high as 97% (22).

Studies conducted in the European region showed that the prevalence of preoperative anxiety among surgical patients varied from 27–80% where the highest was observed in Spain and the smallest was in Holland (11, 23–26).
Studies conducted in India revealed that the prevalence of preoperative anxiety was varied from 47–70.3% (27–29) while the prevalence of preoperative anxiety in Pakistan was ranged from 62–97% (16, 22, 30).

Studies done in the United States of America showed that the prevalence of preoperative anxiety was as high as 20.2% (31, 32) while the prevalence of preoperative anxiety in Brazil was 24%(33).

Prevalence of preoperative anxiety among surgical patients in Ethiopia was very which varied from 47–70.3%(21, 34–36) and other studies in Africa; Nigeria and Tunisia showed that the prevalence of preoperative anxiety was 51 to 90%(10, 37, 38) and 67.5% respectively(39).

Literature mentioned that preoperative anxiety depends on age, gender, marital status, educational level, fear of postponed of surgery, types of surgery, fear of anesthesia, fear of surgery, fear of awakening in the middle of surgery, financial loss, fear postoperative pain, fear of death and fear of unknown origin(2, 4, 6, 12, 25, 33, 35, 36, 38–47). However, the leading cause of preoperative anxiety frequently mentioned in the literature was the outcomes of surgery which accounted for (29.3%) followed by fear of postoperative course (19.5%) and complications during/after the procedure (11.4%(48).

The impacts of preoperative anxiety are numerous which includes acute myocardial infarction, heart failure, pulmonary edema, high readmission rate, poor quality of life and high rate of cardiac mortality which correlate with high postoperative pain, increased analgesic and anesthetic consumption, prolonged hospital stay, adverse influence during anesthetic induction and patient recovery and decrease patient satisfaction with perioperative care(2–5, 7, 12, 13, 25, 40–42, 44, 45, 48–58).

Mortality and morbidity associated with preoperative anxiety are more likely due to major cardiovascular problems associated with health-related behaviors such as smoking, poor diet, poor compliance with treatment, or an inactive lifestyle and direct influence on the myocardial perfusion, autonomic nervous system regulation, platelet activation, increased hypothalamus-pituitary-adrenal axis activity and exaggerated inflammatory processes(3, 4, 7, 8, 12, 13, 17, 26, 41, 44, 45, 50, 51, 57, 59–64). However, the body of evidence on global prevalence and determinates of preoperative anxiety among surgical patients is still in demand. Therefore, this Systematic Review and Meta-analysis is intended to provide evidence on global prevalence and determinates of preoperative anxiety among surgical patients.

Methods

Eligibility criteria

Types of studies

All cross-sectional studies assessing the prevalence of preoperative Anxiety among all surgical patients without any language restriction from January 2000 up to January 2020 were incorporated.

Types of participants
The participants were all patients undergoing surgical procedures under anesthesia.

**Outcomes of interest**

The primary outcome of interest was the prevalence of preoperative anxiety among surgical patients. Sociodemographic characteristics, previous anesthetic exposure, fear of death or complications, presence of comorbidities, health professional mistakes or malpractice, awareness under anesthesia, disability, unable to recover from anesthesia, and fear of postoperative pain were determinants of preoperative anxiety.

**Context**

This systemic review and Meta-Analysis incorporated all studies conducted globally and reporting the prevalence of preoperative anxiety among surgical patients.

**Inclusion criteria**

All cross-sectional studies assessing the prevalence and associated factors of preoperative anxiety among surgical patients from January 2000 to January 2020 without language restriction which were published and unpublished articles conducted globally were included.

**Exclusion criteria**

Studies other than cross-sectional studies, studies that didn’t report the prevalence of preoperative anxiety, and cross-sectional studies scored less than fifty percent on quality assessment were excluded.

**Search strategy**

The search strategy was intended to explore all available published and unpublished studies on the prevalence of preoperative anxiety among surgical patients globally. A three steps search strategy was employed in this review. An initial search on PubMed/Medline, Science direct and LILACS was carried out followed by an analysis of the text words contained in Title/Abstract and indexed terms. A second search was undertaken by combining free text words and indexed terms with Boolean operators. The third search was conducted with the reference lists of all identified reports and articles for additional studies. Finally, the additional and grey literature search was conducted on Google scholars up to ten pages. The result of the search strategy was presented with the Prisma flow chart (Fig. 1).

**Data extraction**

The data from each study were extracted by SM and YA independently with Microsoft excel format and imported for analysis in R software version 3.6.1 and STATA version 14. Author, publication year, the mean age of participants, Country, types of surgery, events of preoperative anxiety, sample size, and events in each risk factor for factor analysis were extracted.

**Assessment of methodological quality**
Articles identified for retrieval were assessed by two independent Authors for methodological quality before inclusion in the review using a standardized critical appraisal Tool adapted from the Joanna Briggs Institute (supplemental Table 1). The disagreements between the Authors appraising the articles were resolved through discussion. Articles with average scores greater than fifty percent were included for data extraction.

**Data analysis**

The pooled prevalence of preoperative anxiety was determined with a random effect model as there was no substantial heterogeneity. The Heterogeneity among the included studies was checked with forest plot, \( \chi^2 \) test, \( I^2 \) test, and the p-values. Substantial heterogeneity among the included studies was investigated with subgroup analysis and meta-regression. Sensitivity analysis was done to evaluate the influential studies and further analysis was made after removing the outliers.

Publication bias was checked with a funnel plot and the objective diagnostic test was conducted with Egger's correlation, Begg's regression tests, and Trim and fill method. Furthermore, moderator analysis was carried out to identify the independent predictors of the prevalence of preoperative anxiety among surgical patients. The results were presented based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA)(65).

**Results**

**Protocol and registration**

The systematic review and meta-analysis was conducted based on the Preferred Reporting Items for Systematic and Meta-analysis (PRISMA) protocols. This systematic review and meta-analysis was sent for registration in Prospero international prospective register of systematic reviews.

**Description of included studies**

A total of 852 articles were identified from different databases as described in the methodology section with the Prisma flow diagram (Fig. 1). Forty-five articles were selected for evaluation after the successive screening. Twenty-eight Articles with 14,652 participants assessing the prevalence and determinants of preoperative anxiety as a primary outcome among surgical patients were included (Table 1) and the rest were excluded with reasons (supplemental Table 2).

The included studies were published from 2001–2019 with sample size ranged from 20 to 1447.

The twenty-eight included studies were conducted in Brazil (2 studies), Ethiopia (5 studies), Holland (one study), India (3 studies), Pakistan (4 studies), Iran (1 study), Nigeria (3 studies), Palestine (1 study), Saudi Arabia (1 study), Spain (2 studies), Tunisia (1 study), UK (1 study) and USA (3 studies).

The majority of included studies were conducted on different types of surgical specialties (eighteen studies) while five, two, one, and two studies were conducted on cancer, cardiac, obstetrics, and
orthopedics respectively.

All most all of the included studies identified the possible risk factors of preoperative anxiety among surgical patients which includes but not limited to gender, age, fear of complication, fear of death, fear of medical mistakes, awakening in the middle of surgery, postoperative pain, financial loss, disability, unable to recover from anesthesia, fear of unexplained origin, unexpected outcomes of operation, and so on.
<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>event</th>
<th>Sample</th>
<th>country</th>
<th>Types of surgery</th>
<th>Quality score</th>
<th>P(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asres et al(34)</td>
<td>2019</td>
<td>191</td>
<td>407</td>
<td>Ethiopia</td>
<td>All Surgeries</td>
<td>8</td>
<td>47(42, 52)</td>
</tr>
<tr>
<td>Getachew et al(66)</td>
<td>2019</td>
<td>133</td>
<td>237</td>
<td>Ethiopia</td>
<td>All Surgeries</td>
<td>7</td>
<td>56(50, 62)</td>
</tr>
<tr>
<td>Khalili et al(67)</td>
<td>2019</td>
<td>109</td>
<td>231</td>
<td>Iran</td>
<td>All Surgeries</td>
<td>6</td>
<td>47(41, 54)</td>
</tr>
<tr>
<td>Zeb A et al(30)</td>
<td>2019</td>
<td>17</td>
<td>70</td>
<td>Pakistan</td>
<td>All Surgeries</td>
<td>5</td>
<td>24(16, 35)</td>
</tr>
<tr>
<td>Majumdar et al (32)</td>
<td>2019</td>
<td>1447</td>
<td>8665</td>
<td>America</td>
<td>cancer</td>
<td>7</td>
<td>17(16, 17)</td>
</tr>
<tr>
<td>José et al (26)</td>
<td>2019</td>
<td>48</td>
<td>60</td>
<td>Spain</td>
<td>cardiac</td>
<td>5</td>
<td>80(68, 88)</td>
</tr>
<tr>
<td>Woldegerima et al(21)</td>
<td>2018</td>
<td>106</td>
<td>178</td>
<td>Ethiopia</td>
<td>All Surgeries</td>
<td>6</td>
<td>60(52, 66)</td>
</tr>
<tr>
<td>Mulugeta et al(35)</td>
<td>2018</td>
<td>215</td>
<td>353</td>
<td>Ethiopia</td>
<td>All Surgeries</td>
<td>9</td>
<td>61(56, 66)</td>
</tr>
<tr>
<td>Tajgna et al(68)</td>
<td>2018</td>
<td>140</td>
<td>160</td>
<td>India</td>
<td>All Surgeries</td>
<td>5</td>
<td>88(58, 68)</td>
</tr>
<tr>
<td>Arshi et al(69)</td>
<td>2018</td>
<td>228</td>
<td>363</td>
<td>Pakistan</td>
<td>All Surgeries</td>
<td>5</td>
<td>63(58, 68)</td>
</tr>
<tr>
<td>Mellouli et al (39)</td>
<td>2018</td>
<td>224</td>
<td>332</td>
<td>Tunisia</td>
<td>All Surgeries</td>
<td>6</td>
<td>67(62, 72)</td>
</tr>
<tr>
<td>Edipoglu et al(11)</td>
<td>2018</td>
<td>221</td>
<td>499</td>
<td>Turkish</td>
<td>All Surgeries</td>
<td>6</td>
<td>44(40, 49)</td>
</tr>
<tr>
<td>Ya'akba et al(70)</td>
<td>2017</td>
<td>184</td>
<td>320</td>
<td>Palestine</td>
<td>All Surgeries</td>
<td>6</td>
<td>57(52, 63)</td>
</tr>
<tr>
<td>Bansal et al(27)</td>
<td>2017</td>
<td>110</td>
<td>200</td>
<td>India</td>
<td>Obstetrics</td>
<td>5</td>
<td>55(48, 62)</td>
</tr>
<tr>
<td>Palazón et al(7)</td>
<td>2017</td>
<td>56</td>
<td>200</td>
<td>Spain</td>
<td>cardiac</td>
<td>8</td>
<td>28(22, 35)</td>
</tr>
<tr>
<td>Saini et al(28)</td>
<td>2016</td>
<td>129</td>
<td>219</td>
<td>India</td>
<td>All Surgeries</td>
<td>5</td>
<td>59(52, 65)</td>
</tr>
<tr>
<td>Le Xu et al(71)</td>
<td>2016</td>
<td>11</td>
<td>53</td>
<td>China</td>
<td>cancer</td>
<td>5</td>
<td>21(12, 33)</td>
</tr>
<tr>
<td>Author</td>
<td>Year</td>
<td>event</td>
<td>Sample</td>
<td>country</td>
<td>Types of surgery</td>
<td>Quality score</td>
<td>P(95% CI)</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------</td>
<td>-------</td>
<td>--------</td>
<td>---------</td>
<td>------------------</td>
<td>---------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Adesanmi et al(10)</td>
<td>2015</td>
<td>26</td>
<td>51</td>
<td>Nigeria</td>
<td>All Surgeries</td>
<td>5</td>
<td>51(38, 64)</td>
</tr>
<tr>
<td>Hellstadius et al(25)</td>
<td>2015</td>
<td>36</td>
<td>106</td>
<td>UK</td>
<td>cancer</td>
<td>8</td>
<td>34(26, 43)</td>
</tr>
<tr>
<td>Nigussie et al(36)</td>
<td>2014</td>
<td>168</td>
<td>239</td>
<td>Ethiopia</td>
<td>All Surgeries</td>
<td>7</td>
<td>70(64, 76)</td>
</tr>
<tr>
<td>Gangadharan et al(60)</td>
<td>2014</td>
<td>12</td>
<td>20</td>
<td>Saudi Arabia</td>
<td>All Surgeries</td>
<td>5</td>
<td>60(39, 78)</td>
</tr>
<tr>
<td>Santos et al(72)</td>
<td>2014</td>
<td>16</td>
<td>41</td>
<td>Brazil</td>
<td>cancer</td>
<td>5</td>
<td>39(26, 54)</td>
</tr>
<tr>
<td>Duivenvoorden et al(23)</td>
<td>2013</td>
<td>79</td>
<td>282</td>
<td>Holland</td>
<td>Orthopedics</td>
<td>6</td>
<td>28(23, 34)</td>
</tr>
<tr>
<td>Ebirim et al(38)</td>
<td>2010</td>
<td>43</td>
<td>125</td>
<td>Nigeria</td>
<td>All Surgeries</td>
<td>5</td>
<td>34(27, 43)</td>
</tr>
<tr>
<td>Jafar et al(16)</td>
<td>2009</td>
<td>186</td>
<td>300</td>
<td>Pakistan</td>
<td>All Surgeries</td>
<td>5</td>
<td>62(56, 67)</td>
</tr>
<tr>
<td>Palpattu et al(73)</td>
<td>2004</td>
<td>28</td>
<td>62</td>
<td>USA</td>
<td>cancer</td>
<td>6</td>
<td>45(33, 57)</td>
</tr>
<tr>
<td>Caumo et al(33)</td>
<td>2001</td>
<td>141</td>
<td>592</td>
<td>Brazil</td>
<td>All Surgeries</td>
<td>8</td>
<td>24(21, 27)</td>
</tr>
</tbody>
</table>

**Meta-Analysis**

This systematic review and Meta-Analysis was intended to provide evidence on the global prevalence of preoperative anxiety and its determents among surgical patients. All of the included studies reported the prevalence of preoperative anxiety among surgical patients.

The global pooled prevalence of preoperative anxiety among surgical patients was 48% (95% confidence interval (CI): 39 to 47%, 28 studies, 14652 participants (Fig. 2).

The subgroup analysis by continent revealed that preoperative prevalence of anxiety among surgical patient was the highest in African continent 56% (95% confidence interval(CI): 48 to 64, 8 studies, 1922 participants followed by Asian continent 54% (95% confidence interval(CI): 43 to 65, 10 studies, 1936 participants). Whereas the lowest prevalence of preoperative anxiety was seen in North America 24% (95% confidence interval (CI): 16 to 33, three studies, 633 participants) followed by Latin America 25% (95% confidence interval (CI): 21 to 28, two studies, 9014 participants) (Fig. 3).
Subgroup analysis revealed that preoperative anxiety among surgical patients by country was the highest in India 67% (95% confidence interval (CI): 46 to 89, three studies, 579 participants) followed by Tunisia 67% (95% confidence interval (CI): 62 to 72, one study, 332 participants), Saudi Arabia 60% (95% confidence interval (CI): 36 to 81, one study, 20 participants), Ethiopia 59% (95% confidence interval (CI): 51 to 67, five studies, 1414 participants), Palestine 57% (95% confidence interval (CI): 52 to 63, one study, 320 participants) and Pakistan 50% (95% confidence interval (CI): 32 to 69, three studies, 733 participants) and whereas the lowest which is less than fifty percent was found in China 21% (95% confidence interval (CI): 11 to 32, one study, 53 participants), America 24% (95% confidence interval (CI): 16 to 34, three studies, 9014 participants), Brazil 25% (21 to 28, two studies, 633 participants), Holland 28% (95% confidence interval (CI): 23 to 34, one study, 282 participants), UK 34% (95% confidence interval (CI): 25 to 44, one study, 36 participants), Nigeria 39% (95% confidence interval (CI): 32 to 46, 175 participants) and Turkey 44% (95% confidence interval (CI): 40 to 39, one study, 499 participants) (supplemental Fig. 1).

Subgroup analysis by types of surgery revealed that the prevalence of anxiety was the highest in obstetric patients 55% (95% confidence interval (CI): 48 to 62): one study, 200 participants) followed by studies with different types of surgical specialty patients 54% (95% confidence interval (CI): 46 to 63, 18 studies, 4696 participants), cardiac patients 42% (95% confidence interval (CI): 37 to 48, two studies, 260 participants) while the lowest was seen in cancer patients 30% (95% confidence interval (CI): 18 to 42, five studies, 8927 studies) followed by orthopedics 24% (95% confidence interval (CI): 20 to 27, two studies, 569 participants) (Fig. 4).

The funnel plot for evaluation of publication bias didn’t show asymmetric funnel plot. Besides, the rank correlation and Egger’s regression test didn’t show a significant difference for small study effect (p-value > 0.05) (supplemental Fig. 2).

Determinants of preoperative Anxiety

Literature mentioned different types of risk factors of preoperative anxiety among surgical patients despite the presence of inconclusive evidence on the major independent predictors of anxiety. The most commonly mentioned risk factors of preoperative anxiety among surgical patients including but not limited to gender, age, fear of complication, fear of death, fear of medical mistakes, awakening in the middle of surgery, postoperative pain, financial loss, disability, unable to recover from anesthesia, fear of unexplained origin, and unexpected outcomes of the operation.

The systematic review and Meta-Analysis revealed that preoperative anxiety was approximately 4 times more likely in patients who had fear of complications, $RR = 3.53$ (95% confidence interval (CI: 3.06 to 4.07, six studies). The systematic review also showed that the risks of preoperative anxiety among surgical patients increased by eighty-two percent in females as compared to male patients, $RR = 1.18$ (95% confidence interval (CI): 1.10 to 1.27, 12 studies).
The systematic review also showed that the risks of developing preoperative anxiety among surgical patients were associated with patients perceived perception of awakening in the middle of surgery, fear of medical mistakes, and postoperative pain: RR = 2.58 (95% confidence interval (CI): 2.17 to 3.06, 4 studies), RR = 1.93 (95% confidence interval (CI): 1.57 to 2.36, 2 studies) and RR = 1.43 (95% confidence interval (CI): 1.31 to 1.56, 4 studies) respectively. However, history of previous anesthesia or surgical exposure reduced the risks of developing preoperative anxiety among patients by eighteen percent, RR = 0.88 (95% confidence interval (CI): 0.82 to 0.95, 9 studies) (Fig. 5).

Discussion

The preoperative anxiety among surgical patients is not routinely performed as part of preoperative patient evaluation and preparation for Anesthesia and surgery (5, 74-77). However, body of evidences revealed that preoperative anxiety contributed a huge impact on perioperative undesirable outcomes including increased doses of induction agents(11, 22, 78, 79), hemodynamic instability(11, 22, 27, 52, 79), cardiac morbidity and mortality in high risk patients(26, 51, 64, 80, 81), postoperative pain and increased consumption of analgesics(18, 72, 74, 78, 82-86), postoperative delirium(87), patient dissatisfaction(88-91), increased hospital length of stay(29, 89, 92) and these in turn can incur a significant health care cost(1, 86, 89, 92).

This systematic review and Meta-analysis was aimed to provide evidence on global preoperative anxiety and its determinants among surgical patients for different stakeholders to mitigate strategies to prevent preoperative anxiety and associated undesirable outcomes.

The pooled global prevalence of preoperative anxiety among surgical patients was unexpectedly very high 48% (95% confidence interval (CI): 39 to 47%, 28 studies, 14652 participants).

The subgroup analysis by continent revealed that preoperative anxiety was the highest in African continent 56% (95% confidence interval (CI): 48 to 64, 8 studies, 1922 participants) followed by Asian 54% (95% confidence interval (CI): 43 to 65, 10 studies, 1936 participants) as compared to the rest of the world. This discrepancy might be due to the inclusion of several studies conducted in Africa and Asia. Another possible explanation might be low awareness about anesthesia, surgery, and postoperative pain management options in these continents because the majority of populations reside in the countryside where there are limited infrastructure and access to health information.

The Meta-Analysis revealed that the prevalence of preoperative anxiety was the highest in the obstetric patient(27) followed by other major surgical(11, 16, 21, 30, 35, 36, 38, 67, 69) and cardiac surgery patients(7, 26) while the lowest was seen in cancer patients(25, 32, 71-73). These variations can be explained by two lives in the obstetric patient, a small number of included studies, and inclusion of heterogeneous groups in studies with all surgical patients. The lower prevalence of preoperative anxiety among cancer patients mighty is because these patients had already known the outcomes of their disease prognosis and the felt they did not worry anymore.
The Meta-Analysis showed that fear of complication RR=3.53 (95% confidence interval (CI): 3.06 to 4.07), being female RR=1.18 (95% confidence interval (CI): 1.10 to 1.27), fear of awakening in the middle of surgery 2.58 (95% confidence interval (CI): 2.17 to 3.06), fear of medical mistakes RR= 1.93 (95% confidence interval (CI): 1.57 to 2.36) and fear of postoperative pain RR=1.43 (95% confidence interval (CI): 1.31 to 1.56) were the major independent predictors of preoperative anxiety. This finding is similar to the findings of the included studies.

Previous anesthesia or surgical exposure showed a significant reduction in preoperative anxiety among surgical patients and this finding is in line with the findings of the included studies. This could be explained as patients had opportunities to know about the operation theatre environment, about types of anesthesia and surgery, postoperative pain.

**Quality of evidence**

The systematic review and meta-analysis included plenty of studies with adequate sample size. The methodological quality of included studies was moderate to high quality as depicted with Joanna Briggs Institute assessment tool for meta-analysis of cross-sectional studies. However, substantial heterogeneity associated with dissimilarities of included studies in surgical specialty, settings, location, and anxiety assessment tools which entail further observational and randomized controlled trials by controlling potential confounders.

**Limitation of the study**

The review incorporated plenty of studies with a large number of participants but the majority of studies included in this review didn’t report risk determinants for factor analysis. The included studies were conducted in a different setting, surgical specialty, and population which caused substantial heterogeneity. Besides, there were a limited number of studies in some countries and it would be difficult to provide conclusive evidence with results pooled from fewer studies.

**Implication for practice**

Body of evidence revealed that preoperative anxiety among surgical patients significantly affects perioperative patients’ outcomes particularly in high-risk patients including patients with cardiac disease, hypertension, diabetes mellitus, advanced age, pre-existing psychological disorders, or susceptible to anxiety. However, preoperative anxiety assessment is not routinely practiced as part of preoperative evaluation and preparation for surgery. Therefore, preoperative anxiety screening, patient education on how to reduce anxiety, awareness creation about anesthesia and surgery, and postoperative pain management options should be incorporated in preoperative patient evaluation and preparation period.
The implication for further research

The Meta-analysis revealed that preoperative anxiety among surgical patients was very high and the major independent predictors of preoperative anxiety were traced. However, the included studies were too heterogeneous, and cross-sectional studies also don’t show a temporal relationship of preoperative anxiety and its determinants. Therefore, further observational and randomized controlled trials are in demand for a specific group of surgical patients by stratifying the possible independent predictors.

Conclusion

The global prevalence of preoperative anxiety among surgical patients was very high which entails special attention. The Meta-Analysis revealed that the prevalence of preoperative anxiety was the highest in Africa followed by Asia while the lowest was seen in North America followed by Latin America and Europe.

The Meta-analysis showed that fear of complication, gender, fear of medical mistakes, fear of awakening during surgery and fear of postoperative pain were independent predictors of preoperative anxiety while previous Anesthesia or surgical experience showed a significant reduction in preoperative anxiety and this, in turn, reminds the health care providers, preoperative education and information about the perioperative situations may reduce preoperative anxiety.

Abbreviations

CI: Confidence Interval; ES: effect size; LILACS: Latin American and Caribbean on Health Sciences Literature; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses; RR: Relative Risk

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Registration

This umbrella review was submitted for registration in Prospero international prospective register of systemic reviews.

Availability of data and materials
Data and material can be available where appropriate.

Competing interests

The authors declare that there are no competing interests

Funding

No funding was obtained from any organization

Authors’ contributions

AS and AC conceived the idea and design the study. All the Authors involved in searching strategy, data extraction, quality assessment, analysis and manuscript preparation. All Authors have read and approved the manuscript.

Acknowledgments

The authors would like to acknowledge Dilla University for technical support and encouragement to carry out the project.

References

8. Theunissen M, Peters ML, Bruce J, Gramke H-F, Marcus MA. Preoperative anxiety and catastrophizing: a systematic review and meta-analysis of the association with chronic postsurgical


**Figures**

![Prisma flow chart]

**Figure 1**

Prisma flow chart
Figure 2

Forest plot for the global prevalence of preoperative anxiety: The midpoint of each line illustrates the prevalence; the horizontal line indicates the confidence interval, and the diamond shows the pooled prevalence.
Figure 3

Forest plot for subgroup analysis of the global prevalence of preoperative anxiety by continent: The midpoint of each line illustrates the prevalence; the horizontal line indicates the confidence interval; the diamond shows the pooled prevalence.
**Figure 4**

Forest plot for subgroup analysis of the global prevalence of preoperative anxiety with types of surgery: The midpoint of each line illustrates the prevalence; the horizontal line indicates the confidence interval; the diamond shows the pooled prevalence.
Figure 5

Forest plot showing pooled relative risk (log scale) of the associations between preoperative anxiety and its determinants (fear of complication, Gender, previous surgery, fear of medical mistakes, and fear of awakening during surgery respectively.

Supplementary Files
This is a list of supplementary files associated with this preprint. Click to download.

- suplementalTable2.docx
- prismachecklist.doc
- suplementalFig1.docx
- suplemntalttable1.docx