

Domestic Violence against Infertile Women

A systematic review and meta-analysis

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ABSTRACT: Domestic violence (DV) against infertile women is an important health concern affecting their well-being. This systematic review and meta-analysis investigated the prevalence of DV against infertile women. The study was done based on the preferred reporting items for systematic reviews and meta-analysis (PRISMA) guideline. Various international electronic databases were utilised in order to retrieve the necessary data. Articles were included if they were cross-sectional studies published in English and in Persian journals and investigated the prevalence of DV against infertile women up to May 2020. Out of 630 studies, 26 cross-sectional studies were systematically reviewed, from which 15 studies were included in the meta-analysis. The experiences of DV varied widely among the infertile women (14.987–88.918%). The results of meta-analysis showed that the prevalence of DV stood at 47.163% (95% Confidence Interval: 34.660–59.850). Psychological and emotional violence were among the most common types of violence. Considering the high rate of DV, it is recommended that policymakers address the issue by providing supportive care to such vulnerable populations, including educational and counselling services.

Keywords: Female Infertility; Violence; Domestic Violence; Intimate Partner Violence.

VIOLENCE AGAINST WOMEN, ESPECIALLY PARTNER and sexual violence, is one of the most pressing public health concerns affecting women today.¹

In addition to violating basic human rights, violence of this sort affects the physical, sexual, reproductive, emotional, mental and social health of both the individual and their family. Unfortunately, more than a third (30%) of women in the world have reported that they have experienced some form of physical and/or sexual violence in their lifetime by their partner/non-partner. Globally accrued data reported by the World Health Organization (WHO) has shown that spousal physical or sexual violence varies from 15% in Japan to 70% in Ethiopia and Peru.² Additionally, 38% of murders of women has been reported to be committed by their intimate partners.¹ Spousal violence often has negative effects on an individual's chronic conditions, physical diseases and health-risk behaviours.³ Domestic violence (DV) has also been shown to have a significant effect on women's reproductive health.⁴ Often, such women are of poor health and receive less medical care than others. Many other problems caused by violence against women include the subsequent harm to the health and well-being of their children, the effect of DV on economic development and ultimately, the failure to achieve the millennium development goals (MDGs).^{1,2} Risk factors for DV include low levels of education, having a mother with a history of violence, young age, socio-economic status, low income, unemployment, childhood abuse, alcohol abuse, gender inequality, male dominance over

a woman in a relationship and a general attitude of accepting violence.^{2,5}

Infertility is a public health issue affecting a large part of the world's population. Research from developing countries has shown that one in four women is infertile with many studies indicating the psychological and social effects of infertility.^{6–14} DV against infertile women includes physical, psychological and sexual abuse.¹⁵ It has been demonstrated that 1.8–61.8% of infertile women experience different types of violence.^{16–18} Infertility often becomes a significant source of stress leading to sudden changes in women's relationships with family members and society.¹⁹ In some communities, women are considered to be the cause of infertility and factors such as level of education, employment status, independence, and social status appear to determine risk of violence against such women.⁴ DV has been also reported to be associated with forced marriage, treatment with in-vitro fertilisation (IVF), drug abuse, women's emotional status, addiction, smoking or drug abuse of the spouse and mental and physical diseases of the husband.²⁰ Although a systematic review by Steller *et al.* showed evidence for a relationship between infertility and intimate partner violence (IPV), they acknowledged that the availability of data was limited, leaving them with only 21 studies for the review.²¹ Moreover, the study carried out by Steller *et al.* was only a systematic review with a narrative report of IPV and no meta-analysis was conducted on the prevalence of violence against infertile women. It also seems that after more

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than five years of conducting the last review on the topic, there is a need for an updated investigation of the research in this area including more recent studies on the violence against infertile women. In their study titled “Factors Related to Violence against Infertile Women,” Hajizade-Valokolaee *et al.* used a qualitative method and an ecological approach in which a number of qualitative themes were extracted.²² Given the importance of women’s rights, the fact that infertile women are a group at risk of IPV and in need of support and considering that no comprehensive review has been done recently in this field, the present systematic review and meta-analysis was conducted to investigate the prevalence of DV against infertile women.

Methods

This systematic review and meta-analysis was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline.

SEARCH STRATEGY

The process of data collection entailed a thorough search of various English-language databases including PubMed, Scopus, Web of Science, Ovid and Google Scholar as well as Persian databases including Iran-Medex and Scientific Information Database (SID) for relevant articles. The following keywords were used for a search of the titles, abstracts or keywords of the articles: Apostrophe ‘Sterility’, ‘Subfertility’, ‘Infertility’, ‘Violence’, ‘Domestic Violence’, ‘Intimate Partner Violence’ and

‘Spousal Abuse’. The ‘AND’ and ‘OR’ operators were used between each keyword, with no time limit. Additionally, the references of the retrieved articles were also searched for any remaining articles that was possibly relevant to the current study. All of the aforementioned searches were independently performed by two reviewers and in case of disagreement in certain cases, a third party was consulted. The data collection period lasted from the beginning of March to the end of August 2020.

INCLUSION CRITERIA

Articles in both English- and Persian-languages were included in the present review if they assessed prevalence of DV in infertile women until May 5th, 2020. After independent assessment by the authors, eligible studies were included in the study while expert opinions, newspaper articles, book chapters, dissertations, conference presentations, reviews, editorials, brief communications and case reports were excluded [Figure 1].

STUDY SELECTION

As part of the article selection process, one of the researchers reviewed the titles and abstracts of the articles for relevance. In the initial search of the online databases, 630 studies were extracted including 311 articles from PubMed, 129 from Scopus, 76 from Web of Science, 100 from Google Scholar, five from Ovid, one from SID and four from Magiran databases. Four additional articles were obtained from searching through the references of relevant articles. A total of 145 articles were excluded due to duplication and 485 articles remained. After screening the titles

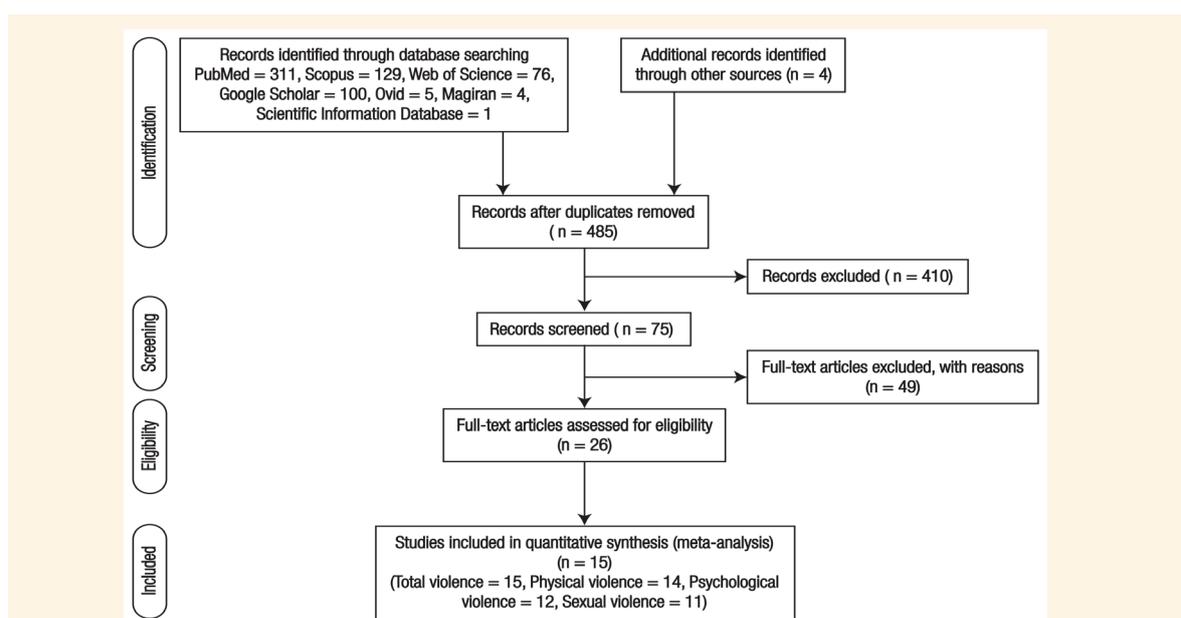


Figure 1: Flowchart showing the study selection process used for identifying articles included in the current systematic review and meta-analysis.

Table 1: List of criteria based on the critical appraisal skills programme tool for descriptive/cross-sectional studies to assess the quality of articles on domestic violence against infertile women²³

Value	Study participants
A	Was the sample representative of a defined population?
B	A description is included of at least two socio-demographic variables (e.g. age, sex, economical status, educational status, etc.)
C	Inclusion and/or exclusion criteria are provided
D	Participation rates (defined as the % age of eligible patients who gave their informed consent) are included and these rates exceed 70%
E	Information is given about the ratio between non-responders versus responders
Violence assessment	
F	A standard questionnaire is used
G	Are measurement tools available or described?
H	Is the method of reliability and its measures justified?
Study design	
I	Is the setting for data collection justified?
J	Is the sample size sufficient?
K	Is the method of sampling justified?
L	A primary objective of the study is to examine the DV in infertile women
M	It is clear how the data were collected (e.g. interview, questionnaire)
Results	
N	Are the results significant and meaningful (<i>P</i> value)?
O	Is there a summary of the bottom-line result of the trial in one sentence (key findings)?
P	Is there an in-depth description of the analytic process?
Q	Is sufficient data presented to support the findings?
R	Are the findings explicit?

DV = domestic violence.

and abstracts, 410 articles were removed based on the inclusion and exclusion criteria and a total of 75 articles were retained. After assessment of the full text of the articles for eligibility, 49 articles were excluded in accordance with the study criteria yielding a final total of 26 studies for qualitative synthesis (systematic review). Of the 26 articles, 15 were presumed to be eligible for quantitative analysis and were included in the meta-analysis. Among these 15 articles, 15 reported the overall prevalence of DV and 14, 12 and 11 articles reported only physical violence, psychological violence or sexual violence, respectively [Figure 1].

DATA EXTRACTION

A total of 26 descriptive studies were used for systematic review. All the included studies were about DV and infertility in women. Titles and abstracts were

evaluated to select eligible studies and some articles were excluded given the study criteria. Following this, the full text of the selected articles was checked for relevance based on the inclusion criteria. Data including the article title, authors, year of publication, journal name, research location, sample size, sampling method, inclusion criteria, exclusion criteria, type of questionnaire used to assess the prevalence of violence and its types among participants, method of scoring the questionnaire, reliability of the questionnaire and the study findings were extracted into two checklists by the first and second authors.

QUALITY ASSESSMENT

A checklist was designed to assess quality of the studies [Table 1]. This checklist was the same as the critical appraisal skills programme tool for descriptive/cross-sectional studies and was specifically used to address the question of the present study, and has been used in a previous systematic reviews.^{23,24} The questionnaire consisted of 18 items and the score of each item was either 0 or 1; if the study met the desired criteria, a score of 1 was given and if the required criteria were not met, a score of 0 was given. The total score of the checklist ranged from 0–18. Consequently, based on their scores, all included studies were classified into three levels: (1) "High quality studies", including the studies scoring 75% and above (13 points or higher) of the total score; (2) "Medium quality studies", including the studies scoring between 50–75% (9–12 points) of the total score; and (3) "Low quality studies", including the studies scoring below 50% of the total score (8 points or less).²⁴ The results of quality assessment of the articles showed that 22 studies (81.5%) were classified as being high quality, four studies (14.8%) as medium quality and one low quality study (3.7%).

DATA SYNTHESIS AND ANALYSIS

After careful reading and examination, 15 studies were included in the meta-analysis of the overall prevalence of total score of domestic violence against infertile women. It should be noted that one more article, in which the total score of violence had not been reported and just the frequency of different types of violence was reported, was included in the meta-analysis of different types of domestic violence. All the included studies had reported the score of DV in infertile women. A test for heterogeneity was applied using the Chi-Square test and I^2 statistics ($I^2 = 98.68\%$, $P < 0.0001$). According to this test, the overall estimates were calculated using the random-effects meta-analysis model. Data analysis was carried out using the MedCalc[®] statistical software package, Version 19.4.1 (MedCalc Software, Ostend, Belgium).

Table 2: Characteristics of 26 studies assessing domestic violence against infertile women^{15,16,18,20,25-46}

Author (Year)	Country	Study design	Sampling	Tool	N	Relevant findings	Quality using CASP
Aduloju <i>et al.</i> ³⁸ (2015)	Nigeria	Cross-sectional	Convenient	Semi-structured questionnaire on violence	131	<ul style="list-style-type: none"> •Total DV = 31.2% •Psychological DV: >50% •DV associated with unemployment, polygamous marriage, husband's social habits, primary infertility and prolonged duration of infertility. •No significant differences in the age of the women, duration of marriage and duration of infertility. 	High
Akpınar <i>et al.</i> ³³ (2019)	Turkey	Cross-sectional	Convenient	AAS	142	<ul style="list-style-type: none"> •Total DV = 47.9% •Psychological DV = 76.5% •Physical DV = 17.6% •Sexual DV = 4.4% •Physical and sexual abuse = 1.5% •Risk factors included low educational and economic level and living in a compound family. 	Moderate
Akyuz <i>et al.</i> ³⁶ (2013)	Turkey	Comparative descriptive	Convenient	SDVW	228	<ul style="list-style-type: none"> •Emotional, economic and sexual violence scores were higher in the infertile group. •The verbal violence score was lower. 	High
Alijani <i>et al.</i> ²⁸ (2018)	Iran	Cross-sectional	Consecutive	CTS2	379	<ul style="list-style-type: none"> •Total DV = 88.9% •Physical violence = 25.9 % •Sexual violence = 28.2% •No relationships between violence and women's educational status, men's jobs, place of residence, alcohol consumption and drug addiction. •Risk factors included men being smokers and women being of younger age. 	High
Ameh <i>et al.</i> ¹⁵ (2007)	Nigeria	Cross-sectional	Consecutive	Demographic and DV Questionnaire	233	<ul style="list-style-type: none"> •Total DV = 41.6% •Physical abuse = 17.5% •Psychological torture = 51.5% •Verbal abuse = 39.2% •Educational level, parity, type of marriage and duration of infertility were not statistically significant. 	Moderate
Ardabili <i>et al.</i> ¹⁶ (2011)	Iran	Cross-sectional	Convenient	CTS2	400	<ul style="list-style-type: none"> •Total DV = 61.8 •Psychological DV = 33.8% •Physical DV = 14% •Sexual DV = 8% 	High
Bondade <i>et al.</i> ³⁵ (2018)	Turkey	Cross-sectional	Convenient	HAM-A, HAM-D, WHO violence against women instrument	100	<ul style="list-style-type: none"> •Total DV = 50% •Psychological violence = 34% •Physical violence = 11% •Sexual violence = 5% •The prevalence of anxiety disorder and depressive disorder was high among the IPV group. 	High
Dhont <i>et al.</i> ⁴⁴ (2011)	Rwanda	Survey	-	Structured questionnaire	312	<ul style="list-style-type: none"> •DV more frequently in the survey by infertile than fertile couples. •Infertility was important determinant for the psycho-social consequences suffered. 	Moderate
Etesami pour <i>et al.</i> ³¹ (2011)	Iran	Comparative descriptive	Simple random	Family violence and sexual satisfaction, disorders questionnaire	100	<ul style="list-style-type: none"> •The rate of mental, physical and economical violence in infertile women was significantly higher than fertile ones. •Significant interaction effect between education of women and the rate of couple abuse was not observed in fertile and infertile groups. 	High
Farzadi <i>et al.</i> ³⁰ (2014)	Iran	Cross-sectional	Convenient	Modified questionnaire of violence against women	200	<ul style="list-style-type: none"> •Experienced at least one type of physical violence = 45% •Sexual violence ≈ 54% •Psychological violence = 82% 	High
Iliyasu <i>et al.</i> ³⁹ (2016)	Nigeria	Cross-sectional	Systematic random	DHS, CTS2	373	<ul style="list-style-type: none"> •Total DV = 35.9% •Psychological violence = 94.0% •Sexual = 82.8% •Verbal = 35.1% •Physical forms = 18.7% •Multiple forms of violence = 25.4% •Lack of formal education, employment in the informal sector and having an unemployed spouse or one with low level of education were all independently associated with IPV. 	High
Lotfy <i>et al.</i> ⁴⁰ (2019)	Egypt	Cross-sectional	Convenient	IWEVDS	304	<ul style="list-style-type: none"> •The most common forms of DV were psychological violence and verbal abuse. •Predictors included wife's age, residency, previous intra cytoplasmic sperm injection, divorce threats from and fear of husband. 	High
Mansour <i>et al.</i> ⁴¹ (2018)	Egypt	Cross-sectional	Convenient	Researcher-made questionnaire, general health questionnaire	246	<ul style="list-style-type: none"> •Psychological violence was found to be the most common type of violence followed by sexual and physical violence. •The severity of DV had a significant correlation with the social class of the woman, chronic disease of the husband, duration of marriage and trial of ICSI treatment. 	High

N = total number of infertile women; CASP = critical appraisal skills program; DV = domestic violence; AAS = abuse assessment scale; SDVW = questionnaire and scale for marital violence against women; CTS2 = revised conflict tactics scale; HAM-A = hamilton anxiety rating scale; HAM-D = hamilton depression rating scale; IPV = intimate partner violence; DHS = demographic and health survey instrument; IWEVDS = interview questionnaire of infertile women's exposure to violence determination scale; PSS = perceived stress scale; ICSI = intracytoplasmic sperm injection; SFPS = stigma of fertility problems scale; NFHS-3 = national family health survey 3; FSEI = domestic violence inventory and female sexual function index; IVF = in vitro fertilisation; MQS = marital quality scale; PASNP = partner abuse scale, non-physical; NPAPS = non-physical abuse of partner scale.

Table 2 (cont'd.): Characteristics of 26 studies assessing domestic violence against infertile women^{15,16,18,20,25-46}

Author (Year)	Country	Study design	Sampling	Tool	N	Relevant findings	Quality using CASP
Ozturk <i>et al.</i> ²⁵ (2021)	USA	Survey	Convenient	AAS, PSS, Social support questions, SFPS	786	<ul style="list-style-type: none"> •Total DV = 21.8% •Emotional abuse = 30.3% •Physical abuse = 21.8% •Experiencing high levels of stigma. •One in five infertile women were exposed to emotional or physical violence. 	High
Ozturk <i>et al.</i> ⁴⁵ (2017)	Turkey	Cross-sectional	Convenient	IWEVDS	301	<ul style="list-style-type: none"> •Total DV = 32.5% •Emotional DV = 21.8% •Physical DV = 31.9% •Sexual DV = 21.8% •Verbal DV = 38.7% 	High
Pasi <i>et al.</i> ⁴² (2011)	India	Survey	-	NFHS-3	2023	<ul style="list-style-type: none"> •Experienced physical and/or sexual violence in the last 12 months = 77.8% 	Low
Poorn-owrooz <i>et al.</i> ²⁷ (2019)	Iran	Cross-sectional	Convenient	FSFI	147	<ul style="list-style-type: none"> •Total DV = 56.6% •Physical violence = 34% •Sexual violence = 27.2% •Psychological violence = 52.4% •Physical, sexual and psychological violence were higher in infertile women than fertile women. 	High
Sahin <i>et al.</i> ³⁴ (2018)	Turkey	Cross-sectional	-	Questionnaires administered through the face-to-face interview method, Beck Anxiety Inventory	774	<ul style="list-style-type: none"> •Total DV = 15.0% •Emotional DV = 56.1% •Physical violence = 11% •Sexual DV = 21.9% •Verbal DV = 11% •Associated factors included being a woman aged 25 years and above, education level of high school and above, unemployment, addiction to smoking and alcohol, obesity, marriage more than once, being 19 years of age and below at the time of the first marriage, being married for four or less years, primary infertility, being infertile for two years and below and a family history of infertility. •Anxiety levels were significantly higher among infertile women with a history of DV. 	High
Sami and Ali ^{45,46} (2012)	Pakistan	Cross-sectional	Convenient	AAS	400	<ul style="list-style-type: none"> •DV = 64% •Physical violence = 23.1% •Verbal violence = 60.8% 	High
Sheikhan <i>et al.</i> ²⁰ (2014)	Iran	Cross-sectional	Convenient	DV questionnaire	400	<ul style="list-style-type: none"> •Experienced DV = 34.7% •Physical violence = 5.3% •Emotional violence = 74.3% •Sexual violence = 47.3% •DV was significantly associated with unwanted marriage, number of IVF treatments, drug abuse, emotional status of the women, smoking, addiction or drug abuse by the spouse, mental and physical diseases of the husband. 	High
Sis Çelik <i>et al.</i> ³² (2018)	Turkey	Cross-sectional	Simple random	IWEVDS	423	<ul style="list-style-type: none"> •Total DV = 72%. •Physical violence = 30% •Sexual violence = 6% •Emotional violence = 62% •Economic violence = 19%. •Associations existed between violence against women and husband's low education level, living in a rural area, husband's classification as a 'worker' based on employment type, low level of income and primary infertility. •No significant associations between domestic violence and women's age, educational level and employment status of women, husband's age, type of family, duration of infertility and marriage. 	High
Satheesan and Satyaranyana ⁴³ (2018)	India	Cross-sectional	Simple random	MQS	30	<ul style="list-style-type: none"> •Total DV = 47%. •Women who experienced violence were more likely to report poor quality of marital relationship, higher levels of distress and lower resilience than women who did not. •Experience of at least one form of intimate partner violence emerged as a significant predictor of psychological distress. 	Moderate
Solanki <i>et al.</i> ³⁷ (2018)	Nigeria	Survey	-	Nigeria Demographic and Health Survey	8646	<ul style="list-style-type: none"> •Lower DV among childless women. 	High
Tabrizi <i>et al.</i> ²⁹ (2016)	Iran	Cross-sectional	Random sampling	General health questionnaire	384	<ul style="list-style-type: none"> •The violence rate was significant among families with infertile women, women with husbands educated at the primary level or below and among women with lower economic status. •Lengthened duration of marriage and increased awareness of the infertile women was associated with higher rates of the violence. •A strong relationship existed between all components of violence and the total general health score. 	High
Taebi <i>et al.</i> ²⁶ (2016)	Iran	Cross-sectional	Convenient	PASNP, NPAPS	131	<ul style="list-style-type: none"> •A significant difference existed between the mean scores of perceived non-physical partner abuse and factor of infertility. 	High

N = total number of infertile women; CASP = critical appraisal skills program; DV = domestic violence; AAS = abuse assessment scale; SDVW = questionnaire and scale for marital violence against women; CTS2 = revised conflict tactics scale; HAM-A = hamilton anxiety rating scale; HAM-D = hamilton depression rating scale; IPV = intimate partner violence; DHS = Demographic and Health Survey instrument; IWEVDS = interview questionnaire of infertile women's exposure to violence determination scale; PSS = perceived stress scale; ICSI = intracytoplasmic sperm injection; SFPS = stigma of fertility problems scale; NFHS-3 = national family health survey 3; FSFI = domestic violence inventory and female sexual function index; IVF = in vitro fertilisation; MQS = marital quality scale; PASNP = partner abuse scale, non-physical; NPAPS = non-physical abuse of partner scale.

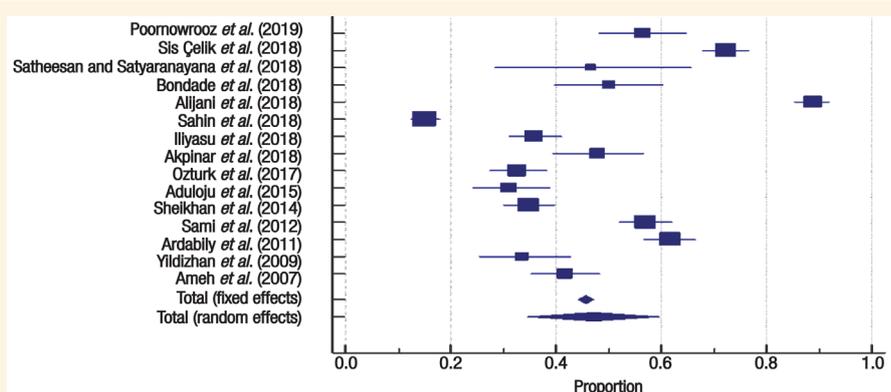
Table 2 (cont'd): Characteristics of 26 studies assessing domestic violence against infertile women^{15,16,18,20,25-46}

Author (Year)	Country	Study design	Sampling	Tool	N	Relevant findings	Quality using CASP
Yildizhan <i>et al.</i> ¹⁸ (2009)	Turkey	Cross-sectional	Convenient	Structured questionnaire modified from AAS	122	<ul style="list-style-type: none"> •Total DV = 33.6% •Physical abuse = 31.7% •Forced sexual intercourse = 7.3% •DV in case of a female infertility factor = 78% •Verbal abuse = 63.4% •Economic deprivation = 29.2% 	High

N = total number of infertile women; CASP = critical appraisal skills program; DV = domestic violence; AAS = abuse assessment scale; SDVW = questionnaire and scale for marital violence against women; CTS2 = revised conflict tactics scale; HAM-A = hamilton anxiety rating scale; HAM-D = hamilton depression rating scale; IPV = intimate partner violence; DHS = demographic and health survey instrument; IWEVDS = interview questionnaire of infertile women's exposure to violence determination scale; PSS = perceived stress scale; ICSI = intracytoplasmic sperm injection; SFPS = stigma of fertility problems scale; NFHS-3 = national family health survey 3; FSFI = domestic violence inventory and female sexual function index; IVF = in vitro fertilisation; MQS = marital quality scale; PASNP = partner abuse scale, non-physical; NPAPS = non-physical abuse of partner scale.

Table 3: Forest plot showing the prevalence of total domestic violence against infertile women according—the fixed and random effects models (N = 15)

Author (year of publication)	Total sample size	Proportion of DV in %	95% CI	Weight in %	
				Fixed	Random
Poornowrooz <i>et al.</i> ²⁷ (2019)	147	56.463	48.046–64.613	3.36	6.65
Sis Çelik <i>et al.</i> ³² (2018)	423	72.340	67.813–76.552	9.62	6.77
Satheesan and Satyanarayana ⁴³ (2018)	30	46.667	28.342–65.674	0.70	6.04
Bondade <i>et al.</i> ³⁵ (2018)	100	50.000	39.832–60.168	2.29	6.57
Alijani <i>et al.</i> ²⁸ (2018)	379	88.918	85.317–91.896	8.62	6.76
Sahin <i>et al.</i> ³⁴ (2018)	774	14.987	12.545–17.699	17.58	6.79
Iliyasu <i>et al.</i> ³⁹ (2018)	373	35.925	31.051–41.025	8.48	6.76
Akpinar <i>et al.</i> ³³ (2017)	142	47.887	39.440–56.424	3.24	6.64
Ozturk <i>et al.</i> ⁴⁵ (2017)	301	32.558	27.293–38.170	6.85	6.74
Aduloju <i>et al.</i> ³⁸ (2015)	170	31.176	24.304–38.719	3.88	6.67
Sheikhan <i>et al.</i> ²⁰ (2014)	400	34.750	30.087–39.641	9.10	6.76
Sami <i>et al.</i> ⁴⁶ (2012)	400	57.000	51.987–61.909	9.10	6.76
Ardabily <i>et al.</i> ¹⁶ (2011)	400	61.750	56.790–66.535	9.10	6.76
Yildizhan <i>et al.</i> ¹⁸ (2009)	122	33.607	25.310–42.720	2.79	6.61
Ameh <i>et al.</i> ¹⁵ (2007)	233	41.631	35.230–48.248	5.31	6.71
Total (fixed effects)	4,394	45.610	44.132–47.094	100.00	100.00
Total (random effects)	4,394	47.163	34.660–59.850	100.00	100.00



Results

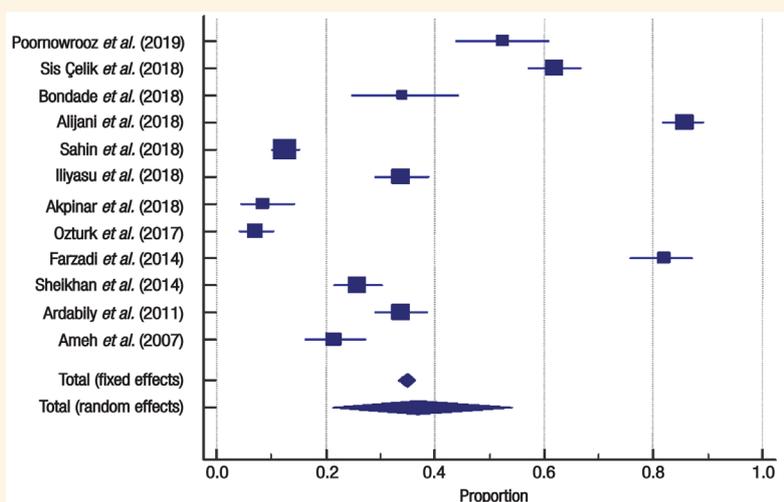
OVERVIEW OF THE SELECTED STUDIES

Out of the 630 articles reviewed, a total of 26 articles, of which 24 were English and two in Persian, were included in the study.^{15,16,18,20,25-46} One of the reviewers

who was fluent in both Persian and English, independently translated the Persian articles into the English language. This was then double-checked by another reviewer. One study had been conducted in USA, a high-income country while the rest were from various middle- and low-income countries.²⁵ Table 2 presents

Table 4: Forest plot showing the prevalence of domestic psychological violence against infertile women (n = 12)

Author (year of publication)	Total sample size	Proportion of domestic psychological violence in %	95% CI	Weight in %	
				Fixed	Random
Poornowrooz <i>et al.</i> ²⁷ (2019)	147	52.381	43.991–60.673	3.81	8.28
Sis Çelik <i>et al.</i> ³² (2018)	423	61.939	57.123–66.586	10.92	8.37
Bondade <i>et al.</i> ³⁵ (2018)	100	34.000	24.822–44.153	2.60	8.21
Alijani <i>et al.</i> ²⁸ (2018)	379	85.752	81.822–89.112	9.78	8.37
Sahin <i>et al.</i> ³⁴ (2018)	774	12.532	10.282–15.073	19.95	8.40
Iliyasu <i>et al.</i> ³⁹ (2018)	373	33.780	28.992–38.828	9.63	8.37
Akpinar <i>et al.</i> ³³ (2017)	142	8.451	4.443–14.296	3.68	8.27
Ozturk <i>et al.</i> ⁴⁵ (2017)	301	6.977	4.370–10.467	7.78	8.35
Farzadi <i>et al.</i> ³⁰ (2014)	200	82.000	75.962–87.063	5.18	8.32
Sheikhan <i>et al.</i> ²⁰ (2014)	400	25.750	21.533–30.330	10.32	8.37
Ardabily <i>et al.</i> ¹⁶ (2011)	400	33.750	29.126–38.616	10.32	8.37
Ameh <i>et al.</i> ¹⁵ (2007)	233	21.459	16.367–27.293	6.02	8.33
Total (fixed effects)	3,872	34.943	33.442–36.466	100.00	100.00
Total (random effects)	3,872	36.964	21.385–54.084	100.00	100.00



a summary of all 26 studies that met the inclusion criteria. These studies were descriptive, had identified violence against infertile women as a primary or secondary objective and most of them were cross-sectional and survey-based.

PREVALENCE OF DOMESTIC VIOLENCE AGAINST INFERTILE WOMEN

In the present study, the percentage of violence against infertile women varied from 15% to nearly 89%. A majority of the studies were from Iran (eight articles) and Turkey (seven articles).^{16,18,20,26–36,45} In addition, Nigeria accounted for four articles while Egypt and India each accounted for two articles.^{15,37–43} USA, Rwanda and Pakistan each accounted for one article.^{25,44,46} In the current study, the highest rate of DV (88.9%) was reported in Iran.²⁸ However, the overall frequency of DV varied greatly in this country from 34.7–88.9%.^{15,16,18,20,25–46}

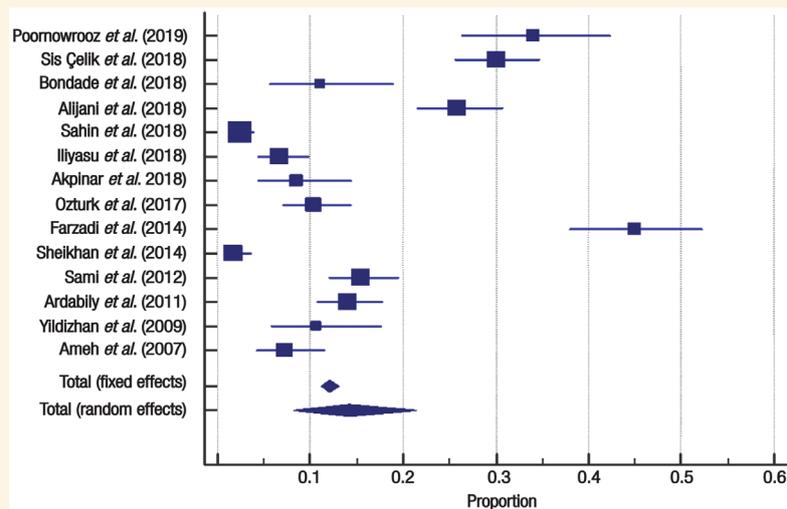
Table 3 presents the total estimated prevalence of violence against infertile women. Prevalence rates obtained from 15 studies ranged between 14.987% (95% CI: 12.545–17.699%) and 88.918% (95% CI: 85.317–91.896%). Overall, the pooled prevalence was equal to 47.163% using random-effects model (95% CI: 34.660–59.850%).

PREVALENCE OF TYPES OF DOMESTIC VIOLENCE IN INFERTILE WOMEN

According to the items on the globally used Revised Conflict Tactics Scales, types of DV against women includes physical, psychological and sexual violence.¹⁶ The overall prevalence of violence against infertile women was obtained from 15 studies considered for the current evaluation with a sum total of 4,394 participants.^{15,16,18,20,27,28,32–35,38,39,43,45,46} A sub-total of 12 studies with 3,872 participants reported psychological

Table 5: Forest plot showing the prevalence of domestic physical violence against infertile women (n = 14)

Author (year of publication)	Total sample size	Proportion of domestic physical violence in %	95% CI	Weight in %	
				Fixed	Random
Poornowrooz <i>et al.</i> ²⁷ (2019)	147	34.014	26.410–42.276	3.36	7.01
Sis Çelik <i>et al.</i> ³² (2018)	423	30.024	25.690–34.639	9.62	7.25
Bondade <i>et al.</i> ³⁵ (2018)	100	11.000	5.621–18.830	2.29	6.85
Alijani <i>et al.</i> ²⁸ (2018)	379	25.858	21.521–30.576	8.62	7.24
Sahin <i>et al.</i> ³⁴ (2018)	774	2.455	1.484–3.807	17.58	7.31
Ilyasu <i>et al.</i> ³⁹ (2018)	373	6.702	4.384–9.735	8.48	7.23
Akpınar <i>et al.</i> ³³ (2017)	142	8.451	4.443–14.296	3.24	7.00
Ozturk <i>et al.</i> ⁴⁵ (2017)	301	10.299	7.106–14.299	6.85	7.20
Farzadi <i>et al.</i> ³⁰ (2014)	200	45.000	37.975–52.175	4.56	7.11
Sheikhan <i>et al.</i> ²⁰ (2014)	400	1.750	0.706–3.572	9.10	7.24
Sami <i>et al.</i> ⁴⁶ (2012)	400	15.500	12.095–19.425	9.10	7.24
Ardabilly <i>et al.</i> ¹⁶ (2011)	400	14.000	10.752–17.792	9.10	7.24
Yildizhan <i>et al.</i> ¹⁸ (2009)	122	10.656	5.797–17.532	2.79	6.94
Ameh <i>et al.</i> ¹⁵ (2007)	233	7.296	4.307–11.425	5.31	7.14
Total (fixed effects)	4,394	12.111	11.162–13.111	100.00	100.00
Total (random effects)	4,394	14.183	8.271–21.367	100.00	100.00



and emotional violence and this type of violence was the most common compared to the rest.^{15,16,20,27,28,30,32–35,39,45}

A total of 14 studies with 4,394 participants reported the presence of or increase in physical violence.^{15,16,18,20,27,28,30,32–35,39,45,46} Also, 11 studies with 3,460 participants reported sexual violence.^{16,18,20,27,28,30,32–35,39} It should be noted that just in one article, only the frequency of different types of violence was separately reported, whereas the total score of violence was not reported.³⁰

The results of the meta-analysis done for the current study showed that the rates of psychological, physical and sexual violence were 36.964 (95% CI: 21.385–54.084), 14.183 (95% CI: 8.271–21.367) and 14.289 % (95% CI: 7.206–23.281), respectively [Tables 4–6]. Although, verbal violence is often cited as part of psychological violence, its frequency had been

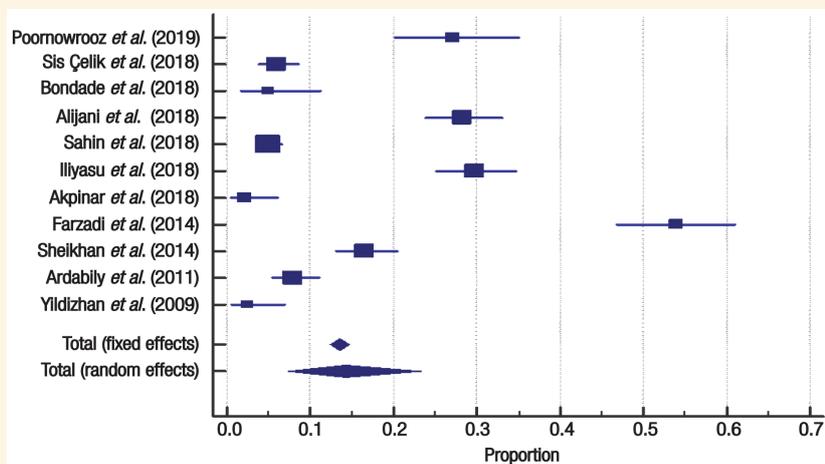
mentioned separately in six studies ranging from 11% to 63.4%.^{15,18,34,39,45,46} Nevertheless, in one study, verbal violence was lower in infertile women.³⁶ According to the results from some studies, several types of violence had been expressed simultaneously.^{25,39,42} Additionally, there was also an increase in economic violence (for example, economic deprivation) according to some reports [Table 2].^{18,31,32,36}

COMPARISON OF DOMESTIC VIOLENCE IN FERTILE AND INFERTILE WOMEN

Five studies reported the comparison of DV in fertile and infertile women.^{27,31,36,37,44} Out of these, four studies showed that infertility was a significant factor in increasing spousal violence against women and the

Table 6: Forest plot showing the prevalence of domestic sexual violence against infertile women (n = 11)

Author (year of publication)	Total sample size	Proportion of domestic sexual violence in %	95% CI	Weight in %	
				Fixed	Random
Poornowrooz <i>et al.</i> ²⁷ (2019)	147	27.211	20.205–35.159	4.26	8.96
Sis Çelik <i>et al.</i> ³² (2018)	423	5.910	3.861–8.601	12.22	9.22
Bondade <i>et al.</i> ³⁵ (2018)	100	5.000	1.643–11.283	2.91	8.79
Alijani <i>et al.</i> ²⁸ (2018)	379	28.232	23.754–33.054	10.95	9.21
Sahin <i>et al.</i> ³⁴ (2018)	774	4.910	3.497–6.677	22.33	9.29
Ilyasu <i>et al.</i> ³⁹ (2018)	373	29.759	25.162–34.680	10.77	9.20
Akpınar <i>et al.</i> ³³ (2017)	142	2.113	0.438–6.050	4.12	8.95
Farzadi <i>et al.</i> ³⁰ (2014)	200	54.000	46.828–61.052	5.79	9.07
Sheikhan <i>et al.</i> ²⁰ (2014)	400	16.500	12.997–20.508	11.55	9.21
Ardabily <i>et al.</i> ¹⁶ (2011)	400	8.000	5.536–11.106	11.55	9.21
Yildizhan <i>et al.</i> ¹⁸ (2009)	122	2.459	0.510–7.018	3.54	8.88
Total (fixed effects)	3,460	13.514	12.393–14.697	100.00	100.00
Total (random effects)	3,460	14.289	7.206–23.281	100.00	100.00



remaining one study showed no increase in this regard.^{27,31,36,44} However, one of these studies showed that the rate of spousal violence was lower among childless women.³⁷

DETERMINANTS OF DOMESTIC VIOLENCE IN INFERTILE WOMEN

Infertility Factors

Whether infertility is caused by a male or female factor is important in determining the type of psychosocial consequences.⁴⁴ A study by Yildizhan *et al.* showed that the rate of violence against women with the infertility factor was 78% while among the others, the infertility factor had not been found to be associated with violence.^{15,18,32} Primary infertility was also associated with DV.^{32,34,38} While some studies showed that prolongation of infertility, increase in the duration of marriage and marriage under 19 years of age could be potential predictors of and were associated with increased violence, another study showed that a marriage duration of less than four years could be

responsible for the increase in violence.^{29,34,38,41} An infertility period of less than two years and a family history of infertility and obesity in women were also associated with violence.³⁴ A study on individuals with a higher frequency of treatment using the *in vitro* fertilisation approach showed that the prevalence of violence against infertile women was lower.²⁰ In other studies however, intracytoplasmic sperm injection (ICSI) was a predictive factor and was associated with increased violence.^{40,41} In yet another study, no association had been found between childbirth and violence against infertile women [Table 2].³⁷

Demographic Factors

Although some studies showed no association between women's age and DV, other studies were showed that young and old age was, in fact, associated with violence.^{28,32,34,38,40}

In some studies, no relationship was found between the age of the wife and domestic violence.^{32,38} Nevertheless, another study showed the rate of violence to be higher in younger age women.²⁸ Additionally, in

some studies, no significant relationship was found between violence and women's level of education, husbands' age, place of residence and level of spousal violence; whereas in a few studies, low level of education and living in a village were determinants of violence against women.^{15,28,31-34,39,40}

With regard to employment, unemployment of the women was associated with an increase in violence against them.^{34,38,39} On the other hand, although one study showed the unemployment of men was not related to violence, some others showed that unemployment and having low-level jobs were significantly associated with violence against women.^{28,32,38,39} Similarly, there was a significant increase in violence against infertile women belonging to families with low economic status and low social class.^{29,32,41}

According to the results from a few studies, no association was found between family type or type of marriage and violence.¹⁵ However, there were a few other studies that showed a significant relationship between family type, involuntary marriage, polygamy and remarriage.^{20,33,34,38} While a study by Alijani *et al.* showed that alcohol consumption and drug addiction were not associated with DV, a few other studies did show that couples' addiction had been reported to increase DV.^{20,28,34,38} Additionally, a study conducted in Nigeria showed that there was no association between religion and ethnicity and intimate partner violence.³⁸

Psychological Factors of Couples

DV was significantly associated with women's emotional status and their husband's mental and physical diseases.^{20,41} Notably, the prevalence of anxiety disorders and depression was higher among those exposed to DV and there was a significant relationship between components of violence and their general health score.^{29,34,35}

Discussion

This study was done to investigate prevalence of DV against infertile women. Existing evidence showed that infertile women are vulnerable to and often experience all of types of DV.

Similar to the findings from the study by Staller *et al.*, the most frequent type of violence against infertile women by the husband was psychological and emotional violence.²¹ It seems this issue might be due to a country's progressive transition from a traditional to a modern society. As per a study done previously, sexual violence had also been reported as an important factor associated with women's infertility.⁴⁷ The results of the present study showed a significant difference in results between fertile and infertile women.

In most of the reviewed articles, infertility was an important factor determining the increase in spousal violence against women, a trend that is in-line with the findings from the current review.^{29,31,36,44} Paradoxically, however, the results from a study done by Solanke *et al.* indicated that the rate of violence was lower among childless women, also the rate of violence against women was higher among those with two or three children compared to childless women.³⁷ This difference in results could be due to the socio-cultural differences that exist between the various communities studied as part of the current review as well as the differences in the measurement tools being used.

Infertility factor (female or male factor), type of infertility (primary or secondary), duration of infertility and prolonged duration of infertility, duration of marriage and number of attempts for assisted reproductive techniques were among the essential determinants of domestic violence and its psychosocial consequences.^{29,32,34,38,40,41,44} In a study by Hajizadeh-Valokolae *et al.*, duration of infertility and younger age at marriage were among the key factors playing a role in the violence against infertile women.²² Since duration of infertility has been shown to be related to marital life satisfaction, a drop in such satisfaction could potentially lead to increased violence in marital life.²⁰ Marriage at an early age may often lead the male spouse to exercise power over their younger female spouse.^{22,28,34} In many cultures, there is a social stigma attached to infertility that women try to avoid.^{48,49} Openly, identifying the spouse, who is infertile often increases the violence between partners.³⁶

For instance, with respect to variables as age, couples' educational level and occupation of the husband, although in some studies no relationship was found but in others, older age, having young age, low level of education, being employed and type of employment occupation of the husband, and rurality were all determinants of violence against infertile.^{15,28,31-34,38,39,40}

The findings regarding the relationship between demographic factors and spousal violence against infertile women were contradictory. For example, there were factors such as age, education level of a couple and occupation of the wife, although in some studies no relationship had been found, other studies showed that older age, having young husbands who smoked, low level of education, being employed, type of employment and rurality were all determining factors in committing violence against infertile women.^{15,28,30,32,34,38,39,40}

The results from the current systematic review were consistent with the study by Hajizade-Valokolaee *et al.*²² The empowerment of women is positively correlated with education and educated women and men seem to have a better view of family, gender and infertility, factors that all are effective in reducing violence against women.^{20,31–34,39} Additionally, the increase in violence was significant among families with infertility issues that are of low economic status and social class, echoing trends similar to those from the study by Hajizade-Valokolaee *et al.*^{22,29,32,41} A study by Sheikhan *et al.* showed that tendencies for domestic violence was higher in men with high-income status than those who were unemployed.²⁰ A few studies also indicated a significant relationship between addiction, family type, unwanted marriage, polygamy and remarriage and domestic violence.^{20,33,34,38}

It seems that in all of the aforementioned cases, cultural characteristics emerged as the most determinant factors in modulating the effect of the other remaining risk factors. In a systematic review by Coker, spousal violence was strongly associated with hazards relating to risky sexual behaviour such as unwanted pregnancies and abortions, sexually transmitted infections and polygamy.⁵⁰

Previous studies on the general female population have also shown that risk factors for spousal violence against women include lower level of education, young age, socio-economic status, low income, unemployment, alcohol abuse, gender inequality and an acceptance of violence.² All of these risk factors also seem to be the cause for the increased violence against infertile women in low- and middle-income societies.

According to the results of the present systematic review, DV was shown to have a significant relationship with the emotional and mental state of couples.^{29,34,35} Extant literature has also provided similarly strong evidence stating that DV is associated with psychological stress.^{20,21,32,51} Violence against infertile women and the resulting stress could also have an impact on infertility treatments.^{22,52} Furthermore, since infertile women are prone to violence by their husbands, this problem increases the challenges of infertility.³² Thus, preventing DV will be important in reducing not only the burden of infertility but also the long-term costs for the individuals, economy and public health in general, as shown in both the present study and the study by Stellar *et al.* In this regard, it would be essential for women who are referred to reproductive clinics to be supported and examined for spousal violence.

Consistent with the results from multinational studies on violence against women reported by the WHO, findings from the present study revealed the

various adverse effects of violence on personal (physical and psychological harm) and social dimensions (including disease burden, costs, and adverse effects on children) of infertility.⁵³ Given that the experience of infertility is an instinctively stressful situation, its aggravation due to physical and psychological injuries caused by the accompanying DV is not unexpected.⁵⁴ Infertility healthcare providers should consider the possibility of DV against women and its potential psychological consequences, as a large proportion of women believed that the acts of violence against women has been committed by their husbands and the need for well-designed and well-executed services will continue to be vital for the victims.⁴⁰ Education of victims and early intervention would not only help such vulnerable women but also prevent violence against the future children. It is also recommended that infertility management be done with the help of a full-fledged consulting team including psychologists, reproductive health professionals and gynaecologists, taking into account the problem of violence and its risk factors. Education of the couples, participation of programme planners in this field, awareness and education of the community and taking into account the local socio-cultural practices should be at the forefront of awareness programmes. An important factor to be taken into consideration is the issue of blaming women, especially in cases where they are the cause for infertility.^{26,55} It would then be important for men to participate in the counselling process and various other support programs.⁵⁶

A strength of the current study was the large number of articles that were accrued. However, although the studies included in the systematic review and meta-analysis were from different countries, most of them belonged to the Asian and African continents as the studies available from other countries were limited. This issue limits generalisation of results to countries outside of the aforementioned regions. The second major limitation was the use of varied methods and tools across all the included studies.

Therefore, it is recommended that future reviews use more consistent and better comparative study methods and tools, comprehensive multi-centre studies and preferably more cohort studies.

Conclusion

Given that infertility and the associated DV is a significant public health issue, it would be necessary to pay attention to infertile women to ensure the quality of their of reproductive health. The current systematic review and meta-analysis investigated the prevalence of DV against infertile women. The prevalence rates

obtained from 15 studies ranged between 14.987% and 88.918%. Since multiple factors have been shown to influence the incidence of violence against women, identifying the factors associated with violence against infertile women can be effective in planning interventions to reduce violence and treat infertility. In this regard, there were also a number of demographic, infertility and psychological factors associated with DV. Due to the number of potential threats posed by DV, including its effect on future pregnancies and children, proper IPV screening is required. Policies and programs creating awareness around the issue, reducing the tendencies to blame women for infertility, promoting monogamy, expanding access to education and employment and empowering women could help reduce spousal violence. Future studies should focus on producing more generalizable results by including data from more countries and studies employing more homogenous methods and tools.

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AUTHORS' CONTRIBUTION

FS and RLR contributed to the study conception and design. FS and RLR performed the literature search, study selection, data collection and risk of bias assessment. JJ conducted the meta-analysis and ran the Software. FS drafted the manuscript under the supervision of RLR. All authors read and approved the final version of the manuscript.

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