Prevalence of episiotomy practice and factors associated with it in Ethiopia, systematic review and meta-analysis

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Abstract
An episiotomy is one of the most commonly performed obstetrics surgeries indicated in emergencies during the second stage of labor like fetal distress, dystocia, and tight perineum. As a result, this systematic review and meta-analysis aimed to assess the prevalence of episiotomy practice and associated factors in Ethiopia. Ten cross-sectional studies with a total population of 3718 were included in this study. The search was done using online databases like PubMed, HINARI, Web of Science, other gray, and online repositories of Universities. All the included papers were extracted and appraised using the standard extraction sheet format of JOANNA Briggs Institute. The Cochran Q-test and $I^2$ statistics test were used to test the heterogeneity of studies. To detect the publication bias of the included studies, a funnel plot and Egger’s test were used. The pooled prevalence of episiotomy practice and the odds ratio with a 95% confidence interval were presented using forest plots. The overall pooled prevalence of episiotomy practice was 45.11% (95% CI: 37.04–53.18; $I^2 = 96.3\%$). Prolonged second stage of labor (OR: 4.79, 95% CI: 3.03, 7.57), face presentation (OR: 4.26, 95% CI: 1.21, 15.07), birth weight $>$ 4000 g (OR: 6.71, 95% CI: 3.14–14.33), instrumental delivery (OR: 4.26, 95% CI 3.95, 6.14), and primiparity (OR: 3.70, 95% CI: 1.90, 7.2) were factors associated with episiotomy practice. The overall prevalence of episiotomy practice was higher in Ethiopia compared to studies conducted in other countries. The prolonged second stage of labor, face presentation, birth weight $>$ 4000 g, instrumental delivery, and primiparity of women were the factors associated with episiotomy practice. Therefore, efforts should be made to prevent routine episiotomy practice through creating awareness, adjusting national guidelines, affecting the World Health Organization episiotomy policy, and monitoring the activities of the health care facilities in executing the protocols.

Keywords
episiotomy, Ethiopia, indications, meta-analysis, obstetrics surgeries, systematic review

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Introduction
Worldwide, more than 140 million births occur every year, those births have the risk of complications and mortality for both mother and newborn unless necessary interventions were taken to prevent through on time identification and management using instrumental delivery and obstetrics surgeries.¹ An episiotomy is one of the most commonly performed obstetrics surgeries around the world which is done by an incision made in the perineum and...
vaginal orifice to prevent soft tissue dystocia and ease the passage of the fetus. It was indicated for emergencies during the second stage of labor (SSOL) like fetal distress, dystocia, and delayed the progress of the labor as a result of tight perineum. There are different types of episiotomy incisions, but the most commonly recommended and safest type is mediolateral episiotomy, in which the incision was made in the midline but directly downward and then laterally away from the rectum.

However, it was linked with maternal complications like bleeding, infection, perineal lacerations, urinary incontinence, rectal incontinence, dyspareunia, sexual dysfunction, and pelvic organ prolapse. Its effectiveness in preventing perineal tear and obstetric anal sphincter injuries (OASIS) was in doubt. Also, it remains a serious maternal health concern that is associated with maternal morbidities, including pelvic floor dysfunction, and has an impact on long-term anxiety, psychological shadow, less confidence in successive vaginal deliveries, delayed healing, and severe pain than other perineal tears.

Currently, 10%–90% of delivering women will have an episiotomy depending on the part of the world they are having delivery. According to a study in 20 European countries, the rates of episiotomy practice was ranged from 3.7% in Denmark to 75.0% in Cyprus, but this figure is higher in developing countries like Africa, Asia, and Latin America compared to the aforementioned countries where episiotomy is practiced routinely or liberally.

The evidence showed that selective episiotomy with appropriate identification, diagnosis, and timing reduces the rate of practice and associated complications, this is why World Health Organization (WHO) suggests a restrictive episiotomy policy other than the routine practice of episiotomy performed with care provider’s perception and attitude, misdiagnosis and without pertinent obstetric and maternal indication. The extent of episiotomy practice was determined by the presence or absence of the protocol or policy for health care providers, work experience, and professions.

Ethiopian ministry of health is providing emergency obstetrics and new-borne care (BEmONC) training in partnership with non-governmental organizations for obstetrics care providers to advance their performances and reduce maternal mortality and morbidity, increase institutional delivery and improve women’s satisfaction with the quality of care by avoiding unnecessary obstetrics interventions or mistreatment. Regardless of a few single studies conducted on the practice of episiotomy and associated factors, there are no satisfactory data to demonstrate the overall prevalence, and its difference between the regions, and associated factors in Ethiopia. This systematic review and meta-analysis aimed to estimate the pooled prevalence of episiotomy practice and associated factors in Ethiopia.

Methods

This systematic review and meta-analysis estimated the pooled prevalence of episiotomy and associated factors in Ethiopia using the standard Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) checklist guideline.

Search strategy

To search for suitable articles on the prevalence of episiotomy practice and associated factors international databases like (PubMed, HINARI, and Web of Science) and literature from electronics repositories of different Universities in Ethiopia were used. The search was implemented according to the PICO formatting question from the database stated above. These are “fetus,” “fetal distress,” “breech presentation,” “big baby,” “face presentation,” “mal-presentation,” “tight perineum,” “shoulder dystocia,” “primiparity,” “soft tissue dystocia,” “operative vaginal delivery,” “instrumental delivery,” “forceps delivery,” “vacuum delivery,” “augmentation of labor,” “induction of labor,” “maternal morbidity,” “episiotomy,” “practice of episiotomy,” “associated factors with episiotomy,” “maternal indication of episiotomy,” “fetal indication of episiotomy,” “Ethiopia.” The MeSH engine term used for search includes “Fetal” OR “Women” OR “Fetus” AND “Fetal distress” OR “Tight perineum” OR “Shoulder dystocia” OR “Soft tissue dystocia” OR “Breech presentation” OR “Face presentation” OR “Forceps delivery” OR “Vacuum delivery” OR “Operative vaginal delivery” OR “Instrumental delivery” OR “Induction of labor” OR “Augmentation of labor” OR “Episiotomy” OR “Practice of episiotomy” OR “Factors associated with episiotomy practice” OR “Maternal indication of episiotomy” OR “Fetal indications of episiotomy” AND Ethiopia and related terms.

Eligibility criteria

Inclusion criteria

In this systematic review and meta-analysis (SR/MA), ten cross-sectional articles were included. Articles that reported the prevalence of episiotomy practice and associated factors were included. For this study, articles published till July 2021 were reviewed, screened, and appraised. All studies conducted in Ethiopia were also published in the English language.

Exclusion criteria

Those articles without complete abstracts or texts, articles reported out of the scope of the outcome interest, and qualitative studies were excluded.
Quality assessment

The cross-sectional quality appraisal checklist was obtained from JOANNA Briggs Institute (JBI) and independently evaluated the quality of each article and literature by Z.F.D., T.T.C., and W.M. All disagreements happened during this process were resolved by fourth and fifth reviewers R.G.B., T.T.C., and E.B.U. The number of items the JBI tool consists of for the cross-sectional studies was eight. The first is whether inclusion criteria are clearly defined. The second is an appropriate description of the study subject and setting. The third item is whether the measurement of exposure is valid and reliable. The fourth item is an appropriate description of the objective and standard criteria used. Fifth is representing the identification of confounders appropriately. Sixth is an appropriate strategy to handle confounders. The seventh is reliability and validity of outcome measurement and finally, the eighth one is the appropriateness of the statistical analysis method used. The JBI checklist value of 50% and above of the quality assessment indicators was low risk and good to be included in the analysis.

Data extraction

Endnote version X8 software was used to export all the datasets, and also to remove duplication of the data in review Microsoft Excel spreadsheet was used. Three authors (Z.F.D., T.T.C., W.M., and T.T.M.) independently extracted all the important data using a standardized JBI data extraction format. Any disagreements between reviewers were resolved by the fourth and fifth reviewers (R.G.B. and E.B.U.). The consensus was declared through critical. Those articles without complete abstracts or texts reported out of the scope of the outcome, interest, and qualitative studies were excluded.

Measurement of outcome

This study had two measurements of outcome variables. The first measurement outcome variable was the prevalence of episiotomy practice whereas the second measurement outcome variable was factors associated with episiotomy practice. The odds ratio (OR) was calculated for the common factors of the reported studies. The outcome of this study was to focus on single studies estimating the prevalence of episiotomy practice and associated factors.

Episiotomy: Was defined as a surgical incision of the vaginal orifice and perineum to ease the passage of an infant’s head and buttock in breech presentation.

Factors associated with episiotomy practice: Were defined as the reasons for the practice of episiotomy including fetal distress in SSOL, macrosomia, instrumental delivery, prolonged SSOL, tight perineum, soft tissue dystocia, breech presentation, face presentation, oxytocin use, and qualification of birth attendant.

Data analysis

To check the publication bias of articles that meet inclusion criteria, a funnel plot and Egger’s regression test were used. In addition to that, Cochran Q-test and \( I^2 \) statistics were computed to check the heterogeneity of studies. Pooled analysis was conducted using the random-effects inverse-variance model. Subgroup analysis was done by the study region in the country. STATA version 14 statistical software was used to compute the analysis. The forest plot format was used to present the pooled point prevalence, and factors associated with episiotomy practice with a 95% confidence interval (CI).

Result

Literature search result

Characteristics of the included studies. One hundred ninety-nine studies were retrieved at PubMed, Science Direct, Web of Science, HINARI, and other gray and online repositories accessed articles regarding the prevalence of episiotomy practice and associated factors. The total number of articles identified during a search was 199. After duplicates were expunged using Microsoft Excel, 111 studies were left for further review of their title and abstracts. Out of 111 remaining articles, 39 articles were excluded after a review of their titles and abstracts. Therefore, 33 full-text articles were accessed and assessed for inclusion criteria, which resulted in the further exclusion of 23 articles. As a result, 10 studies met the inclusion criteria to undergo the final systematic review and meta-analysis (Figure 1; Table 1).

Prevalence of the practice of episiotomy in Ethiopia. The overall pooled prevalence of the practice of episiotomy was presented using a forest plot. Therefore, the pooled estimated prevalence of episiotomy practice in Ethiopia was 45.11% (95% CI; 37.04–53.18; \( I^2 = 96.3\% \), \( p < 0.001 \); Figure 2).

Publication bias. To check publication bias, a funnel plot was assessed for the asymmetry distribution of the practice of episiotomy using a visual inspection of the forest plot (Figure 3). Egger’s regression test showed a \( p \)-value of 0.250 which indicated the absence of publication bias.

Subgroup analysis. Subgroup analysis was conducted based on regions (regional administration) using random effect size analysis. It was also computed with the evidence of heterogeneity. Hence, the Cochran \( I^2 \) statistic (= 98.7%, \( p < 0.001 \)) showed the presence of marked heterogeneity. Regarding the study area (region), the prevalence of episiotomy practice was highest in Southern nation nationality and people’s region (SNNPR) accounted for 49.32% (95% CI: 12.67, 85.97) followed by Addis Ababa (AA) for 47.52 (95% CI: 28.92–66.06; Figure 4).
Factors associated with episiotomy practice

Association between primiparity and practice of episiotomy. Seven studies were included under this category.\textsuperscript{25,27,32} The possibility of episiotomy practice among primiparous women was 4.79 times (OR: 4.79, 95% CI: 3.03, 7.57) more likely compared with multiparous women. In this meta-analysis, included studies were characterized by the existence of marked heterogeneity ($I^{2} = 85.6\%$, $p \leq 0.01$). Moreover, we used a random-effect model analysis due to the presence of heterogeneity (Supplemental Figure 5).

Association between instrumental delivery and practice of episiotomy. In this meta-analysis, four studies were included.\textsuperscript{25,27,32,34} The odds of the practice of episiotomy among instrumental delivery use was 4.26 times (OR: 4.26, 95% CI 2.95, 6.14) more when compared with spontaneous vaginal delivery. Because of the presence of heterogeneity in included studies ($I^{2} = 18.1\%, p = 0.300$) in this meta-analysis, a random effect model analysis was used (Supplemental Figure 6).

Association between the birth weight of the fetus $> 4000$ g and practice of episiotomy. The likelihood of episiotomy practice among the birth weight of a fetus $> 4000$ g was 6.75 times (OR: 6.71, 95% CI: 3.14–14.33) more likely than normal birth weight less than 4000 g. Under this category, three studies were included.\textsuperscript{25,28,30} Fixed effect
model analysis was used in this meta-analysis because of the absence of heterogeneity evidenced with \( I^2 = 0.0\%, \ p = 0.375; \) Supplemental Figure 7).

**Association between face presentation and practice of episiotomy.** Only two studies were included under this category.\(^{25,30,33}\) The likelihood of episiotomy practice with face presentation was 4.26 times (OR: 4.26, 95% CI: 1.21, 15.07) more likely than normal cephalic presentation. Those included studies have heterogeneity with \( I^2 = 58.3\%, \ p = 0.121). \) Therefore, we used a random-effect model analysis of the large heterogeneity of included studies (Supplemental Figure 8).

**Association between prolonged SSOL and practice of episiotomy.** This group encompassed three studies.\(^{25,30,33}\) Women with prolonged SSOL have 9.31 times (OR: 9.31, 95% CI: 5.34, 16.22) higher risk of episiotomy practice than those with a normal duration of SSOL. In this meta-analysis, included studies have some heterogeneity \( I^2 = 36.03\%, \ p = 0.208. \) Furthermore, we used a random-effect model analysis (Supplemental Figure 9).

**Discussion**

Episiotomy is associated with short- and long-term physical, emotional, and psychological problems. In most of the developing countries, including Ethiopia, the practice of routine episiotomy was a common problem. Thus, many African women who undergo childbirth suffer from those complications.\(^{35,36}\) Assessing the pooled prevalence of the episiotomy practice in Ethiopia plays important role in understanding the range of the quality maternity care provided with acceptable diagnosis and management of the case in the health care system and for planning and implementing necessary interventions for improvement.

According to the results of this systematic review and meta-analysis, the pooled prevalence of episiotomy practice was estimated to be 45.11% (95% CI: 37.04, 53.18). This finding showed almost half of the pregnant women admitted to Ethiopian health facilities can undergo episiotomy incision. The finding of this systematic review and meta-analysis was similar to the study in Aminu Kano Teaching Hospital in Nigeria at 41.4%,\(^{37}\) Iran at 41.5%,\(^{38}\) and China at 41.7%.\(^{39}\) The justification for this is perhaps those studies conducted in Ethiopia and those mentioned countries were in similar hospital settings and study design similarity.

Whereas, this finding was almost two to three times higher than the study conducted in the Democratic Republic of Congo 20.4%,\(^{40}\) Brazil 29.1%,\(^{41}\) Vietnam 29.9%,\(^{42}\) Burkina Faso 22%,\(^{43}\) and Nigeria 9.3%,\(^{44}\) The reason for this might be that in those countries the practice of routine episiotomy was restricted by national guidelines and they were valuing recommendations from WHO.

| Table 1. Characteristics of included studies in a meta-analysis of episiotomy practice and associated factors in Ethiopia. |
|---|---|---|---|---|---|---|---|---|---|---|
| No. | Author | Study year | Region | Study area | Study design | Sampling technique | Study design | Sampling technique | Study area | Sample size | Response rate | Prevalence | Quality |
| 1 | Fantahun Beyene et al. \(^{25}\) | 2017 | Amhara | Felege Hiwot Referral Hospital | Cross-sectional | Systematic | 411 | 100 | 41.1% | Low risk |
| 2 | Mitiku Kumera and Ademe \(^{26}\) | 2013 | SNNPR | Mizan Aman General Hospital | Cross-sectional | Consecutively | 110 | 100 | 30.6 | Low risk |
| 3 | Kidane Niguse et al. \(^{27}\) | 2014 | Tigray | Health institutions of Shire town | Cross-sectional | Systematic | 407 | - | 35.4 | Low risk |
| 4 | Yayehayirad Yemaneh et al. \(^{28}\) | 2015 | Tigray | Axum town public health institutions | Cross-sectional | Systematic | 340 | - | 45.0 | Low risk |
| 5 | Kasahun Fikadu et al. \(^{29}\) | 2016 | SNNPR | Arba Minch General Hospital | Cross-sectional | Systematic | 405 | 97.6 | 94.6 | Low risk |
| 6 | Solomon Worku and Mitku \(^{30}\) | 2018 | Addis Ababa | Public health facilities of Addis Ababa | Cross-sectional | Systematic | 406 | 97.6 | 94.6 | Low risk |
| 7 | Bisrat Tamene et al. \(^{31}\) | 2019 | Addis Ababa | Addis Ababa | Cross-sectional | Systematic | 405 | 97.6 | 94.6 | Low risk |
| 8 | Yonas Tefera et al. \(^{32}\) | 2020 | Addis Ababa | St. Paul’s Hospital | Cross-sectional | Systematic | 405 | 97.6 | 94.6 | Low risk |
| 9 | Yonas Tefera et al. \(^{33}\) | 2021 | Addis Ababa | Gonchar CRH | Cross-sectional | Systematic | 405 | 97.6 | 94.6 | Low risk |
| 10 | Eyenew Woretawu et al. \(^{34}\) | 2021 | Amhara | Public health facilities in Metema district | Cross-sectional | Systematic | 405 | 97.6 | 94.6 | Low risk |
Nevertheless, some studies that have a higher prevalence of episiotomy practice than the result of this study; Saudi Arabia 51.20%, Oman 66.0%, India 63.4%, Turkey 52.0%, Romania 92.7%, Colombia 94.5%, and Uganda 73%. Justification for this might be because of the difference in socio-demographic characteristics of women, perception of obstetrics care providers, lack of national standard guideline, and being in contradiction of WHO prohibition of deliberate practice of episiotomy.

The likelihood of episiotomy practice for primiparous women was 4.79 times (OR: 4.79, 95% CI: 3.03, 7.57) more likely to practice episiotomy than for multiparous women. There are some studies from different countries that support this finding; Iran, Colombia, Vietnam, and Congo. This might be because women with first pregnancy have tight perineum which increases the risk of perineal injury and the obstetrics care providers might have a belief of episiotomy necessity for primigravid women even without clear indications.

The possibility of episiotomy practice was 5.08 times (OR: 5.10, 95% CI: 3.47, 7.51) more likely for instrumental delivery when compared with spontaneous vaginal delivery.
delivery. There are similar studies supporting this finding in Iran, China, Brazil, and Vietnam. This might be because of the perception of care providers that both forceps and vacuum have the complication of perineal tear and anal sphincter injury if the vulva was not incised and widened through episiotomy.

The odds of the episiotomy practice among women with a baby big or baby’s birth weight > 4000 g was 8.03 times (OR: 8.03, 95% CI: 3.45–18.71) higher compared with babies born with normal birth weight. Similar study findings were observed in two studies carried out in Cambodia and China. This may be justified by episiotomy done for fear of perineal injury and fetal distress from prolonged SSOL resulting from large baby size.

The risk of episiotomy practice was 9.31 times (OR: 9.31, 95% CI: 5.34, 16.22) higher for women with prolonged SSOL than with a normal duration of labor. This finding was supported by studies from Uganda and China. This might be because when the SSOL was prolonged, women’s pushing effort was exhausted, and the risk of applying operative vaginal delivery (OVD) and fetal distress increased.

There was significant heterogeneity in this systematic review and meta-analysis that may expose the finding to publication bias. This might be due to the sample size of each study, the nature of the study design in which data were collected using questionnaires, and not complete data from the hospitals and the study setting or region.
Conclusion

According to this systematic review and meta-analysis, the overall prevalence of episiotomy was higher in Ethiopia compared to the findings of studies from other countries. Primiparity, instrumental delivery, birth weight of the fetus > 4000 g, face presentation, and prolonged SSOL were factors associated with the practice of episiotomy. Therefore, efforts should be made to prevent routine episiotomy practice through creating awareness, adjusting national guidelines, affecting WHO episiotomy policy, and monitoring the activities of the health care facilities in executing the protocols.

Strength of study

This systematic review and meta-analysis were the first in Ethiopia and we hope it answers the clinical question of overall practice and associated factors of episiotomy. Included studies were from lower and higher health care systems (health centers and hospital settings).

Limitation study

It is hard to know how the study population form included studies compared to that of the larger Ethiopian population in terms of the clinical risk factors. There may be more chances to do these types of studies in institutions with higher episiotomy rates. It may lack national representativeness because the data were only from four regions of Ethiopia out of ten.

Author contribution(s)

Zerihun Figa Deyaso: Conceptualization; Formal analysis; Methodology; Writing – original draft; Writing – review & editing.
Tesfaye Temesgen Chekole: Data curation; Methodology; Supervision.
Rediet Gido Bedada: Conceptualization; Methodology; Visualization.
Wondwosen Molla: Resources; Software; Validation; Writing – review & editing.
Etaferahu Bekele Uddo: Investigation; Software; Validation.
Tizalegn Tesfaye Mamo: Conceptualization; Methodology; Software.

Availability of data and materials

All related data have been presented within the manuscript. The dataset supporting the conclusions of this article is available from the authors on request.

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Supplemental material

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