

The Impact of Female Genital Mutilation/Cutting on Sexual Dysfunction; A Systematic Review and Meta-analysis

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Abstract

Objectives: Female genital mutilation/cutting involves partial or total removal of external female genitalia and may adversely affect sexual health. This study aimed to update the evidence on the association between Female genital mutilation/cutting and sexual function.

Methods: This systematic review and meta-analysis was conducted in accordance with PRISMA guidelines. A comprehensive search of Pubmed, MEDLINE, Scopus, Embase, Web of Science, and Google Scholar was performed from inception to 31 August 2023. Observational studies in adult women that assessed the impact of Female genital mutilation/cutting on sexual health were included. The primary outcomes were Female Sexual Functioning Index (FSFI) and Sexual Quality of Life-Female (SQOL-F) scores. Secondary outcomes were FSFI scores stratified by Female genital mutilation/cutting type. Meta-analyses were conducted using Review Manager (version5). Study quality was assessed using the Newcastle-Ottawa Scale. The review was registered in PROSPERO(CRD42020212103).

Results: Twenty studies met the inclusion criteria, comprising 5269 women with female genital mutilation/cutting and 2585 women without female genital mutilation/cutting.. The metaanalysis revealed that women with female genital mutilation/cutting had significantly lower FSFI scores than controls (mean difference [MD] -5.11, 95% confidence interval [CI] -7.30 to -2.91; $p < 0.00001$). FSFI scores decreased with increasing FGM/C severity; women with type I FGM/C had significantly higher FSFI scores than those with type II (MD 4.00, 95% CI 1.64–6.35) and type III FGM/C (MD 8.51, 95% CI 1.94–15.08), while women with type II had significantly higher scores than those with type III (MD 4.48, 95% CI 0.27–8.69). No statistically significant difference was observed in SQOL-F scores between the Female genital mutilation/cutting and control groups (MD -15.39, 95% CI -36.34 to 5.57).

Conclusions: Female genital mutilation/cutting was associated with poorer sexual function in women, with the greatest impairment observed in type III Female genital mutilation/cutting. Future prospective studies should examine how demographic and clinical factors may modify the relationship between Female genital mutilation/cutting and sexual function

Keywords: female genital mutilation, female genital cutting, FSFI, SQOL-F, sexual dysfunction.

Introduction

Female genital mutilation/cutting (FGM/C) is a major public health concern and is defined as the partial or total removal of the external female genitalia.¹ The World Health Organization classified FGM/C into four types. Type I involves partial or total removal of the clitoris and/or prepuce (clitoral hood). Type II involves partial or total removal of the labia minora, with or without excision of the labia majora, and may include clitoral excision. Type III (infibulation), the most extensive form, entails narrowing of the vaginal opening by creating a covering seal through cutting and repositioning the labia minora or labia majora, typically with suturing. Type IV includes all other harmful procedures to the female genitalia for non-medical purposes, such as pricking, piercing, incising, scraping, or cauterization.^{1,2} Despite being recognized as a violation of human rights and the sustained efforts to eliminate the practice, it is estimated that more than 200 million girls and women worldwide are living with FGM/C, and approximately 3 million girls remain at risk every year.^{2,3} Although the practice is concentrated in parts of Africa, Asia, and the Middle East, increased international immigration has contributed to a wider global distribution, underscoring the need for awareness among healthcare providers of its health consequences.^{1,2}

FGM/C is undertaken for non-medical reasons and is often sustained by socio-cultural norms, including adherence to tradition, perceived preservation of premarital virginity, enhancement of marriage prospects, and aesthetic preferences.^{2,4,5} In some settings, the practice is framed as a religious obligation, although it is not prescribed in major religious texts, including the Quran and the Bible. Social conformity and community-level acceptance are widely regarded as key drivers of its persistence.³

FGM/C is associated with a range of immediate and long-term health complications, including severe pain, hemorrhage, infection, urinary difficulties, and impaired wound healing.^{6,7} It is also linked to adverse obstetric outcomes, such as prolonged labor, cesarean delivery, postpartum hemorrhage, and neonatal death.⁸ Importantly, the consequences extend beyond physical morbidity. Psychological sequelae have been reported, including post-traumatic symptoms and affective disorders; for example, Chibber *et al.* reported that a substantial proportion of women experienced intrusive recollections of the procedure and that many met criteria for an affective psychiatric disorder.⁸

Evidence also suggests that FGM/C adversely affects sexual function. Several studies have reported lower Female Sexual Function Index (FSFI) scores among women with FGM/C compared with women without FGM/C,^{1,2,4,6,9} and vulvar scarring may contribute to dyspareunia.^{3,10} Previous meta-analysis by Pérez-López *et al.* (2020), established an association between FGM/C and impaired female sexual function.¹¹ However, additional primary studies have subsequently become available. The present review updates this evidence base and includes newer studies published. Importantly, beyond updating the overall pooled association between FGM/C and sexual function, this review provides stratified quantitative analyses according to FGM/C severity, with direct comparisons of FSFI scores between types I and II, II and III, and I and III. These analyses allow a more detailed assessment of whether sexual-function impairment increases with the anatomical severity of FGM/C. Accordingly, this systematic review and meta-analysis aimed to provide an updated quantitative synthesis of the association between FGM/C and female sexual function and to determine whether the magnitude of sexual dysfunction differs according to FGM/C type.

Methods

Study design

This study was a systematic review and meta-analysis of observational studies (cross-sectional, cohort studies, and case-control designs) evaluating the association between FGM/C and sexual dysfunction. The review was conducted in accordance with PRISMA guidelines¹² and registered in PROSPERO (CRD42020212103).

Search strategy

PubMed, MEDLINE, Scopus, Embase, Web of Science, and Google Scholar were searched from inception to 31 August 2023. Reference lists of eligible articles were also screened manually. Two reviewers conducted the searches independently, and disagreements were resolved through discussion with a third reviewer. The search strategy used a combination of Medical Subject Headings (MESH) and keywords, including female circumcision, female genital mutilation, female genital cutting, FGM, FGC, sexuality, sexual health, sexual dysfunction, and sexual problems.

Inclusion and exclusion criteria

Eligible studies were observational (prospective or retrospective) studies in adult women (cross-sectional, case-control, or cohort designs) that assessed the impact of FGM/C on sexual health. Studies published in any language were included. Experimental studies, case reports/series, editorials, and review articles were excluded.

Outcome

The primary outcome was the difference in scores on validated sexual health instruments, specifically the Female Sexual Function Index (FSFI)¹³ and/or the Sexual Quality of Life-Female (SQOL-F) questionnaire,¹⁴ comparing women with FGM/C with women without FGM/C. Meta-analysis for an outcome was conducted when at least three studies reported relevant data. Secondary outcomes were FSFI scores stratified by FGM/C type (type I, II, and III).

Data extraction

Two authors independently screened titles and abstracts and assessed full texts for eligibility. Disagreements were resolved by a third author. The following data were extracted: author and year, country, study design, sample size, mean age, effect estimates (odds ratios for dichotomous outcomes and mean for continuous outcomes), confidence intervals, *p*-values, and key findings. Information on adjustment for potential confounders (e.g. comorbidities) was also recorded.

Quality assessment

Two authors assessed study quality using the Newcastle-Ottawa Scale (NOS) for cohort and case-control studies and a modified NOS for cross-sectional studies.^{15,16} The NOS yields scores from 0 to 9 for cohort and case-control studies and from 0 to 10 for cross-sectional studies; scores <5 were considered indicative of lower quality (high risk of bias). Discrepancies were resolved by a third reviewer.

Statistical analysis

Aggregate data were synthesized quantitatively. Meta-analyses were conducted using Review Manager (version 5). For continuous outcomes measured using the same instrument, pooled effect estimates were expressed as mean differences (MDs) with 95% confidence intervals (CIs), using the inverse-variance method. Odds ratios (ORs) with 95% CIs were used for categorical outcomes. Forest plots were generated for overall FSFI and SQOL-F outcomes. Statistical significance was set at *p* < 0.05. Publication bias was assessed using funnel plots and Egger's regression intercept. Between-study heterogeneity was evaluated using the *I*² statistic, with higher values indicating greater heterogeneity. A random-effects model was applied for all meta-analyses.

Results

This review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines.¹⁷

Study selection

A total of 902 records were identified from PubMed (n = 356), MEDLINE (n = 157), Scopus (n = 281), Embase (n = 51), Web of Science (n = 13), and Google Scholar (n = 44). Before screening, 646 records were removed because of duplication (n = 98) or because they were clearly ineligible or not relevant to the review question (n = 451 and n = 97, respectively). The remaining 256 records were screened, and 194 were excluded. Sixty-two reports were sought for retrieval; however, the full texts of 34 reports could not be obtained despite reasonable attempts to retrieve them through available databases and other accessible sources. Consequently, 28 full-text articles were assessed for eligibility. Twenty-eight full-text articles were accessed for eligibility, and eight were excluded due to overlapping datasets (n = 4), methodological concerns (n = 2), or unreliable outcome reporting (n = 2). Twenty studies met the inclusion criteria, comprising 5269 women with female genital mutilation/cutting and 2585 women without female genital mutilation/cutting (Figure 1).

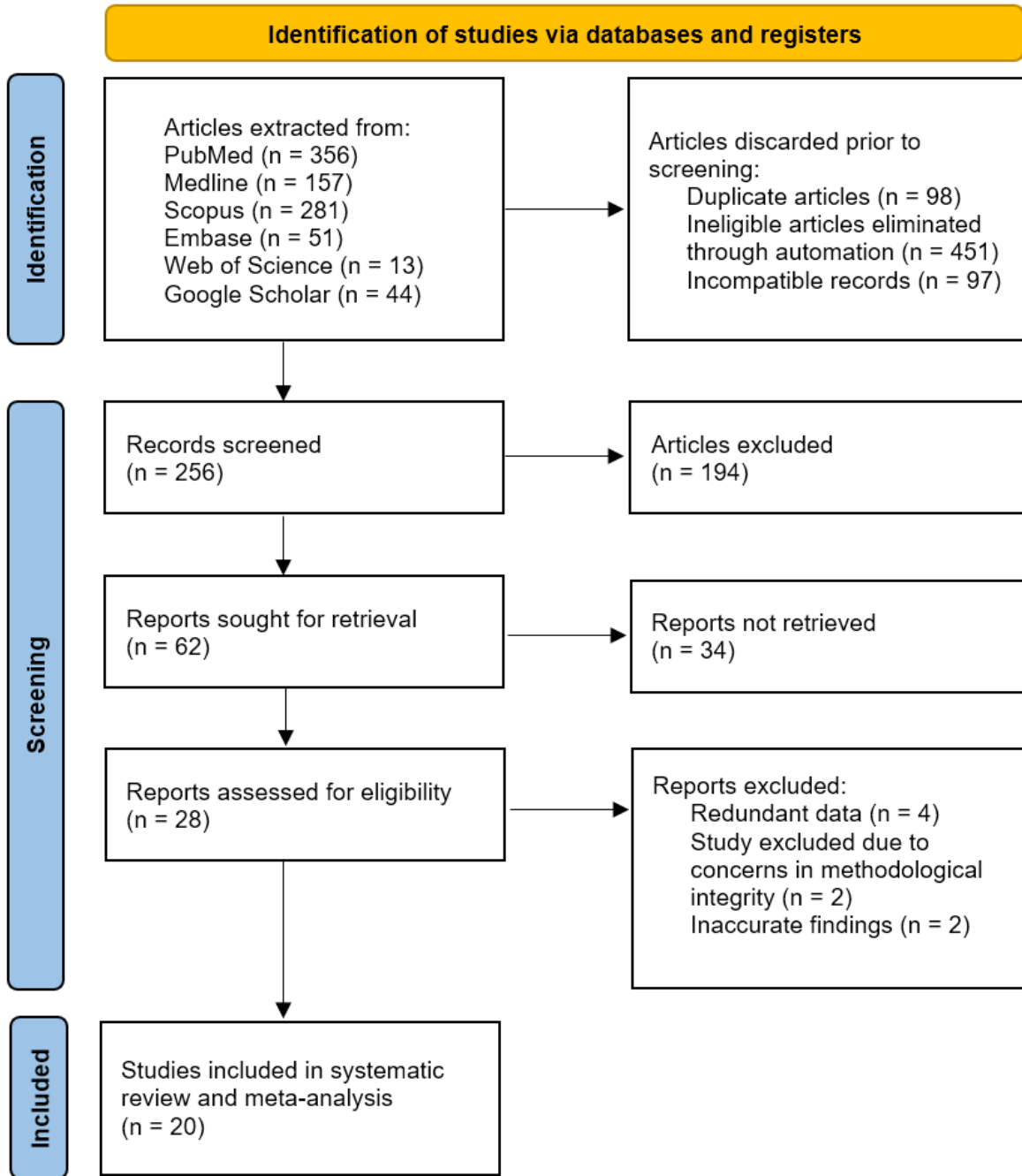


Figure 1: PRISMA flow diagram of study selection

Systematic review

The characteristics of included studies are summarized in Table 1, including authorship, year of publication, country, study design, sample size, mean participant age, effect estimates (odds ratios for dichotomous outcomes and means for continuous outcomes, with corresponding confidence intervals and *p* values), and key findings.

Table 1: Characteristics of studies.

Authors	Publication year	Country	Study design	Sample size	Mean age of the recruited subjects in years	Odds ratio for dichotomous data or mean for continuous variables, including confidence intervals, and p-values (as applicable)	Summary of findings
Andersson et al. ³²	2012	England UK (London)	- Case-control study	N = 110 (FGM/C = 73; No FGM/C = 37)	Cases: 29.16 (range: 19-39) Controls: 34.03 (range: 20-59)	Mean SQOL-F (FGM/C): 62.44 ± 27.93 (p <0.001) Mean SQOL-F (No FGM/C): 88.84 ± 13.73 (p <0.001)	A low SQOL-F was observed in those with FGM/C compared to those who did not experience FGM/C.
Laleh et al. ³³	2022	Iran (Mahabad) – Kurd region	Case-control study	N = 600 (FGM/C = 300; No FGM/C = 300)	Not specified	Mean SQOL-F (FGM/C): 40.28 ±16.76 (p <0.05) Mean SQOL-F (No FGM/C): 45.29 ±19.16 (p <0.05)	Compared to the women who did not undergo FGM/C, those with FGM/C had a 0.13 times reduced SQOL-F score. They also had a higher risk of lower intercourse, infidelity, and spouse violence.
Abdulcadir et al. ¹⁸	2016	Switzerland (Geneva)	Cross-sectional study	N = 30 (FGM/C = 15; No FGM/C = 15)	Cases: 30.64 ± 6.26 Controls: 32.07 ± 7.26	Mean FSFI (FGM/C): 27.05± 3.1 (p <0.05) Mean FSFI (No FGM/C): 30.78±4.2 (p <0.05)	The sexual function in women with FGM/C was significantly reduced compared to those without FGM/C. However, both study groups had no significant differences in pleasure, orgasm, sexual arousal, and associated sexual erectile tissues.
Alsibiani and Rouzi ²	2010	Saudi Arabia	Case-control	N = 260 (FGM/C	Cases: 30 ± 7.8	Arousal scores:	Female genital mutilation

		(Jeddah)	study	= 130; (range: 16-39) No FGM/C = 130) Controls: 31 ± 8.2 (range: 17-40)	FGM/C: 3.6 ± 1.2; p = 0.007 No FGM/C: 4.2 ± 1.4; p = 0.007 Lubrication scores: FGM/C: 3.4 ± 1; p = 0.01 No FGM/C: 3.9 ± 1.3; p = 0.01 Orgasm scores: FGM/C: 3.7 ± 1.2; p = 0.03 No FGM/C: 4.2 ± 1.4; p = 0.03 Satisfaction scores: FGM/C: 4.5 ± 1.2; p = 0.03 No FGM/C: 5 ± 1.4; p = 0.03 Overall scores: FGM/C: 21.4 ± 4.4; p = No FGM/C: 23.5 ± 5; p =	adversely impacted sexual function in the affected women.
Anis et al. ¹	2012	Egypt (Cairo)	Cross-sectional study	N = 650 (FGM/C = 333; No FGM/C = 317)	Cutting mean age: 8.59 ± 1.07 Education level, residential location, and age-adjusted assessment: Overall scores: ArFSFI (FGM/C): 23.99 ± 2.21 ArFSFI (No FGM/C): 26.81 ± 2.26 Desire scores: FGM/C: 4.02 ± 0.78 No FGM/C: 3.37 ± 0.89 Arousal scores: FGM/C: 4.86 ± 0.72 No FGM/C: 4.13 ± 0.71 Lubrication	Apart from the pain domain, FGM/C was associated with a marked decline in FSFI scores, indicating a noticeable reduction in sexual function.

						scores: FGM/C: 4.86 ± 0.75 No FGM/C: 4.16 ± 0.84 Orgasm scores: FGM/C: 4.86 ± 0.68 No FGM/C: 4.50 ± 0.79 Satisfaction scores: FGM/C: 5.04 ± 0.71 No FGM/C: 4.69 ± 0.92	
Biglu et al. ⁴	2016	Iran (Kurdistan)	Case-control study	N = 280 (FGM/C = 140; No FGM/C = 140)	FGM/C: 31.8 $\pm$ 7.7 No FGM/C: 30.7 $\pm$ 7.0	Persian-FSFI (FGM/C): 17.9 $\pm$ 5.39 Persian-FSFI (No FGM/C): 25.3 $\pm$ 4.34	Compared to those without genital mutilation, women who underwent circumcision had a higher level of pain during intercourse and a reduced level of sexual function including, satisfaction, orgasm, lubrication, arousal, and desire.
Birge al. ¹⁹	et 2017	Sudan (Nyala-Darfur)	Cross-sectional study	N = 239 (FGM/C = 210; No FGM/C = 29)	FGM/C + No FGM/C: 33.54 $\pm$ 10.25 (Range: 17-65)	Uncircumcised (29): FSFI (Range): 24.4138 $\pm$ 5.69177 (7.20-32.60) FGM/C type 1 (49): FSFI (Range): 20.3204 $\pm$ 4.15421 (8-27.90) FGM/C type 2 (107): FSFI (Range): 20.2421 $\pm$ 4.08735 (7.8-33.50)	Nearly 51% of the women in this study underwent type 1 circumcision; however, the most severe mutilation type was type 3, associated with the excision of most of the female genitalia. Accordingly, women with FGM/C type 3 had the highest

						FGM/C type 3 (54): FSFI (Range): 16.6741 ± 5.21891 (2.3- 27.60)	predisposition to sexual function disorders along with the lowest FSFI scores.
Chu et al. ²⁰	2016	USA (New York)	Cross- sectional study	N = 68 (FGM/C: 46; No FGM/C: 22)	FGM/C: 35.5 ± 10.9 No FGM/C: 34.6 ± 17.6	FSFI (FGM/C): 16.3 ± 2.07 FSFI (No FGM/C): 16.4 ± 2.38	Reduced sexual arousal and vaginal pain history were more prevalent in women with FGM/C compared to those without circumcision. A 68% prevalence of GFM was observed in this cross-sectional analysis
Daneshkhah et al. ⁶	2017	Iran (Piranshahr county)	Cross- sectional study	N = 200 (FGM/C: 140; No FGM/C: 60)	Not specified	FSFI (FGM/C): 18.25 ± 6.32 FSFI (No FGM/C): 23.9 ± 7.12	The FSFI domains including pain, satisfaction, orgasm, vaginal moisture, arousal, and desire were significantly low in the FGM/C group versus the non- circumcised females.
Esho et al. ²¹	2017	Kenya (Mauche Ward, Nakuru County)	Cross- sectional study	N = 314 (FGM/C: 169; No FGM/C: 145)	30.6 ± 7.4	FSFI (FGM/C): 23.82 ± 6.41 FSFI (No FGM/C): 25.35 ± 3.56	Post-marriage sexual experiences, such as satisfaction, arousal, and desire were low in women with FGM/C status versus the non- cut women.
Helmy et al. ²²	2016	Egypt (Suhag)	Case- control study	N = 640 (FGM/C: 320; No FGM/C: 320)	FGM/C: 26.5 ± 4.2 No FGM/C: 27.6 ± 3.8	FSFI (FGM/C): 22.39 ± 3.15 FSFI (No FGM/C): 32.78 ± 4.11	The sexual dysfunction in ≥3 domains was significantly greater in FGM/C women versus the controls.

Ibrahim et al. ²³	2012	Egypt (Ismailia)	Cross-sectional study	N = 220 (FGM/C: 164; No FGM/C: 56)	FGM/C: 29.6 ± 8.5 No FGM/C: 28.7 ± 6.9	FSFI (FGM/C): 19.6 ± 3.93 FSFI (No FGM/C): 21.5 ± 3.5	The type 2 FGM/C in the studied women correlated with their sexual dysfunction. The type 2 FGM/C contributed to a decline in FSFI score in several domains including, satisfaction, pain, orgasm, lubrication, and desire. In addition, FGM/C increased the incidence of phobia, anxiety, somatization, and depression in the affected women.
Ismail et al. ²⁴	2017	Egypt (Assiut)	Case-control study	N= 394 (FGM/C: 197; No FGM/C: 197)	FGM/C: 32.68 ± 10.35 No FGM/C: 31.71 ± 8.58	FSFI (FGM/C): 19.82 ± 7.1 FSFI (No FGM/C): 23.34 ± 8.1	Compared to controls, a significantly high prevalence of sexual dysfunction was observed in women with FGM/C (84% vs. 65%)
Mahmoud MIH ²⁵	2016	Egypt (Alexandria)	Case-control study	N = 544 (FGM/C: 272; No FGM/C: 272)	FGM/C: 32.7 ± 7.4; No FGM/C: 33.9 ± 8.3	FSFI (FGM/C): 14.3 ± 5.93 FSFI (No FGM/C): 25.9 ± 3.44	A mean reduction in sexual function was observed in FGM/C group. 3.9% of women with FGM/C experienced dysmenorrhea (OR = 3.750), 43.4% had obstructed labor (OR = 1.745) and 27.6% got postpartum hemorrhage (OR = 2.855). Nearly 88% of genital mutilation-

Mohammed et al. ²⁶	2014	Egypt	Cross-sectional study	N = 2106 (FGM/C: 1911; No FGM/C: 195)	29.1 ± 6.3	FSFI (FGM/C): 23.6± 9.14 FSFI (No FGM/C): 34.2 ± 0.3	affected women developed clinical complications, which were majorly related to sexual dysfunction. A high prevalence of FGM/C type 1 was observed in the studied women. The predisposing factors included hygiene, religious misconceptions, and social and cultural myths. Overall, a large proportion of the participants supported the continuation of FGM/C/C in spite of adverse effects and sexual dysfunction associated with it. No statistically significant difference between type I and non-FGM/C/C was found.	
Obaid al. ²⁷	et	2019	Egypt (Damietta)	Case-control study	N = 200 (FGM/C: 100; No FGM/C: 100)	22.5	FSFI (FGM/C): 27.3 ± 5.61 FSFI (No FGM/C): 27.95 ± 4.88	This study did not reveal any significant difference in the sexual function between circumcised women and those who did not undergo circumcision. Elevated occurrences of anorgasmia were observed
Salem al. ²⁸	et	2019	Egypt (Cairo)	Case-control study	N = 500 (FGM/C: 250; No FGM/C: 250)	FGM/C: 31.7 ± 5.3 No	FSFI (FGM/C): 23.8 ± 3.04 FSFI (No	

				250)	FGM/C: 32.1 ± 4.8	FGM/C): 32.94 ± 2.97	in genital mutilation- affected women compared to those who did not undergo FGM/C. In addition, depression, psychological frustration, and pelvic congestion were observed in women with FGM/C versus controls.
Catania et al. ²⁹	2007	Italy	Case-control study	N = 137 adult women affected by different types of FGM/C/C	35.8 ± 9.6	Among 137 women who had undergone various types of FGM/C, nearly 86% reported experiencing orgasm, with 69.23% reporting it consistently. Among 58 young women who had been mutilated, 91.43% reported experiencing orgasm, though only 8.57% reported it consistently.	Findings suggest that despite undergoing FGM/C, many women retain the capacity for orgasm, although consistent orgasm remains less commonly reported.
Mohamed et al. ³⁰	2022	Somalia (Mogadishu)	Cross-sectional study	N = 255 adult women affected by different types of FGM/C/C	24.3 ± 6.1 (Range: 18–50)	FSFI (FGM/C type 1): 22.5 ± 2.51 FSFI (FGM/C type 2): 19.7 ± 4.62 FSFI (FGM/C type 3): 17.3 ± 5.24	Female sexual dysfunction significantly correlated with the type of FGM/C. The lowest FSFI score was observed in women who underwent type 3 FGM/C. This finding emphasized a linear

Rouzi et al.³¹

Saudi Arabia (Jeddah); Sudanese women

Cross-sectional study

N = 42 (Type 1)
N = 27 (Type 2)
N = 38 (Type 3)

36 years (Range: 23-49)
FSFI (FGM/C type 1): 26.8 ± 1.95
FSFI (FGM/C type 2): 21.6 ± 2.82
FSFI (FGM/C type 3): 14.9 ± 5.5

relationship between tissue damage level and sexual dysfunction in genital mutilation-affected women. Excluding the pain and desire domains, FSFI scores were adversely impacted due to the FGM/C intervention in the affected women. Sexual dysfunction was independently predicted by the FGM/C status and correlated with the anatomy of the affected genital parts.

FSFI Scores

Seven case-control studies were included in the meta-analysis of FSFI scores. Compared with controls, women with FGM/C had significantly lower mean FSFI scores (MD -6.45, 95% CI -9.05 to -3.86; $p < 0.00001$; Figure 2a). Heterogeneity was substantial ($I^2 = 98\%$, $p < 0.00001$).

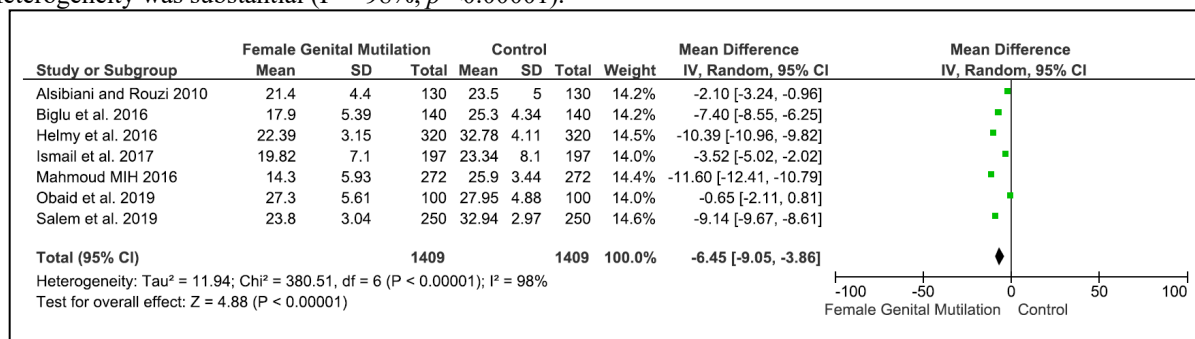


Figure 2a: (FSFI Scores – FGM/C Vs. Control: Case Control Studies)

Eight cross-sectional studies contributed to a separate meta-analysis. FSFI scores were significantly lower among women with FGM/C than among controls (MD -3.92, 95% CI -7.31 to -0.53; $p=0.02$; Figure 2b), with high heterogeneity ($I^2 = 99\%$, $p < 0.00001$).

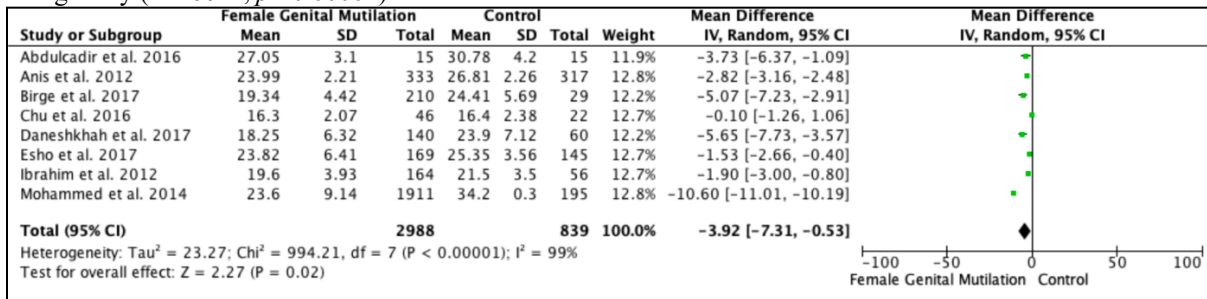


Figure 2b: (FSFI Scores – FGM/C Vs. Control: Cross-Sectional Studies)

In an overall analysis of 15 studies (case-control and cross-sectional designs), 4397 women with FGM/C were compared with 2248 women without FGM/C. Mean FSFI scores were significantly lower in the FGM/C group (MD -5.11, 95% CI -7.30 to -2.91; $p < 0.00001$; Figure 2c). Heterogeneity remained high ($I^2 = 99\%$, $p < 0.00001$).

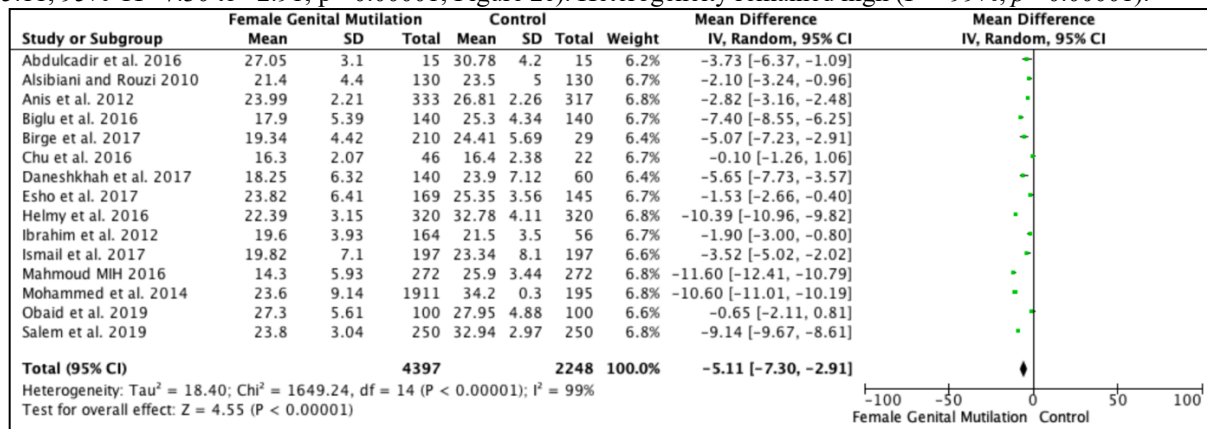


Figure 2c: (Overall FSFI Scores – FGM/C Vs. Control)

FSFI scores by FGM/C type

FSFI scores were compared across FGM/C type I–III. Women with type I FGM/C ($n = 103$) had significantly higher mean FSFI scores than those with type II FGM/C ($n = 109$; MD 4.0, 95% CI 1.64 to 6.35; $p = 0.0009$; Figure 3a), although heterogeneity was high ($I^2 = 87\%$, $p = 0.006$).

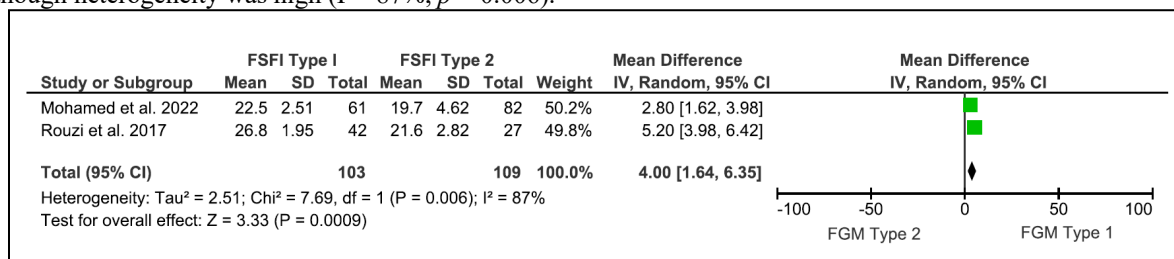


Figure 3a: (FSFI Scores – FGM/C Type 1 Vs. Type 2)

Women with type II FGM/C (n = 109) had significantly higher mean FSFI scores than those with type III FGM/C (n = 150; MD 4.48, 95% CI 0.27 to 8.69; $p = 0.04$; Figure 3b), with substantial heterogeneity ($I^2 = 91\%$, $p = 0.0007$).

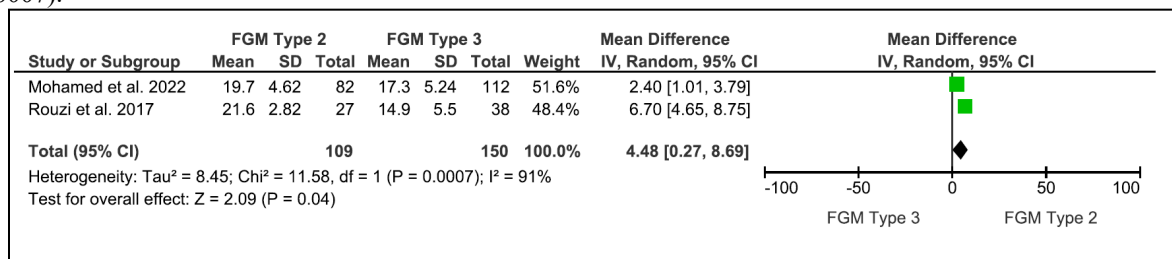


Figure 3b: (FSFI Scores – FGM/C Type 2 Vs. Type 3)

Women with type I FGM/C (n = 103) also had significantly higher mean FSFI scores than those with type III FGM/C (n = 150; MD 8.51, 95% CI 1.94 to 15.08; $p = 0.01$; Figure 3c). Heterogeneity was considerable ($I^2 = 97\%$, $p < 0.00001$).

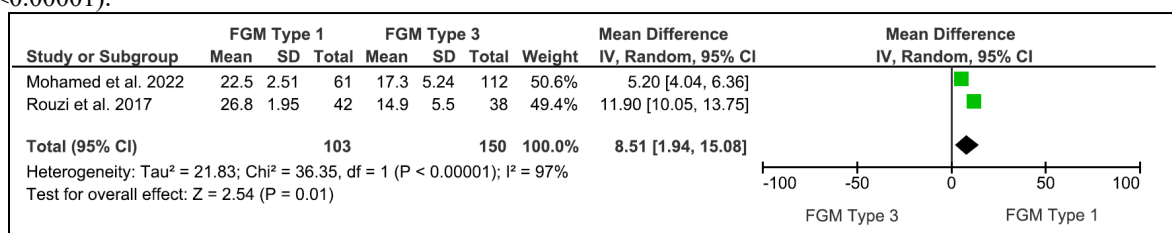


Figure 3c: (FSFI Scores – FGM/C Type 1 Vs. Type 3).

SQOL-F

Two studies contributed data on SQOL-F scores, comparing 373 women with FGM/C with 337 without FGM/C. Mean SQOL-F scores were lower in the FGM/C group; however, the difference was not statistically significant (MD -15.39, 95% CI -36.34 to 5.57; $p = 0.15$; Figure 4). Heterogeneity was substantial ($I^2 = 96\%$, $p < 0.00001$).

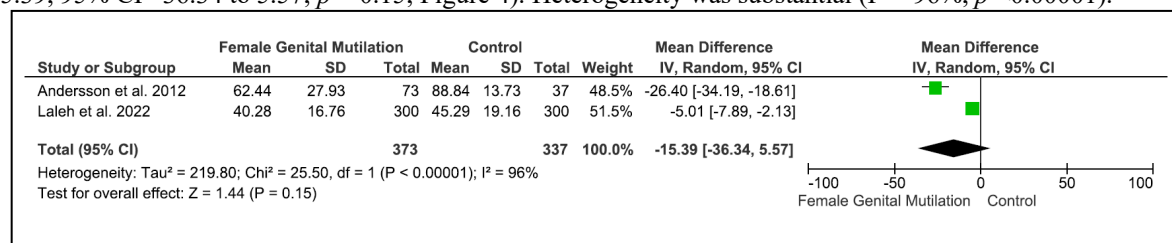


Figure 4: (SQOL-F Scores – FGM/C Vs. Control)

Quality of Studies

Study quality was assessed using the NOS for case-control studies and a modified NOS for cross-sectional studies. The assessment covered selection, comparability, exposure/outcome domains.

Among the 10 case-control studies, all received scores of 8 or 9, indicating high methodological quality (Table 2). Among the 10 cross-sectional studies, three were rated as high quality (score 8), three as moderate-to-high quality (score 7), three as moderate quality (score 6), and one as low-to-moderate quality (score 5; Table 3).

Table 2: Quality analysis of case-control studies (n = 10) via NOS.

Study	Selection (maximum points: 4)	Comparability (maximum points: 2)	Exposure (maximum points: 3)	Total Score (maximum points: 9)	Quality level
Andersson et al. (2012) ³²	4	1	3	8	High
Laleh et al. (2022) ³³	4	2	2	8	High
Alsibiani & Rouzi. (2010) ²	4	2	2	8	High
Biglu et al. (2016) ⁴	4	2	3	9	High
Helmy et al. (2016) ²²	4	2	3	9	High
Ismail et al. (2017) ²⁴	4	2	3	9	High
Mahmoud MIH. (2016) ²⁵	4	2	2	8	High
Obaid et al. (2019) ²⁷	4	2	2	8	High
Salem et al. (2019) ²⁸	4	2	3	9	High
Catania et al. (2007) ²⁹	4	2	2	8	High

Table 3: Quality analysis of cross-sectional studies (n = 10) via modified NOS.

Study	Selection (maximum points: 5)	Comparability (maximum points: 2)	Outcome (maximum points: 3)	Total Score (maximum points: 10)	Quality level
Anis et al. (2012) ¹	4	1	3	8	High
Birge et al. (2017) ¹⁹	3	1	2	6	Moderate
Abdulcadir et al. (2016) ¹⁸	3	1	2	6	Moderate
Chu et al. (2016) ²⁰	2	1	2	5	Low– Moderate
Daneshkhah et al. (2017) ⁶	3	1	3	7	Moderate– High
Esho et al. (2017) ²¹	3	2	3	8	High
Ibrahim et al. (2012) ²³	4	1	3	8	High

Mohamed et al. (2022) ³⁰	3	1	3	7	Moderate–High
Mohammed et al. (2014) ²⁶	3	1	2	6	Moderate
Rouzi et al. (2017) ³¹	3	1	3	7	Moderate–High

Publication bias

Funnel plots for FSFI outcomes comparing women with FGM/C and controls suggested asymmetry, indicating potential publication bias (Figure 5a). Egger’s regression intercept also supported this finding, with a statistically significant intercept ($p < 0.05$; Table 4; Figure 5b), consistent with small-study effects and possible publication bias. However, given the relatively small number of studies included in the primary FSFI meta-analysis ($n = 15$), these findings should be interpreted cautiously because the power of tests for funnel-plot asymmetry is limited with small numbers of studies.

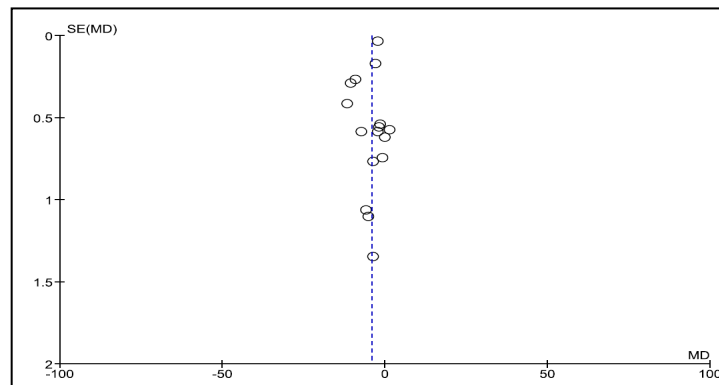


Figure 5a: Funnel plot – FGM/C vs. Control

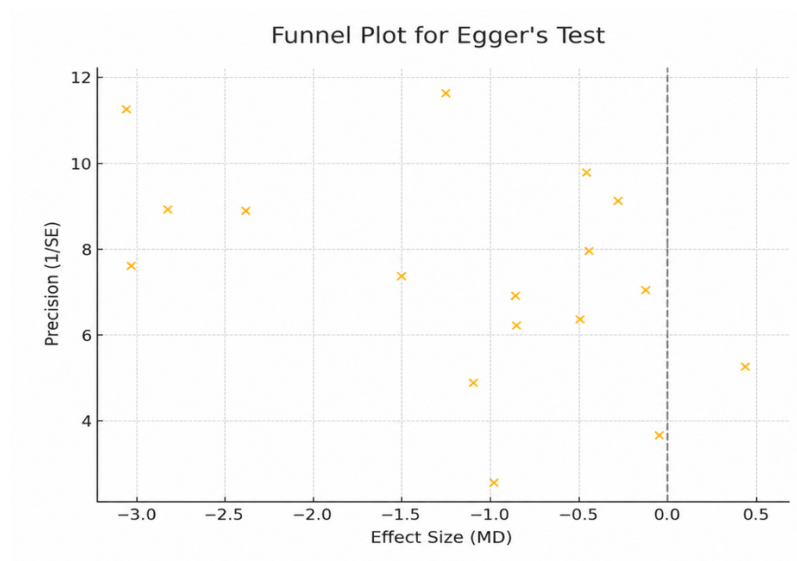


Figure 5b: Egger’s Test (Funnel Plot).

Table 4: Outcomes from the Egger's slope and intercept.

Attribute	Coefficient	Standard error	T value	P value
Intercept	-1.868438453	0.607819	-3.074	0.007716
Slope	4.686730023	3.522478	1.330521	0.203221

Discussion

This systematic review and meta-analysis identified significantly lower FSFI scores among women with a history of FGM/C compared with women without FGM/C.^{1,2,4,6,18-29} When FSFI scores were examined by FGM/C type, women with type III FGM/C had the lowest mean scores, indicating the greatest impairment, whereas women with type I FGM/C had the highest mean scores relative to type II and III.^{30,31} In contrast, SQOL-F scores did not differ significantly between women with FGM/C and controls.^{32,33}

Lower FSFI scores among women with FGM/C are consistent with recent literature described adverse effects on multiple aspects of sexual function. Dura *et al.* (2023) reported reductions in sexual self-image and sexual functioning among women with FGM/C,³⁴ with greater impairment observed in those with more extensive forms of cutting, which is concordant with the present findings type III FGM/C. This gradient across FGM/C types is biologically plausible, given the increasing extent of tissue removal and scarring with more severe forms of FGM/C. The current results are also in line with the meta-analysis by Nzinga *et al.* (2021), which reported poorer sexual function in women with FGM/C, reflected by reduced FSFI scores.³⁵ Similarly, Hassannezhad *et al.* (2024) reported higher mean FSFI scores among women with type I compared with type II FGM/C (23.5 ± 2.0 vs. 17.4 ± 2.39) consistent with the pattern observed in the present analysis.³⁶ Pérez-López *et al.* (2020) also found that women with FGM/C had poorer FSFI domain scores, including pain, satisfaction, orgasm, lubrication, and arousal.¹¹ Notably, studies published after the prespecified search cutoff of 31 August 2023 are cited in this Discussion solely to provide contemporary narrative context and were not considered for eligibility or included in the quantitative synthesis.

The substantial between-study heterogeneity observed across the pooled analyses likely reflects both clinical and methodological diversity. Potential sources include differences in the distribution and severity of FGM/C types across study populations, as pooling women with different anatomical forms of FGM/C may obscure type-specific effects on sexual function. Variation in geographic, sociocultural, and relationship contexts may also influence the perception and reporting of sexual function. In addition, differences in language, cultural adaptation, and validation of the FSFI across study settings may have contributed to variability in measured outcomes. These factors should be considered when interpreting the pooled estimates, particularly given the consistently high I^2 values.

Beyond sexual dysfunction and dyspareunia, recent literature has emphasized the broader clinical sequelae associated with FGM/C, including psychological morbidity and urological, gynecological, and obstetric complications.^{37,38} Reported outcomes include anxiety, depression, somatoform symptoms, dysuria, urinary tract infection, menstrual problems, genital tissue injury, prolonged or obstructed labor, obstetric tears, episiotomy, cesarean delivery, postpartum hemorrhage, long-hospital stay, fetal distress, neonatal asphyxia, and stillbirth.^{37,39,40} The extent to which these morbidities contribute to, or co-occur with, sexual dysfunction has not been examined consistently across studies and could not be evaluated within the present meta-analysis.

Recent evidence suggests that FGM/C may be associated with alterations in reproductive hormone profiles, including total and free testosterone, estradiol, prolactin, luteinizing hormone, and follicle-stimulating hormone.^{41,42} FGM/C has also been linked to lubrication difficulties and reduced sexual arousal or desire, consistent with sexual dysfunction. Psychological sequelae, including sleep disturbance, post-traumatic stress symptoms, anxiety, low self-esteem, phobia symptoms, and somatization, may further compromise sexual function among women affected by FGM/C.⁴³ In addition, disrupted sexual response cycles and broader psychosocial stressors may make sexual stimulation more difficult in circumcised women than in women without FGM/C.⁴⁴ Collectively, these findings highlight the need for further research examining psychosocial determinants and potential physiological pathways that may contribute to impaired sexual health and reduced sexual quality of life following FGM/C.

Limitations

The predominance of case-control and cross-sectional designs, together with limited sample sizes in several studies, restricts the generalizability of the findings. Also, the relatively high proportion of reports that could not be retrieved may have introduced availability bias, as potentially eligible studies may have been excluded before full-text assessment. Reliance on self-reported outcomes, substantial between-study heterogeneity, and evidence of publication bias further complicate interpretation. In addition, data limitations precluded subgroup analyses by comorbidities, demographic characteristics, medical history, or prior interventions, increasing the likelihood of residual confounding.

Recommendations and Future Research Directions

The findings suggest a gradient of impairment in sexual function across FGM/C types, with lower FSFI scores observed with increasing severity. Clinically, this supports the need for structured, evidence-informed care pathways that are sensitive to FGM/C type and symptom burden. Management may include psychosexual counselling, trauma-informed psychological support, and culturally competent, patient-centered gynecological care. Where appropriate, referral pathways for surgical consultation may be considered; however, recommendations regarding reconstructive procedures should be based on robust evidence, individualized assessment, and local clinical guidance. At the population level, prevention remains central, and public health strategies should prioritize education, community engagement, and improved awareness of the health consequences of FGM/C. Training for healthcare professionals should emphasize sensitive enquiry, appropriate clinical assessment, and holistic support that accounts for women's medical histories, health status, social contexts, and beliefs. Future research should use prospective designs with adequate sample sizes to examine long-term psychosexual outcomes and to evaluate the modifying role of age, comorbidities, mental health, and socio-demographic factors on sexual health and health-related quality of life.

Conclusion

This systematic review and meta-analysis supports existing evidence that FGM/C is associated with poorer sexual function among reproductive-age women. The extent of impairment appears to increase with the severity of FGM/C, with type III FGM/C associated with the greatest reduction in sexual function compared with type I and II. Future prospective studies with larger samples are needed to confirm these findings and to clarify the roles of demographic factors, comorbidities, and mental health in shaping sexual function and sexual quality of life following FGM/C.

Author Contributions

HA, IM, HR, ZB, and MK designed the review, including the selection of search engines, search terms, and eligibility criteria. The database search was performed by HA, IM, and HR. Data analysis, including the assessment of search results and study selection, was carried out by HA, IM, HR, ZB, and MK. Figures and tables were prepared by HA, IM, HR, ZB and MK. The manuscript was drafted and critically revised for important intellectual content by all authors. All authors approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

Disclosure

The authors have no competing interests, or other interests that might be perceived to influence the results and/or discussion reported in this paper. This research received no external funding.

Data Availability Statement

the data supporting the findings of this systematic review are available from the corresponding author upon reasonable request. All data were extracted from previously published studies, which are cited in the reference list. No new primary data were collected for this review.

Ethical Consideration: As this systematic review and meta-analysis was based exclusively on previously published aggregate data and involved no collection of new human or animal subject data, institutional ethical approval was not required.

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