

FEMALE SEXUAL FUNCTION

Consequences of Female Genital Mutilation on Women's Sexual Health — Systematic Review and Meta-Analysis



Andy-Muller Nzinga, MAST PMR,¹ Stéphanie De Andrade Castanheira, BSc PT,² Jessica Hermann, BSc PT,² Véronique Feipel, PhD PT,^{3,4} Augustin Joseph Kipula, PhD Sp Med & Reha,¹ and Jeanne Bertuit, PhD PT²

ABSTRACT

Background: Female genital mutilation (FGM) can leave a lasting mark on the lives and minds of those affected.

Aim: To assess the consequences of FGM on women's sexual function in women who have undergone FGM compared to women who have not undergone FGM.

Methods: A systematic review and meta-analysis were conducted from 3 databases; inclusion and exclusion criteria were determined. Studies included adult women having undergone FGM and presenting sexual disorders assessed by the Female Sexual Function Index (FSFI).

Results: Of 129 studies, 5 that met the criteria were selected. The sexual function of mutilated women, based on the FSFI total score and its different domains, was compared to the sexual function of non-mutilated women. There was a significant decrease in the total FSFI scores of mutilated women compared to non-mutilated women. However, the results obtained for the different domains were not the same for all authors. The meta-analysis highlighted a high heterogeneity with inconsistency and true variance in effect size between-studies.

Conclusion: Analysis of studies showed that there is a significant decrease in the total FSFI score, indicating that FGM of any type may cause impaired sexual functioning. But a firm conclusion on this topic is not yet achievable because the results of this analysis do not allow to conclude a cause and effect relationship of FGM on sexual function. **Nzinga A-M, De Andrade Castanheira S, Herklmann J, et al. Consequences of Female Genital Mutilation on Women's Sexual Health — Systematic Review and Meta-Analysis. J Sex Med 2021;18:750–760.**

Copyright © 2021, The Authors. Published by Elsevier Inc. on behalf of the International Society for Sexual Medicine. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Key Words: Female Genital mutilation; Sexual Dysfunction; Sexual health; Women

INTRODUCTION

Female genital mutilation (FGM) was defined by the World Health Organization (WHO) as “all procedures which intentionally alter or damage the external female genitalia organs for non-

medical reasons and which have no benefit for the health of young girls and women.”¹ It is mainly classified into 4 types; Type I: partial or total removal of the clitoris and/or the prepuce (clitoridectomy), Type II: partial or total removal of the clitoris and the labia minora, with or without excision of the labia majora (excision), Type III: narrowing of the vaginal orifice with covering by cutting and appositioning the labia minora and/or the labia majora, with or without excision of the clitoris (infibulation) and Type IV: all other harmful procedures to the female genitalia organs for non-therapeutic purposes, such as pricking, piercing, incision, scarification, and cauterization. The identification of certain ambiguities subsequently led to the creation of sub-divisions in order to make this classification more complete and precise.¹

This practice is present in at least 30 countries, including some European countries, as well as Australia and North America. Although the exact number of girls and women who have undergone FGM is unknown, it is estimated that at least 200 million girls and women have been subjected to this practice. Among these, more than half live in just 3 countries: Indonesia,

Received August 14, 2020. Accepted January 4, 2021.

¹Pelvic floor Re-education Unit, Department of Physical Medicine and Rehabilitation, University Clinics of Kinshasa, Faculty of Medicine, University of Kinshasa (UNIKIN), Kinshasa, Democratic Republic of Congo (DRC);

²School of Health Sciences (HESAV), University of Applied Sciences and Arts Western Switzerland (HES-SO), Lausanne, Switzerland;

³Laboratory of Functional Anatomy, Faculty of Motor Sciences, Université Libre de Bruxelles, Brussels, Belgium;

⁴Laboratory of Anatomy, Biomechanics, and Organogenesis, Faculty of Medicine, Université Libre de Bruxelles, Brussels, Belgium

Copyright © 2021, The Authors. Published by Elsevier Inc. on behalf of the International Society for Sexual Medicine. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

<https://doi.org/10.1016/j.jsxm.2021.01.173>

Egypt, and Ethiopia, and 40 million girls are under the age of 15.^{2,3} In Morocco and the Democratic Republic of Congo (RDC), excision is found only in the border regions of countries where it is performed (Mauritania for Morocco, and the Central African Republic and Sudan for the DRC).⁴

According to the WHO, the greater the intervention performed, the greater the risks involved.⁵ So, FGM can leave a lasting mark on the lives and minds of those who have suffered from it, and they are responsible for various complications in the short-term and the long-term,⁵ such as sexual dysfunction. Therefore, a significant lack in knowledge remains about FGM, as well as about those consequences on women's sexual function.⁶

Thus, this work aims to carry out a systematic review of the literature and meta-analysis in order to assess the consequences of FGM on women's sexual function in women who have undergone FGM compared to women who have not undergone FGM.

METHODS

Protocol

The official PRISMA recommendations were used for carrying out and writing the literature review.⁷

Search Strategy

We conducted a systematic review of the scientific literature and meta-analysis of the consequences of FGM on women's sexual function who undergone it compared to those who had not undergone it. This research was carried out in September 2019. 3 databases were used: CINHALL, PubMed, and Embase. The keywords and descriptors were chosen in order to best respond to the topic (Table 1). The descriptors were found using the Thesaurus of the various databases. Subsequently, the use of the Boolean operators "OR and AND" allowed us to assemble the keywords and descriptors in order to create the search equation that was then developed and specified according to each database (Table 2).

Eligibility Criteria

In order to refine the search, inclusion and exclusion criteria were determined (Table 3). Studies including adult women having undergone FGM and presenting sexual dysfunction assessed by the Female Sexual Function Index (FSFI) and its different domains were selected. In view of the large number of articles concerning the consequences of FGM, all articles published before the year 2000 were excluded. Only descriptive and epidemiological studies published in English, French, and Portuguese were selected.

The FSFI is a multidimensional, reliable, and validated self-assessment questionnaire consisting of 19 items and 6 domains that assess the main dimensions of sexual function in women over the past 4 weeks. The different domains assessed by the FSFI are sexual arousal, lubrication, orgasm, desire, pain, and satisfaction.⁸

Table 1. Keywords

Concept	Keywords
female genital mutilation	"Circumcision, Female" [Mesh] OR "female genital cutting" OR "female circumcision"
sexual disorders	"Libido" [Mesh] OR "decreased libido" OR "stenosis of the artificial opening to the vagina" OR "sexual disorders" OR "Sexual dysfunction"

The 19 items of the FSFI use a 5-point Likert scale ranging from 1–5 with higher scores indicating greater levels of sexual functioning on the respective item. For scoring the measure, the sum of each domain score is first multiplied by a domain factor ratio (0.6 for desire; 0.3 for arousal; 0.3 for lubrication; 0.4 for orgasm; 0.4 for satisfaction; and 0.4 for pain) in order to place all domain totals on a more comparable scale, and then subsequently summed to derive a total FSFI score.⁸

The total (overall) scores range from 2 to 36, and the lower scores indicate more problematic sexual functions.⁹

The FSFI clinical cutoff score of 26.55, established by Wiegell et al in 2005 (English version), has been widely used as an index to aid in distinguishing between women with and without clinical sexual dysfunction.¹⁰

Table 2. Search equation

Database	Search equation
CINHALL	(MH "Circumcision, Female") OR "female genital cutting" OR "female genital mutilation" AND (MH "Sexual Dysfunction, Female") OR "decreased libido" OR "stenosis of the artificial opening to the vagina" OR "sexual disorders" OR "close vagina" OR (MH "Pelvic Pain")
Embase	("female genital mutilation" OR "female genital cutting" OR "female circumcision") AND "female sexual dysfunction" OR "sexual disorders" OR "stenosis of the artificial opening to the vagina" OR "Close vagina" OR "libido disorder" OR "pelvis pain syndrome"
PubMed	"Circumcision, Female" [Mesh] OR "female genital cutting" OR "female circumcision" AND "decreased libido" OR "stenosis of the artificial opening to the vagina" OR "pelvic pain" OR "perineal pain" OR "ruptured vulval scar" OR "perineal tears" OR "avulsion of the urethra" OR "avulsion of the bladder" OR "sexual disorders" OR "Sexual dysfunction"

Table 3. Eligibility criteria

	Inclusion criteria	Exclusion criteria
Population	<ul style="list-style-type: none"> • Adult women with FGM • with sexual disorders 	<ul style="list-style-type: none"> • Nursling, children and teenager with FGM • With other than sexual disorders
Outcome	FSFI- Questionnaire <ul style="list-style-type: none"> • Desire • Pain • Orgasm • Lubrication • Satisfaction • Arousal • Total FSFI score 	Psychological disorders
Language	English, French, and Portuguese	Other language
Published date	From 2000 till 2017	Before 2000
Design of study	<ul style="list-style-type: none"> • Descriptive • Epidemiological 	Other design of study

FSFI = Female Sexual Function Index.

In the English version of the FSFI scale, the contents are not too sexually explicit, which may make it unsuitable for use in many societies. So far, FSFI has been translated into more than 20 languages, and it has become the de facto “gold standard” in the assessment of female sexual function and an indispensable tool in clinical research of female sexual dysfunction.¹¹

This systematic review and meta-analysis used the FSFI translated into the Arabic language because all studies except that of Esho et al¹² used the standardized and validated Arabic version of the FSFI scale (ArFSFI). Thus the ArFSFI recommends 28.1 as the cutoff.¹³

The study by Esho et al had translated the English version by themselves into their local tongue (Kipsigis) with 26.5 as the cutoff.¹²

This ArFSFI cutoff value is higher than that reported for the original FSFI. This difference may be attributed to a variety of cultural, sexual, educational, ethnic makeup, and age-related differences between the study populations. Another source of difference may also be the use of different methods of determination and the high prevalence of FGM in the Arabic (Egyptian) population.¹³

Study Selection and Data Extraction

2 authors independently reviewed the titles and abstracts of the studies obtained in the databases. Compliance with the eligibility criteria was checked. Subsequently, the same authors independently verified, by using a full reading of the studies, the criteria defined in order to include or exclude them from the review. In case of disagreement, another author helped to decide between the situations.

Methodological Quality Assessment

For assessing the quality of the studies, the McMaster grid was selected.¹⁴ It allows the assessing of different types of studies, as well as their internal and external validity. This grid consists of 9 items.

Data Analysis

2 data extraction tables were developed. The first table describes the population and its sociodemographic data such as age, parity, level of education, and place of residence. The second table offers a description of the results by grouping together the scores by domain, as well as the total FSFI scores for each study.

Meta-Analysis

A quantitative analysis was carried out on the results of FSFI. A meta-analysis was also performed to assess the impact of FGM on women’s sexual function. The number of events in each group was considered, and a random-effects model was used. The size effect was calculated with a 95% confidence interval with the MetaEasy (A Meta-Analysis Add-In for Microsoft Excel). The heterogeneity was assessed with Cochran Q tests. When the Cochran Q test is significant ($P < .05$), statistical heterogeneity is present. I² test was used for assessing inconsistency between studies, with values of 25%, 50%, and 75% corresponding to low, moderate, and high heterogeneity, respectively. If there is a high level of heterogeneity, a random-effects model (DerSimonian and Laird random-effects model = DL) is more appropriate, and the DerSimonian and Laird’s estimator for tau squared (τ^2 estimate DL) is the method most widely used to estimate the between-study variance. Hence, if τ^2 estimate is zero, the random effect and fixed effect model are the same.

RESULTS

Selection of the Studies

Figure 1 illustrates article selection. Among the 129 studies identified in the 3 database searches, 5 met the eligibility criteria.

Quality of the Studies

The methodological quality of the studies was assessed using the McMaster grid and is presented in Table 4. 3 studies^{15–17}

Table 4. McMaster grid outcome

Articles	Ismail et al, 2017	Esho et al, 2017	Rouzi et al, 2017	Anis et al, 2012	Alsibiani et al, 2010
Purpose (2 points)					
Stated clearly (1 point)	Yes	yes	yes	yes	yes
Relevant background literature reviewed (1 point)	Yes	yes	yes	yes	yes
Design	case-control study	comparative cross-sectional study	cross-sectional study	cross-sectional study	case-control prospective study
Sample (2 points)					
Described in detail	Yes	yes	yes	yes	yes
Size justified	Yes	no	no	yes	no
Outcomes (2 points)					
Reliable	Yes	no	Yes	yes	yes
Valid	Yes	no	Yes	yes	yes
Intervention (3 points)					
Described in detail	N/A	N/A	N/A	N/A	N/A
Contamination avoided	N/A	N/A	N/A	N/A	N/A
Co intervention avoided	N/A	N/A	N/A	N/A	N/A
Results (4 points)					
Reported in terms of statistical significance	Yes	yes	yes	yes	yes
Analysis method(s) appropriate	Yes	yes	yes	yes	not addressed
Clinical importance reported	not addressed	not addressed	not addressed	not addressed	not addressed
Drop-outs reported	No	no	no	no	no
Conclusions and implications (1 point)					
Appropriate given study methods and results	Yes	Yes	yes	yes	no
Total points/14	9	6	8	9	6

were considered of good methodological quality while the 2 others^{12,18} presented poor methodological quality.

Data Extraction

Characteristics of the Studies

The characteristics of the 5 selected articles are illustrated in [Table 5](#).

The selected studies included participants from different countries such as Saudi Arabia and neighboring countries,¹⁸ Sudan,¹⁷ Kenya¹² and Egypt.^{15,16} The sample sizes varied between 107 and 650 participants. The average age of participants ranged from 26 to 40 years for all studies except that of Esho et al,¹² which reported age groups. In this study, 77 participants were between the ages of 15–24, and 237 participants were aged 25 and over.

Concerning participant groups, all studies except that of Rouzi et al¹⁷ included a group of women with FGM (M) and a group of women without FGM (N-M). 1 study divided the women with FGM group into 2 subgroups, which included women cut before marriage (M–bM) and women cut after marriage

(M–aM).¹² The study by Rouzi et al¹⁷ included only women with FGM type I, II, and III, who were then compared with each other.

In order to determine the type of mutilation, a physical assessment was performed for the participants in 3 of the selected studies,^{15–17} while for the other 2 studies, the type of mutilation was self-reported by the participants.^{12,18}

FSFI Results

The FSFI outcomes of the 5 selected studies are reported in [Table 6](#). Only significant results are reported.

Desire

Anis et al¹⁵ and Ismail et al¹⁶ described that women without FGM experienced more sexual desire than women with FGM. According to the types of mutilation, the study by Ismail et al¹⁶ reported that women without FGM experienced more sexual desire than women with FGM type II. Rouzi et al,¹⁷ revealed that sexual desire was felt more in types I and II than type III.

Table 5. Characteristics of the included studies

	Sample and its division (n)	Age (years)	Level of education				Place of residence		Parity	
Ismail et al, 2017	n = 394		High education				Rural			
	M (197)	32.6 ± 10.3	110 (55.6)				115 (58.6)		2.0 ± 1.4	
	N-M (197)	31.7 ± 8.5	115 (58.5)				101 (51.4)		1.7 ± 1.3	
Esho et al, 2017	n = 314		Kindergarden to primary		≥ secondary school				0–3 ≥4	
	M – bM (140)	15–24 : 12 (15.6)	124 (50.4)		16 (23.5)				28 (22.4) 112 (59.3)	
		≥ 25 : 128 (54.0)								
	M – aM (29)	15–24 : 10 (13.0)	25 (10.2)		4 (5.9)				11 (8.8) 18 (9.5)	
		≥ 25 : 19 (8.0)								
	N-M + M (145)	15–24 : 55 (71.4)	97 (39.4)		48 (70.6)				86 (68.8) 59 (31.2)	
		≥ 25 : 90 (38.0)								
Rouzi et al, 2017	n = 107		Primary school	High/preparatory school	Secondary high school	University degree				
	Type I (42)	31.2 ± 4.7	0 (0)	0 (0)	5 (12.0)	37 (88.0)			2.4 ± 1.3	
	Type II (27)	37.3 ± 5.6	0 (0)	0 (0)	15 (56.0)	12 (44.0)			2.9 ± 1.4	
	Type III (38)	40.1 ± 5.7	11 (29)	15 (39)	12 (32.0)	0 (0)			3.5 ± 1.0	
Anis et al, 2012	n = 650		Elementary		Middle	≥ University	Rural	Urban	Nulliparous 1–2 > 2	
	M (333)		29.3 ± 7.3		82 (26.6)	188 (56.4)	63 (18.9)	180 (54.1)	21 (6.3)	11 (3.3) 301 (90.3)
	N-M (317)		26.2 ± 6.8		73 (23.0)	108 (34.1)	136 (42.9)	271 (85.4)	23 (7.26)	16 (5.1) 278 (87.7)
Alsibiani et al, 2010	n = 260		High school				Saudi	Neighboring countries	Nulliparous Multiparous	
	M (130)	30 ± 7.8	117 (90.0)				108 (41.5)	152 (58.5)	13 (10) 117 (90.0)	
	N-M (130)	31 ± 8.2	120 (92.0)						16 (12.3) 114 (87.3)	

M = women with FGM; M–aM = women with FGM after Marriage; M–bM = women with FGM before Marriage; N-M = women without FGM; N-M + M = married women without FGM. Data are provided as mean ± SD or number (percentage).

Table 6. FSFI results

Studies	Sample and its division (n)	Desire		Arousal		Lubrication		Orgasm		Satisfaction		Pain		Total score	
		Desire	P values	Arousal	P values	Lubrication	P values	Orgasm	P values	Satisfaction	P values	Pain	P values	Total score	P values
Ismail et al, 2017	Type I (145)	3.5 ± 1.4	Inter-group: .038 Type I vs Type II: .229 Type I vs N-M: .141 Type II vs N-M: .020	3.1 ± 1.6	Inter-group: .005 Type I vs Type II: .628 Type I vs N-M: .005 Type II vs N-M: .021	3.6 ± 1.5	Inter-group: .002 Type I vs Type II: .247 Type I vs N-M: .006 Type II vs N-M: .002	3.3 ± 1.5	Inter-group: < .001 Type I vs Type II: .166 Type I vs N-M: .002 Type II vs N-M: < .001	3.6 ± 1.4	Inter-group: .008 Type I vs Type II: .458 Type I vs N-M: .011 Type II vs N-M: .012	3.1 ± 1.5	Inter-group: < .001 type I vs Type II: .024 type I vs N-M: < .001 type II vs N-M: < .001	20.2 ± 6.9	Inter-group: < .001 type I vs Type II: .177 type I vs N-M: < .001 type II vs N-M: < .001
	Type II (52)	3.2 ± 1.3		3.0 ± 1.7		3.3 ± 1.6		2.9 ± 1.5		3.4 ± 1.4		2.6 ± 1.3		18.6 ± 7.5	
	N-M (197)	3.7 ± 1.1		3.6 ± 1.7		4.1 ± 1.7		3.9 ± 1.7		4.0 ± 1.5		3.8 ± 1.6		23.3 ± 8.1	
Esho et al, 2017	M – bM (140)	3.3 ± 1.3	.402	3.8 ± 1.4	.472	3.7 ± 1.4	.008	4.1 ± 1.4	.019	4.7 ± 1.2	.042	4.1 ± 1.5	.142	23.9 ± 6.6	.019
	M – aM (29)	3.3 ± 1.1		3.7 ± 0.9		3.6 ± 0.9		3.8 ± 1.3		4.2 ± 1.1		4.7 ± 1.4		22.8 ± 4.8	
	N-M + M (145)	3.5 ± 1.1		3.9 ± 0.9		4.1 ± 0.8		4.4 ± 0.9		4.7 ± 1.1		4.4 ± 1.1		25.3 ± 3.5	
Rouzi et al, 2017	Type I (42)	4.0 ± 0.4	Type I vs Type III <.001 Type II vs Type III <.001	4.1 ± 0.3	Type I vs Type III <.001 Type II vs Type III <.001	4.6 ± 0.5	Type I vs Type III <.001 Type II vs Type III <.001	4.8 ± 0.3	Type I vs Type III <.001 Type II vs Type III <.001	4.8 ± 0.7	Type I vs Type III <.001 Type II vs Type III <.001	4.5 ± 0.5	Type I vs Type III <.001 Type II vs Type III <.001	26.8 ± 1.9	Type I vs Type III <.001 Type II vs Type III <.001
	Type II (27)	3.3 ± 0.4		3.3 ± 0.4		3.8 ± 0.5		3.8 ± 0.5		4.0 ± 1.0		3.5 ± 0.8		21.6 ± 2.8	
	Type III (38)	2.2 ± 0.5		1.9 ± 0.8		2.6 ± 1.2		2.7 ± 1.3		3.4 ± 0.9		2.2 ± 1.2		14.9 ± 5.5	
Anis et al, 2012	M(333)	3.3 ± 0.8	Inter- group: < .05	4.1 ± 0.7	Inter- group: < .05	4.1 ± 0.8	Inter- group: < .05	4.5 ± 0.7	Inter- group: < .05	4.6 ± 0.9	Inter- group: < .05	3.1 ± 1.2	NS	23.9 ± 2.2	Inter- group: < .05
	N-M (317)	4.0 ± 0.7		4.8 ± 0.7		4.8 ± 0.7		4.8 ± 0.6		5.0 ± 0.7		3.2 ± 0.7		26.8 ± 2.2	
Alsibiani et al, 2010	M (130)	3.6 ± 1.1	NS	3.6 ± 1.2	Inter- group: .007	3.4 ± 1	Inter- group: .01	3.7 ± 1.2	Inter- group: .03	4.5 ± 1.2	Inter- group: .03	3.5 ± 1	NS	21.4 ± 4.4	Inter- group: .009
	N-M (130)	3.7 ± 1.2		4.2 ± 1.4		3.9 ± 1.3		4.2 ± 1.4		5 ± 1.4		3.8 ± 1.1		23.5 ± 5	

NS = no significant.

M: women with FGM/N-M: women without FGM; M–bM: women with FGM before Marriage/M–aM: women with FGM after Marriage/N-M + M: married women without FGM.

Data are provided as mean ± SD.

The FSFI score is ranges from 2 to 36 and the lower scores indicate more problematic sexual function. The cutoff used is 28.1.

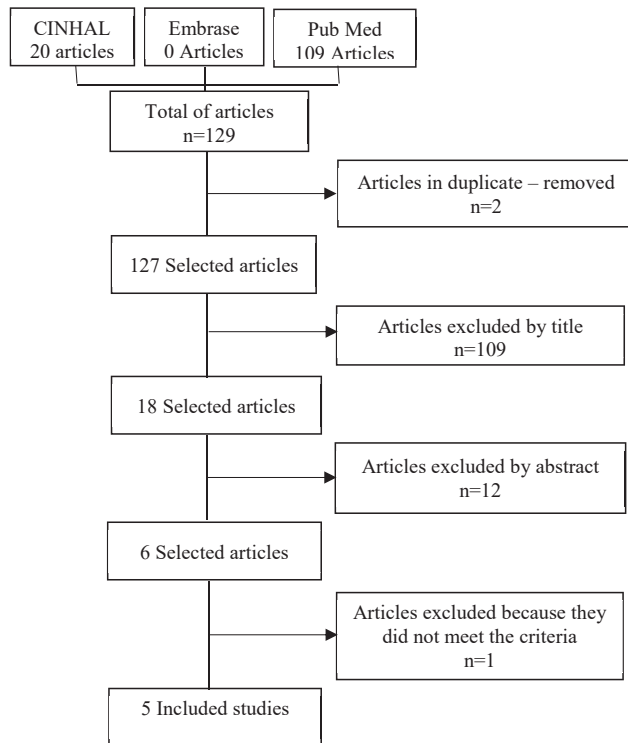


Figure 1. Flow-chart.

Arousal

According to the studies by Anis et al,¹⁵ Ismail et al,¹⁶ and Alsibiani et al,¹⁸ women without FGM experienced more sexual arousal than women with FGM. Women without FGM are more sexually aroused than those with FGM types I and II.¹⁶ Sexual arousal was felt more in types I and II than type III.¹⁷

Lubrication - Orgasm—Satisfaction

Esho et al,¹² Anis et al,¹⁵ Ismail et al,¹⁶ and Alsibiani et al¹⁸ revealed that women without FGM had more lubrication, orgasm, and sexual satisfaction than women with FGM.

According to Ismail et al,¹⁶ women without FGM had more lubrication, orgasm, and sexual satisfaction than women with FGM types I and II. The lubrication, orgasm, and sexual satisfaction were present more in types I and II than type III.¹⁷

Pain

According to the study by Ismail et al,¹⁶ women without FGM experienced less pain during sexual intercourse than women with FGM. Ismail et al¹⁶ described that women without FGM experienced less pain during intercourse than women with FGM types I and II, and women with FGM type I experienced less pain than those of type II. According to the study by Rouzi et al,¹⁷ pain during intercourse was less felt in women with FGM types I and II than those of type III.

Total Score

3 studies demonstrated that women with FGM had more sexual dysfunction than women without FGM.^{15,16,18}

Ismail et al¹⁶ illustrated that the women without FGM had less sexual dysfunction than women with FGM types I and II. According to the study by Rouzi et al,¹⁷ women with FGM types I and II had less sexual dysfunction than those of type III. The study by Esho et al¹² found that married women without FGM had less sexual dysfunction than women with FGM cut before and after marriage.

Meta-Analysis

In order to facilitate the understanding of these results, 2 graphs were created (Figure 2). About the comparison between FSFI results scores obtained by women with and without FGM, in the study by Ismail et al,¹⁶ the comparison was made between women with FGM type I and women without FGM, and in the study by Esho et al,¹² it was done between mutilated women after marriage and married women without FGM. Since the

Studies	WMD	lower 95%CI	upper 95%CI	effect size	lower 95%CI	upper 95%CI	error bars
Ismail et al 2017	-3,08	-4,67	-1,49	-0,40	-0,62	-0,19	0,21
Esho et al 2017	-2,54	-4,40	-0,68	-0,67	-1,07	-0,27	0,40
Anis et al 2012	-2,81	-3,16	-2,47	-1,26	-1,41	-1,10	0,15
Alsibiani et al 2010	-2,1	-3,24	-0,96	-0,45	-0,69	-0,20	0,24
FE model (mean)				-0,85	-0,95	-0,74	
DL model (mean)				-0,70	-1,19	-0,21	
Test for overall effect : z = -0,694 (p<0,05)							
Test for heterogeneity: Cochran Q =54,9 ; df=3 (p=0,000) ; I ² =94,5%							
Tau ² estimate (DL) = 0,24							

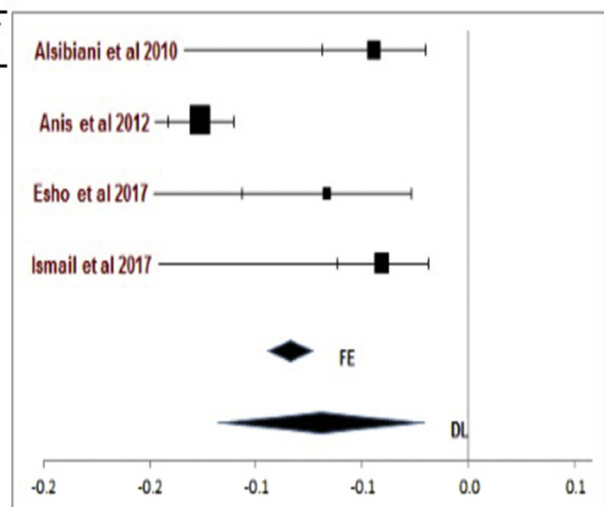


Figure 2. Forests -plots of FSFI total scores. Figure 1 is available in color online at www.jsm.jsexmed.org.

study by Rouzi et al¹⁷ did not contain a group of women with FGM, the results obtained by these authors were not displayed on this graph.

With confidence level of 95% (*t*-test) the *P* value was smaller than 0.05; It means that this meta-analysis have shown statistically significant negative effects of FGM on women's sexual function. Several studies had reported the same outcomes and were sufficiently similar to warrant pooling the negative effect of FGM in women's sexual health. However, this meta-analysis found the high heterogeneity ($I^2 = 94.5\%$) with inconsistency between studies. So, a random-effects model was used and found a true variance in effect size (τ^2 estimate = 0.23) between-studies.

DISCUSSION

All studies included a large number of participants (≥ 107 participants). Concerning the recruitment context, 3 studies recruited participants during a routine consultation in the gynecology department of the regional hospital.^{16–18} In the study by Anis et al,¹⁵ participants were also recruited during a hospital visit, but the context of this visit is not specified. Finally, Esho et al¹² stated that the participants in their study were identified from the sample of a similar study.

In order to determine or confirm the type of FGM included in the studies, a physical assessment was carried out in 3 of the selected studies.^{15–17} In the other 2 studies, the type of mutilation was self-reported.^{12,18} Confirming the type of mutilation by a genital assessment is a strong point since self-declaration of the type of mutilation is not reliable, and it is possible that it influences the accuracy of the results obtained by the authors.¹⁹ The eligibility criteria for women in the studies are only specified by 2 out of 5 authors.^{15,17} On the other hand, all studies except that of Esho et al¹² included only sexually active women.

All studies except that of Rouzi et al¹⁷ compared the results obtained by the FSFI of women with FGM with those obtained in women without FGM to determine whether or not there was more sexual dysfunction in women who have undergone it. While Rouzi et al¹⁷ compared the results of the different groups of women who undergone FGM to determine the influence of type on sexual dysfunction.

Given those studies used both the FSFI questionnaire in Arabic (ArFSFI) and Kipsigis version with different cut off of the total FSFI score, respectively, of 28.1 and 26.55 to aid in distinguishing between women with and without clinical sexual dysfunction, for the interpretation of this score, we considered that the lower scores indicated more problematic sexual function.

All authors found a significant decrease in the total FSFI score obtained by women who experienced FGM as compared with women who did not have FGM. According to them, FGM may cause impaired sexual functioning. Rouzi et al¹⁷ suggested that 9 out of 10 women who have undergone type I to III FGM suffer from sexual dysfunction. The authors showed that the average

FSFI scores obtained by women with FGM, whatever the type, were below the recommended threshold of 28.1. However, the authors pointed out that the scores obtained in type III FGM were significantly lower than those obtained in types I and II FGM. This means that the more extensive is the FGM, the greater is the sexual dysfunction.

However, the domains affected by this sexual dysfunction were not the same for all the authors. Indeed, Esho et al¹² demonstrated a significant difference between married women without FGM and those with FGM in only 3 out of 6 domains (lubrication, orgasm, and satisfaction), compared to 4 out of 6 domains (lubrication, arousal, orgasm and satisfaction) for Alsibiani et al¹⁸ between without FGM and with FGM women, and 5 domains out of 6 (desire, lubrication, arousal, orgasm and satisfaction) for Anis et al¹⁵ concerning the same groups.

Ismail et al¹⁶ were the only ones to demonstrate that all domain scores were lower in women who have undergone FGM compared to women without FGM, with the exception of the sexual desire domain, which did not differ between women without FGM and those with FGM type I. Finally, Rouzi et al¹⁷ showed that although all types of mutilation were associated with scores below the recommended threshold of 28.1, all scores (6 of 6 domains) obtained by women with FGM type III were significantly lower than the scores obtained by women with FGM types I and II.

According to the literature, there is a higher risk of dyspareunia with type III FGM relative to types I and II,²⁰ and FGM decrease sexual satisfaction, reduce sexual desire and arousal, decrease lubrication during sexual intercourse and reduce the frequency of orgasm or anorgasmia.^{20–22}

This can be justified by the fact that in women with FGM, parts of the erogenous genital zones and sexually responsive vascular tissue are excised.²² The removal of women's genital parts may lead to damaged nerve endings, as well as to the development of inelastic scar tissue and adhesions surrounding the excised areas, and for this reason, FGM may cause impaired sexual functioning.²³

Given that some types of FGM involve the removal of sexually sensitive structures, including the clitoral glans and part of the labia minora, some women report the reduction of sexual response and diminished sexual satisfaction. In addition, scarring of the vulvar area may result in pain, including during sexual intercourse.^{20–22}

Nevertheless, although not all women with FGM show sexual issues, it seems that they may be physiologically less capable of becoming sexually stimulated than women without FGM,²² due to the essential role of the integrity of the clitoris and labia minora for the achievement of sexual response.²³ It is important to specify that in women with FGM, some essential structures involved in the achievement of orgasm have not been removed.²⁴

Let us highlight that the mean scores of FSFI found in women who did not experience FGM were also below the recommended threshold of 28.1. Although they had the intact structures involved in the achievement of sexual response, this can be justified in the fact that some psychological or physiological factors are also involved in this decrease, which is the reason why those women without FGM had a low score, but this score remained above the mutilated women's score.

According to WHO guidelines, women's sexuality is multifactorial and depends, among other things, on the interaction of anatomic, cognitive, and relational factors.²¹

In addition, another possible compensatory mechanism to overcome the "anatomical barrier" is the ability of women to enhance stimulus originating from other sensory or erotic areas or through the ideation of emotions and fantasy.^{22,25,26}

So, some authors underline that women with FGM identify their breasts, tongue, or vagina as their most sensitive parts of the body.^{27–29}

According to the WHO guidelines, although there is evidence showing that these adverse health outcomes are associated with FGM and that many communities have started to acknowledge this association, in reality, health care providers are still often unaware of the many negative health consequences and remain inadequately trained to recognize and treat them properly.²¹

So, clitoral reconstruction represents the principal but not the only reconstructive option for women with FGM. Other possibilities include reconstruction of the clitoris and labia, deinfibulation, removal of cysts, neuromas, and scar tissue.³⁰ In addition, these approaches can be combined with novel reconstructive techniques.²⁴

Clitoral reconstruction is the procedure that involves the resection of the skin that covers the stump with the aim of revealing the clitoris; the suspensory ligament is subsequently sectioned to mobilize the stump. The scar tissue is then removed, and the glans is placed into a physiological position.³¹ The aim of surgery is to restore both clitoral anatomy and function, improve the patient's self-esteem, body image, sexual function, and reduce pain during sexual intercourse.³²

Deinfibulation is a minor surgical procedure carried out to reopen the vaginal introitus in women living with type III FGM. This procedure is performed to improve health and well-being, as well as to allow intercourse and/or to facilitate childbirth.²¹

A recent systematic review evaluated the effects of reconstructive surgery. The results indicate that about 3 women out of 4 regain a visible clitoris; self-reported ameliorations in pain during sex, clitoral function/pleasure, orgasm, and desire are in the 43–63% range, but up to 22% reported a worsening in sexual outcomes. As underlined by the authors, it is difficult to ascertain the real impact of reconstructive surgery due to methodological limitations and insufficient study similarity.^{24,33}

So prospective studies of the impact of reconstructive surgery on the sexual function of women with FGM are limited.^{23,31,34,35}

That is the reason why, the GDG (Guideline Development Group) underlined that surgery alone, in particular clitoral reconstruction, does not treat all aspects of sexual dysfunction that may occur among women living with FGM (57), and other medical interventions such as the use of genital lubricants have not been extensively studied.^{21,36}

As suggested by WHO guidelines, sexual counselling is recommended for preventing or treating female sexual dysfunction among women living with FGM (conditional recommendation; no direct evidence). This is conditional because there is a general lack of direct evidence regarding the use of sexual counseling, specifically among women living with FGM, and it is anticipated that this topic will be highly sensitive.²¹

A systematic review investigating the effects of sexual counselling for treating or preventing sexual dysfunction in women living with FGM was conducted to help inform this recommendation. The authors found no studies that met the inclusion criteria, and therefore, direct evidence could not be used.^{21,37}

Given that women's sexuality is multifactorial, the GDG noted that offering treatment alternatives for sexual dysfunction, in this case sexual counselling, to this population should be seen as a priority.²¹

After surgery, WHO offers to provide treatment and post-traumatic re-education for girls and women victims of mutilation.³⁸ This pelvic floor re-education and other explanations are needed to help women become familiar with their "new" genitalia image.³⁹

Abdulcadir et al proposed further studies that could evaluate the effectiveness of treatments, such as perineal re-education (eg, biofeedback or Kegel exercises) in women with FGM. Because perineal re-education could improve not only lower urinary tract symptoms and dyspareunia but could also increase the woman's self-knowledge of anatomy and physiology, which may improve satisfaction with genitalia image.⁶

Overall, careful counseling and a multidisciplinary approach are essential to identify those women who would most benefit from a surgical and/or psychological approach or pelvic floor re-education.²⁴

In short, all authors demonstrated a significant difference between the total FSFI scores obtained by women with and without FGM. Indeed, women with FGM had significantly lower scores than women without FGM, indicating that they had more sexual dysfunction.

However, the domains affected by this dysfunction differed slightly from 1 study to another. Despite the differences found among studies concerning the various domains, the results collected in this review demonstrate that FGM may cause sexual dysfunction in affected women, and the more FGM is extended,

the greater is the dysfunction. Based on these findings, a firm conclusion on this topic is not yet achievable because this meta-analysis found the high heterogeneity with inconsistency and true variance in effect size between-studies.

This review has some limitations. First, this article focusses on only 1 of the various domains affected by FGM. Other complications linked to FGM were not analyzed in view. Second, the language and publication bias may have led to a lack of studies on sexual function on women with FGM with negative results found, and no funnel plot or other assessment of publication bias was included. Third, often the lack of appropriate standardized sexual function questionnaires and appropriate control groups was observed. Finally, we could not generalize the results of negative effect of FGM on women's sexual function because conclusions about cause and effect can only be drawn in the case of randomized controlled trials.

For the future, it would therefore be interesting to carry out a review concerning other types of short-term and long-term complications due to FGM and to propose management options for each of these complications. This would provide a broader understanding of this topic, as well as a holistic idea of the management that can be used by different health care professionals, including physiotherapists.

CONCLUSION

The analysis of these 5 selected studies showed that there is a significant decrease in the total FSFI score, meaning that FGM of any type may cause impaired sexual functioning; however, the results obtained for the different domains were not the same for all authors. The meta-analysis highlighted a high heterogeneity with inconsistency between the different studies. Therefore, a firm conclusion on this topic is not yet achievable because the results of this analysis do not allow to conclude a cause and effect relationship of FGM on sexual function.

Corresponding Author: Jeanne Bertuit, PhD PT, School of Health Sciences (HESAV), University of Applied Sciences and Arts Western Switzerland (HES-SO), Av de Beaumont 21 -1011, Lausanne, Switzerland. Tel: +4121 316 81 33; E-mail: jeanne.bertuit@hesav.ch

Conflict of interest: The authors report no conflicts of interest..

Funding: None.

STATEMENT OF AUTHORSHIP

Andy-Muller Nzinga, Writing review and editing Software; Stéphanie De Andrade Castanheira, Writing original Draft Investigation Data Curation; Jessica Herklmann, Writing original Draft Investigation Data Curation; Véronique Feipel, Conceptualization Methodology; Augustin Joseph Kipula, Conceptualization; Jeanne Bertuit, Funding Supervision Conceptualization.

REFERENCES

1. World Health Organization. Classification of female genital mutilation. WHO. Available at: <https://www.who.int/reproductivehealth/topics/fgm/overview/en/>; Accessed November 1, 2020.
2. United Nations Children's Fund. Female Genital Mutilation/Cutting: A global concern. Available at: https://www.unicef.org/media/files/FGMC_2016_brochure_final_UN_UNICEF_SPREAD.pdf; Accessed November 1, 2020.
3. Land of Women Switzerland. Female genital mutilation in Switzerland: State of place of prevention, care and protection measures in relation to female genital mutilation (FGM) in Switzerland: Summary. Bern. Available at: https://www.terre-des-femmes.ch/images/docs/2014_EtatsdesLieux_MGF.pdf; Accessed November 1, 2020.
4. FPS Public Health, Safety of the Food Chain and Environment and GAMS Belgium. Female Genital Mutilation: guide for the use of the professions concerned. Brussels. Available at: http://gams.be/wp-content/uploads/2016/05/guide-mgf-fr_GAMS-Belgique.pdf; Accessed November 1, 2020.
5. World Health Organization. Female genital mutilation and other harmful practices. Geneva (n.d.). Available at: https://www.who.int/reproductivehealth/topics/fgm/overview_fgm_research/en/; Accessed November 1, 2020.
6. Abdulcadir J, Rodriguez MI, Say L. Research gaps in the care of women with female genital mutilation: An analysis. *BJOG* 2015;122:294-303.
7. Liberati A, Altman DG, Tetzlaff J, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *Plos Med* 2009;6:e1000100.
8. Rosen C, Brown J, Heiman S, et al. The Female Sexual Function Index (FSFI): A Multidimensional Self-Report Instrument for the Assessment of Female Sexual Function. *J Sex Marital Ther* 2000;26:191-208.
9. Female sexual function index. Available at: <https://www.fsfquestionnaire.com>; Accessed November 1, 2020.
10. Wiegel M, Meston C, Rosen R. The Female Sexual Function Index (FSFI): Cross-validation and development of clinical cutoff scores. *J Sex Marital Ther* 2005;31:1-20.
11. Sun X, Li C, Jin L, et al. Development and validation of Chinese version of Female Sexual Function Index in a Chinese population-A pilot study. *J Sex Med* 2011;8:1101-1111.
12. Esho T, Kimani S, Nyamongo I, et al. The 'heat' goes away: Sexual disorders of married women with female genital mutilation/cutting in Kenya. *Reprod Health* 2017;14:164.
13. Anis TH, Aboul Gheit S, Saied HS, et al. Arabic translation of female sexual function index and validation in an Egyptian population. *J Sex Med* 2011;8:3370-3378.
14. Law M, Stewart D, Pollock N, et al. Critical Review Form Quantitative Studies. Available at: <https://srs-mcmaster.ca/wp-content/uploads/2015/04/Critical-Review-Form-Quantitative-Studies-English.pdf>; Accessed November 1, 2020.
15. Anis TH, Aboul Gheit S, Awad HH, et al. Effects of Female Genital Cutting on the Sexual Function of Egyptian Women. A Cross - Sectional Study. *J Sex Med* 2012;9:2682-2692.

16. Ismail SA, Abbas AM, Habib D, et al. Effect of female genital mutilation/cutting; types I and II on sexual function: Case-controlled study. *Reprod Health* 2017;14:108.
17. Rouzi AA, Berg RC, Sahly N, et al. Effects of female genital mutilation/cutting on the sexual function of Sudanese women: A cross-sectional study. *Am J Obstet Gynecol* 2017;217:62.e1-62.e6.
18. Alsibiani SA, Rouzi AA. Sexual function in women with female genital mutilation. *The Egypt J Fertil Steril* 2010;12:3-8.
19. Elmusharaf S, Elhadi N, Almroth L. Reliability of self reported form of female genital mutilation and WHO classification: Cross sectional study. *BMJ* 2006;333:124.
20. Berg RC, Underland V, Odgaard-Jensen J, et al. Effects of female genital cutting on physical health outcomes: a systematic review and meta-analysis. *BMJ Open* 2014;4:e006316.
21. World Health Organization. Guidelines on the management of health complications from female genital mutilation. Geneva: WHO. Available at: [https://www.who.int/reproductivehealth/topics/fgm/management-health-complications-fgm/en](https://www.who.int/reproductivehealth/topics/fgm/management-health-complications-fgm/en;); Accessed November 1, 2020.
22. Berg RC, Denison E, Fretheim A. Psychological, social and sexual consequences of female genital mutilation/cutting (FGM/C): a systematic review on quantitative studies. Report from Kunnskapssenteret nr 13-2010. Oslo: Nasjonalt kunnskapssenter for helsetjenesten; 2010.
23. Thabet SMA, Thabet ASMA. Defective sexuality and female circumcision: the cause and the possible management. *J Obstet Gynaecol Res* 2003;29:12-19.
24. Buggio L, Facchin F, Chiappa L, et al. Psychosexual Consequences of Female Genital Mutilation and the Impact of Reconstructive Surgery: A Narrative Review. *Health Equity* 2019;3:36-46.
25. Abdulcadir J, Botsikas D, Bolmont M, et al. Sexual Anatomy and Function in Women With and Without Genital Mutilation: A Cross-Sectional Study. *J Sex Med* 2016;13:226-237.
26. Nour NM, Michels KB, Bryant AE. Defibulation to treat female genital cutting: effect on symptoms and sexual function. *Obstet Gynecol* 2006;108:55-60.
27. Megafu U. Female ritual circumcision in Africa an investigation of the presumed benefits among Ibos of Nigeria. *East Afr Med J* 1983;60:793-800.
28. Nwajei SD, Otiono AI. Female Genital Mutilation: implications for Female Sexuality. *Women's Stud Int Forum* 2003;26:575-580.
29. Okonofu FE, Larsen U, Oronsaye F, et al. The association between female genital cutting and correlates of sexual and gynaecological morbidity in Edo State, Nigeria. *BJOG* 2002;109:1089-1096.
30. Sigurjonsson H, Jordal M. Addressing Female Genital Mutilation/Cutting (FGM/C) in the Era of Clitoral Reconstruction: plastic Surgery. *Curr Sex Health Rep* 2018;10:50-56.
31. Folde`s P, Cuzin B, Andro A. Reconstructive surgery after female genital mutilation: a prospective cohort study. *Lancet* 2012;380:134-141.
32. Paterson LQP, Davis SN, Binik YM. Female genital mutilation/ cutting and orgasm before and after surgical repair. *Sexology* 2012;21:3-8.
33. Berg RC, Taraldsen S, Said MA, et al. The effectiveness of surgical interventions for women with FGM/C: a systematic review. *BJOG* 2018;125:278-287.
34. Ouédraogo CM, Madzou S, Touré B, et al. Practice of reconstructive plastic surgery of the clitoris after genital mutilation in Burkina Faso. Report of 94 cases. *Ann Chir Plast Esthet* 2013;58:208-215.
35. Vital M, de Visme S, Hanf M, et al. Using the Female Sexual Function Index (FSFI) to evaluate sexual function in women with genital mutilation undergoing surgical reconstruction: a pilot prospective study. *Eur J Obstet Gynecol Reprod Biol* 2016;202:71-74.
36. Abdulcadir J, Rodriguez MI, Say L. A systematic review of the evidence on clitoral reconstruction after female genital mutilation/cutting. *Int J Gynaecol Obstet* 2015;129:93-97.
37. Okomo U, Ogugbue M, Inyang E, et al. Sexual counselling for treating or preventing sexual dysfunction in women living with female genital mutilation: A systematic review. *Int J Gynaecol Obstet* 2017;136(Suppl 1):38-42.
38. World Health Organization. Female genital mutilation: an overview. Geneva : WHO. Available at: <https://apps.who.int/iris/handle/10665/42150>; Accessed November 1, 2020.
39. Adyam Y. Management of female genital mutilation: health, socio-cultural, psychosocial, ethical, and legal dimensions. [Thesis] Geneva: Geneva University of Health; 2013. Available at: https://apps.who.int/iris/bitstream/handle/10665/206437/9789241549646_eng.pdf. Accessed November 1, 2020.