The 100 cited articles in menstrual health among adolescent girls: A Citation analysis

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Abstract

**Background:** Menstrual health is a public health concern where it is still considered taboo, and adolescent girls lack knowledge about menstrual health, access to sanitation facilities, and the affordability of sanitary materials. Every year numerous articles are published; however, only a few of them would be influential in the evolution of a particular field. The number of citations received by an article serves as a quality factor for the impact of the article in a particular field. Citation analysis analyses the relationship between citations received by articles. From the literature search, no citation analysis was conducted on menstrual health. Hence the objective of the study was to identify the articles which received a hundred or more citations and also to identify the leading countries, journals, study designs, and departments conducting research on menstrual health.

**Methods:** Citation analysis was done with search terms pertaining to adolescent and menstrual health using google scholar as a database in Publish or Perish software. The articles retrieved were exported to Microsoft Excel. Articles that received a hundred and more citations were screened for the type of article, department, and country where the study was conducted, and articles that were books, patents, and non-journal publications were excluded. A descriptive analysis of the hundred and more cited articles was done in Microsoft Excel.

**Results:** A total of 980 articles pertaining to menstrual health among adolescent girls were retrieved. There were a hundred articles with hundred and more citations pertaining to the menstrual health of adolescent girls. There were five citation classics among the hundred articles with hundred and more citations. Cross-sectional study design, Obstetrics and Gynaecology department, India and USA countries, and PLOS ONE journal, had the most citations in research on menstrual health among adolescent girls. The top ten articles were on menorrhagia, menstrual hygiene practices, Water, Sanitation and hygiene (WASH), stigma on menstruation, and education on menstrual health.

**Conclusion:** The present citation analysis analyses the top countries, journals, and departments conducting research on menstrual health, and there is an immediate need to strengthen research in lower-income countries and conduct more interventional studies.

Plain English Summary

Menstrual health is an important public health entity where menstrual health management remains poor among adolescent girls in lower-middle-income countries. From the literature, it has been observed that there is a lack of research pertaining to menstrual health. Research-related performances are evaluated through various objective measures; one of them is the number of citations received by the articles, which implicates the impact of the article in a particular field. Hence the objective of our study was to enlist the articles pertaining to menstrual health on adolescent health which received hundred and more citations. The most common study design, department, country, and journal were determined from articles that received hundred and more citations. The study results showed that the Cross-sectional study design,
Obstetrics, and Gynaecology department, India and USA countries, and PLOS ONE journal conducted research with the highest articles having hundred and more citations. The top ten articles included research pertaining to domains such as menorrhagia, menstrual hygiene practices, Water, Sanitation, and hygiene (WASH), stigma on menstrual health, and education on menstrual health, which are imperative with respect to adolescent girls’ menstrual health. From the current citation analysis, it is evident that there is a need for strengthening research on menstrual health, which will generate evidence-based interventions and help policymakers implement necessary policies for adolescent health.

Introduction

Menstrual health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity in relation to the menstrual cycle. Menstrual health is imperative to improve global population health, achieve Sustainable Development Goals, and attain gender equality and human rights. Achieving menstrual health means that girls, women, and all other people who experience a menstrual cycle throughout their life course, can access timely, accurate, age-appropriate information about menstruation, the menstrual cycle, and changes experienced throughout the life course, as well as related to hygiene practices and self-care. (1) Millions of girls and women worldwide experience period poverty, described as limited access to menstrual education, period products, or adequate water sanitation and hygiene (WASH) facilities. Various studies conducted worldwide found that menstrual hygiene practices remain poor in lower-middle-income countries (LMICs). Menstrual hygiene management (MHM) poses challenges for adolescent girls in LMICs when attending a school where cultural taboos prevent them from seeking help. Adolescent girls also restrict their diet and activities during menstruation. (2) Hence, a more creative and comprehensive analysis is needed to determine effective interventions for MHM in adolescent girls.

Over the years, related research performance of universities, as well as that of individual researchers, is increasingly evaluated through the use of objective measures. There is a growing awareness in research communities, government organizations, and funding bodies around the concept of evaluation metrics such as Informetrics, Bibliometrics, Scientometrics, Webometrics, and Altmetrics. (3) Bibliometrics are statistical analyses of books, articles, or other publications. Citation analysis is a commonly used bibliographic method. A citation implies a relationship between a part or the whole of the cited document and a part or the whole of the cited document. (4) Citation analysis is that area of bibliometrics that deals with the study of these relationships. Citation analysis uses various means, including mathematical, statistical, comparison, abstraction, generalization, and logical methods. These methods are used to analyze a variety of scientific journals and papers and cite phenomena. (5) The influence of a published article is gauged by the number of times the particular article is cited. For the last decade, various studies have been conducted that identified landmark articles in various disciplines of the medical field. There are also citation classics reported; these are the articles having at least 400 citations. (6) Concurrently, citation analysis helps to learn about a particular field and seminal works done in that particular area to determine the impact of a particular author. Citation analysis enlightens regarding the rigor of research in
particular fields, most common countries where research is conducted, which eventually helps in identifying the gaps and implicates recommendations in the forerun.

Since menstrual health is an important public health entity and there exist various lacunae in research on menstrual health, we aimed to identify and analyze top-cited articles on menstrual health to date. The objective of the study was to enlist articles that received more than 100 citations in research pertaining to menstrual health among adolescents, leading Journals publishing, to find out the standard study designs employed, to identify the departments involved, and to enumerate countries publishing research in menstrual health.

**Methods**

We conducted a citation analysis in the field of menstrual health to examine the patterns and frequency of citations of published articles.

**Bibliometric approach**

The top 100 cited articles on menstrual health were identified as of March 2022 using a free, publicly accessible search software named Harzing's Publish or Perish.\(^7\) Publish or Perish is a software program that retrieves and analyzes the academic citation data provided by various data sources such as Google Scholar, Scopus, Web of science, etc. The software provides raw citations, analyzes these, and provides different metrics such as h-index, g-index, total numbers of citations, etc. To attain the study objectives, a database that was up-to-date and publicly accessible such as google scholar, was used. We searched the articles using the search terms (adolescent OR adolescence OR puberty' AND 'Menstruation OR menstrual OR menses' AND 'hygiene OR hygienically OR sanitation OR sanitary) Using Google Scholar database on Harzing's Publish or Perish V6 software. The retrieval of articles was set at 1000, which was the maximum limit, and a total of 980 articles were retrieved. The articles obtained were exported to Microsoft Excel from the software. Two researchers screened the articles on menstrual health, which received a hundred or more citations.

**Study characteristics**

The hundred or more cited articles were evaluated for characteristics such as citation number, country of origin, the department involved, type of study design, and journal in which the article was published.

**Statistical analysis**

The software provides a link that has access to the articles; hence the abstracts were screened through the link for the type of article, department, and country where the study was conducted; these data were entered manually into Microsoft excel by the two researchers. We excluded the papers, which were books, patents, and non-journal publications. The data was presented using the descriptive analysis of the hundred articles with hundred and more citations done in Microsoft Excel.
Results

A total of 980 articles related to menstrual health among adolescent girls were retrieved using Publish or Perish software. The publication years ranged from 1910 to March 2022. Of the 980 articles, there were a hundred articles received more than 100 citations. Out of the hundred, five articles received more than 400 citations each and hence can be categorized as citation classics. The mean citation score was 212.9 ± 144.4, and the median of 170 (IQR:138–246). Out of 980 articles, minimum citation was one, and maximum was 1270.

Various domains with Rank one for articles that received 100 citations

Cross-sectional study is the most common study design, ranking first, with thirty-four articles having more than a hundred citations, followed by review articles and qualitative study. The department of Obstetrics and Gynaecology ranked one with twenty-six articles, followed by the department of Community Medicine and School of public health. India and the USA are ranked first, with 24 articles, each having more than a hundred citations, followed by the United Kingdom and Ethiopia. PloS One is the leading journal that published six articles with more than a hundred citations, followed by BMJ open and Obstetrics and Gynaecology. (Table 1).

Table 1

Table 1 Various domains which stand at Rank 1 for articles that received 100 citations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Rank 1</th>
<th>Total number of articles N = 100, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design</td>
<td>Cross-sectional study</td>
<td>34(34)</td>
</tr>
<tr>
<td>Department</td>
<td>Department of Obstetrics and Gynaecology</td>
<td>26(26)</td>
</tr>
<tr>
<td>Country</td>
<td>India &amp; USA</td>
<td>24(24)</td>
</tr>
<tr>
<td>Journal</td>
<td>PLOS ONE</td>
<td>6(6)</td>
</tr>
</tbody>
</table>

Characteristics of top ten articles with more than 100 citations

The top ten articles were in research pertaining to menorrhagia, menstrual hygiene, stigma pertaining to menstrual health, WASH, and education on menstrual health.

The topmost article received 1270 citations, assessed menstrual blood loss using a pictorial chart, and was published in BJOG: An International Journal of Obstetrics and Gynaecology journal in the year 1990, which the department of Obstetrics and Gynaecology conducted. The study measured the diagnostic accuracy of a pictorial chart in assessing menorrhagia.
Citation classics: Among the top ten articles, five received more than four hundred citations and are regarded as citation classics. The article which ranked second had 639 citations, titled Menstrual hygiene: how hygienic is an adolescent girl? Which was published in the Indian Journal of Community Medicine. The study was a cross-sectional study conducted in India by the department of Community Medicine. The third article in the order received 514 citations which also determined menstrual blood loss conducted in Sweden. Fourth in order was a clinical report about the menstrual cycle as a vital sign which received 493 citations. The fifth citation classic was a Cochrane systematic review on antifibrinolytics for heavy menstrual bleeding. (Table 2)

Original and review articles shared equal proportions in the decade 1981–1990, and an increase in trend is noted in the decade 2011–2020; there were more original research articles when compared to review articles in the coming decades. The trend analysis included seventy articles from the last forty years (Fig. 1).
Table 2
Characteristics of top 10 articles having citations of more than 100

<table>
<thead>
<tr>
<th>Rank</th>
<th>Article title</th>
<th>Citations</th>
<th>Journal</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Assessment of menstrual blood loss using a pictorial chart (8)</td>
<td>1270</td>
<td>BJOG: An International Journal of Obstetrics and Gynecology</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>2</td>
<td>Menstrual hygiene: how hygienic is the adolescent girl? (9)</td>
<td>639</td>
<td>Indian Journal of Community Medicine</td>
<td>India</td>
</tr>
<tr>
<td>3</td>
<td>Determination of blood loss (10)</td>
<td>514</td>
<td>Scandinavian Journal of Clinical and Laboratory Investigation</td>
<td>Sweden</td>
</tr>
<tr>
<td>4</td>
<td>Menstruation in girls and adolescents: using menstrual cycle as a vital sign (11)</td>
<td>493</td>
<td>Pediatrics</td>
<td>USA</td>
</tr>
<tr>
<td>5</td>
<td>Antifibrinolytic for heavy menstrual bleeding (12)</td>
<td>411</td>
<td>Cochrane database of systematic reviews</td>
<td>New Zealand</td>
</tr>
<tr>
<td>6</td>
<td>Treatment of menorrhagia during menstruation: randomized controlled trial of mefenamic acid and tranexamic acid (13)</td>
<td>384</td>
<td>BMJ open</td>
<td>Ireland</td>
</tr>
<tr>
<td>7</td>
<td>Menstrual hygiene: Knowledge and practice among adolescent schoolgirls of Nagpur district (14)</td>
<td>379</td>
<td>Journal of the clinic and diagnostic research</td>
<td>India</td>
</tr>
<tr>
<td>8</td>
<td>Where the education system and women's bodies collide: The health impact of girls' experiences of menstruation in Tanzania (15)</td>
<td>357</td>
<td>Journal of adolescence</td>
<td>Tanzania</td>
</tr>
<tr>
<td>9</td>
<td>Menstrual practices and reproductive problems: a. study of adolescent girls in Rajasthan (16)</td>
<td>351</td>
<td>Journal of Health Management</td>
<td>India</td>
</tr>
<tr>
<td>10</td>
<td>The menstrual mark: Menstruation as social stigma (17)</td>
<td>341</td>
<td>Sex roles</td>
<td>United Kingdom</td>
</tr>
</tbody>
</table>

Discussion

We identified the articles having hundred citations in the field of menstrual health that were published from the year 1910 till March 2022. There were various citation analysis done across various disciplines, which were in departments of Obstetrics and Gynaecology, critical care, orthopedics, dermatological,
ophthalmology journals, citation classics in fertility and sterility, Uro-gynaecology, surgery, nephrology, in field of opioids, and in urethral construction.\(^{18-27}\) However, after a literature search, no citation analysis was done on menstrual health.

In the literature, various databases were used, such as Science citation index, Scopus, and Web of Science, among various citation analysis,\(^{18-21,25-27}\), in the current study, the database used was google scholar. Cross-sectional study was the most common study design among hundred cited articles. It was observed that the number of interventional studies increased compared to observational studies in coming decades, wherein one of the topmost cited articles, there was one clinical trial that assessed the efficacy of drugs such as ethamsylate, mefenamic acid, and tranexamic acid for treating menorrhagia.\(^{13}\) This study is one of the path-breaking studies as it was observed that school absenteeism was seen among adolescent girls due to heavy menstrual bleeding and pain.\(^{28}\) Thus, this study generated evidence implicating the need for evidence-based interventions pertaining to menstrual health.

Department of Obstetrics and Gynaecology, the department of community medicine, and the School of Public Health were pioneer departments pertaining to research in menstrual health; this finding was expected as they are conducive to menstrual hygiene management. There was also collaboration between various departments in the top cited articles, including departments of epidemiology, medicine, and pediatrics.\(^{10,11}\) Also, collaboration among authors from different countries who contributed to research in menstrual health.\(^{12}\) The leading countries conducting research were India and the United States and, the United Kingdom. However, there is a need to enhance research in other lower-income countries as, from the literature, menstrual hygiene practices remain poor in these countries.\(^{2}\) The top journals publishing literature pertaining to menstrual health were PLOS ONE, BMJ Open, and the Indian Journal of Community Medicine. However, the articles published in these journals were not open access, thus hindering the access to scientific information pertaining to menstrual health.\(^{8,10}\)

One of the important findings noted from the current citation analysis is that among the top ten articles that received citations more than a hundred research were in domains such as menorrhagia, menstrual hygiene practices, stigma pertaining to menstruation, WASH such as access to sanitation facilities and education pertaining to menstrual health. These findings are concurrent with menstrual health needs in society and the necessity to address these domains. Where menorrhagia has a direct implication on the health of an adolescent girl leading eventually to anemia, the other components indirectly affect adolescent girls’ health. Top cited articles pertaining to menorrhagia addressed the determination of blood loss using pictorial charts and spectrophotometric methods.\(^{8,10}\) Menorrhagia, as per se, causes significant distress among adolescent girls and causes health issues such as dyspnea, tachycardia, and palpitations.\(^{29}\) Hence this domain in our finding was the top cited, implicating the importance of menorrhagia in an adolescent girl. Other domains inferred that menstrual hygiene practices remained poor among adolescent girls posing them at a high risk for reproductive tract infections.\(^{30}\) Another study from Tanzania addressed where school-going adolescent girls were unaffordable to sanitary materials, access to toilets at schools, and inclusion of age-appropriate sexual and reproductive health
education in schools. (15) The citation classics were in the domains of menorrhagia and menstrual hygiene. Out of five citation classics in the study, there were two articles on menorrhagia where in one of the studies a pictorial chart was used to measure menstrual blood loss, which was the topmost cited article in other various methods such as spectrophotometric studies were used, and the irony was both articles were not open access thus defeating the purpose of research and scientific literature. (8, 10)

Thus, current citation analysis enlightens on the amalgam of research conducted in menstrual health, which helped in analyzing the most common countries and studies deployed in the research as well as lacunae that can be addressed in the future.

**Strengths And Limitations**

The current citation analysis addressed an important public health entity, menstrual hygiene; as per the literature search, there were no citation analyses done in this field; this is the first citation analysis that provides an overview of various countries and departments conducting the research pertaining to menstrual health. The analysis included age-old articles, and all types of articles were included, which included narrative reviews, cross-sectional studies, interventional studies, and mixed-method studies.

The limitations of the study include only Google Scholar database was used as the search engine. It did not include other forms of citations as those from textbooks. There could be an effect of time on the number of citations an article receives. Articles published in languages other than English were not included in the analysis. Further bibliometric analysis can be performed to understand the patterns and more rigorous analysis of articles.

**Conclusion**

In the present citation analysis, articles with or more than hundred citations in the field of menstrual health were analyzed descriptively. India and USA countries, PLOS ONE journal, Obstetrics and Gynecology department, Cross-sectional study design ranked first among hundred and more cited articles pertaining to menstrual health. The top ten cited articles included research in areas such as menorrhagia, menstrual hygiene practices, stigma pertaining to menstruation, WASH, and education on menstrual health. This citation analysis provides an important insight into the origin and trends of research in the field of menstrual health. The current analysis highlights the need for research in lower-income countries where menstrual hygiene practices still remain poor and need for more interventional studies to generate evidence to address the challenges regarding menstrual health.

**Abbreviations**

LMICs
Lower-middle income countries
MHM
Menstrual hygiene management
WASH
Water, Sanitation and, Hygiene

**Declarations**

**Ethics approval and consent to participate**: Ethical approval was not sought as it was a review of existing database.

**Consent for publication**

Not applicable

**Availability of data and materials**

All data generated or analysed during the current study are available from the corresponding author on reasonable request.

**Competing interests**

The authors declare that they have no competing interest

**Funding:**

No funding

**Author's contributions**

PMB conceptualized the study. AG and DPS have searched the literature, conducted and analysed the study under the supervision of PMB. AG wrote manuscript with inputs from DPS and, PMB. DPS and PMB reviewed the final manuscript. All authors approved the final manuscript.

**References**


5. communication BC and significance of citations in scientific, 1984 undefined. The citation process. ci.nii.ac.jp [Internet]. [cited 2022 Sep 18]; Available from: https://ci.nii.ac.jp/naid/10000066224/

6. What is a Citation Classic? [Internet]. [cited 2022 Sep 18]. Available from: http://gareld.library.upenn.edu/classics.html

7. Publish or Perish [Internet]. [cited 2022 Dec 21]. Available from: https://harzing.com/resources/publish-or-perish


Figure 1

Top-cited articles in research on Menstrual Health by the decade of Publication