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# Publications in Plastic Surgery and Reconstruction: A Review from a Developing Country, Sudan

Mohammed Yousof Bakhiet, MD*†
Alshareef Mohamed Alshareef, MD*‡
Aimen Elsheikh Khalil Abuelnour, MD*
Mohammed Nasser Asiri, Facharzt*
Rayan Abdullah J. Alzahrani, MBBS*
Saja Mohammed S. Alghamdi, MBBS*
Rayan Murdhi A. Alzahrani, MBBS*
Hanin Ayed M. Alghamdi, MBBS*
Mohamed Daffalla-Awadalla Gismalla, MD*§

**Background:** Plastic and reconstructive surgery services need to be improved in developing African countries. Research and article publications from those countries are limited. This review was conducted to identify published articles from Sudan in the area of plastic and reconstructive surgery.

**Methods:** This review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-analysis guidelines. The Preferred Reporting Items for Systematic Reviews and Meta-analysis guidelines were used for the preparation of this systematic review. A comprehensive systematic search was performed using PubMed, ScienceDirect, and Web of Science databases. Articles published in Sudan, specifically in the area of plastic and reconstructive surgery, and written in English were included in this review.

**Results:** The total number of articles that fulfilled the inclusion criteria was 23. The articles were written from 1969 to 2023. Only two articles were published in the 20th century. The most common study type was a retrospective study of eight articles, and the most common study area was Khartoum Teaching Hospital. Regarding the publishing journals, the number of subscription journals was six (30%), whereas open access was 17 (70%).

**Conclusion:** This review demonstrates the lack of articles published on plastic surgery in Sudan. Further investigation is needed to determine the challenges and problems associated with possible clarifications. *(Plast Reconstr Surg Glob Open 2024; 12:e5761; doi: 10.1097/GOX.0000000000005761; Published online 3 May 2024.)*

## INTRODUCTION

Globally, plastic surgery is experiencing rapid growth as procedure demand increases.[1] Plastic surgery involves the correction of disfigurements on the body at every level, both congenital and acquired.[2] Plastic and reconstructive surgery availability in developing countries and underserved areas is severely limited and requires significant changes to provide functional services.[3,4] Moreover, more information is needed regarding the recent changes in research production in the field.

Medical publication in Sudan started in the 19th century, and there was an active and highly influential medical research community in Sudan. Until March 2019, a total of 19 Arabic and 30 English Sudanese online journals were publishing articles from various higher education institutions. Despite this, none are indexed by Scopus, and only one is indexed by PubMed.[5] As of April 2022, Sudan ranked 100th worldwide in terms of number of periodicals published each year between 1996 and 2021.[6] Additionally, Sudan ranks 15th among 59 African nations and 13th among 22 Arab countries, across all categories. Publication in medicine is the highest, and the most common discipline was infectious diseases. Publication in the field of surgery came at the bottom of the list.[5]

In sub-Saharan Africa, for instance, plastic surgery practice is severely lacking in published data.[2] The situation in Sudan is close to this concept, as publication in the field of plastic and reconstructive surgery is very scanty despite the large area covered within this area, especially in Sudan.

Until 2010, there were only three plastic surgery units: one each at Omdurman Teaching Hospital and Omdurman Military Hospital, and a third unit which was divided between Soba Teaching Hospital and Khartoum Teaching Hospital. The establishment of plastic surgery units outside the capital city began after the inauguration of the Sudan Medical Specialization Plastic Surgery Board

*From the *Department of Surgery, Faculty of Medicine, Al-Baha University, Al Baha, Saudi Arabia; †Department of Surgery, Faculty of Medicine, Kordofan University, Elobeid, Sudan; ‡Department of Surgery Faculty of Medicine, University of Kassala, Kassala, Sudan, and §Department of Surgery, Faculty of Medicine, University of Gezira, Medani, Sudan.*

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in 2010. However, publications in this field have yet to improve.[3]

There are no systematic reviews describing the current state of publications on plastic surgery in Sudan. This study aimed to review Sudanese publications on plastic and reconstructive surgery and examine the research quality.

## Takeaways

**Question:** What is the current state of plastic surgery publications from Sudan?

**Findings:** There is a lack of plastic surgery publications from Sudan (fewer than 40 articles during the last 50 years).

**Meaning:** There is a lack of plastic surgery publications in Sudan, and further investigation is needed to determine the challenges.

## METHODS

The Preferred Reporting Items for Systematic Reviews and Meta-analysis guidelines were followed for the preparation of this systematic review. A comprehensive systematic search was conducted using PubMed, ScienceDirect, and Web of Science databases. The search terms used in the databases were Sudan, plastic surgery, reconstructive surgery, burns, microsurgery, craniofacial surgery, hand surgery, and aesthetic surgery. The inclusion criteria were studies conducted or published in Sudan, specifically in plastic and reconstructive surgery, and written in English language only. Studies that did not originate from Sudan or that involved non-Sudanese institutions were excluded.

Data were collected from all relevant publications without any time restrictions. One author (R.A.) executed the literature review and consulted with the senior author (M.Y.). The four authors (R.A., R.M., S.M., and H.A.) were split into two groups and screened for articles by title, abstract, and full text. Senior authors (M.Y. and M.D.) resolved disagreements and determined which articles should be included or excluded from the study (Fig. 1).

If multiple Sudanese institutions were involved in an article, it was attributed to the center with the most significant contribution from the authors. After reviewing the data, articles were categorized into subspecialties, such as hand surgery, microsurgery, aesthetics, burns, craniofacial, breast, and pediatric plastic surgery. If not categorized under any category, they were classified as general plastic surgery. The state of the institutions was also noted.

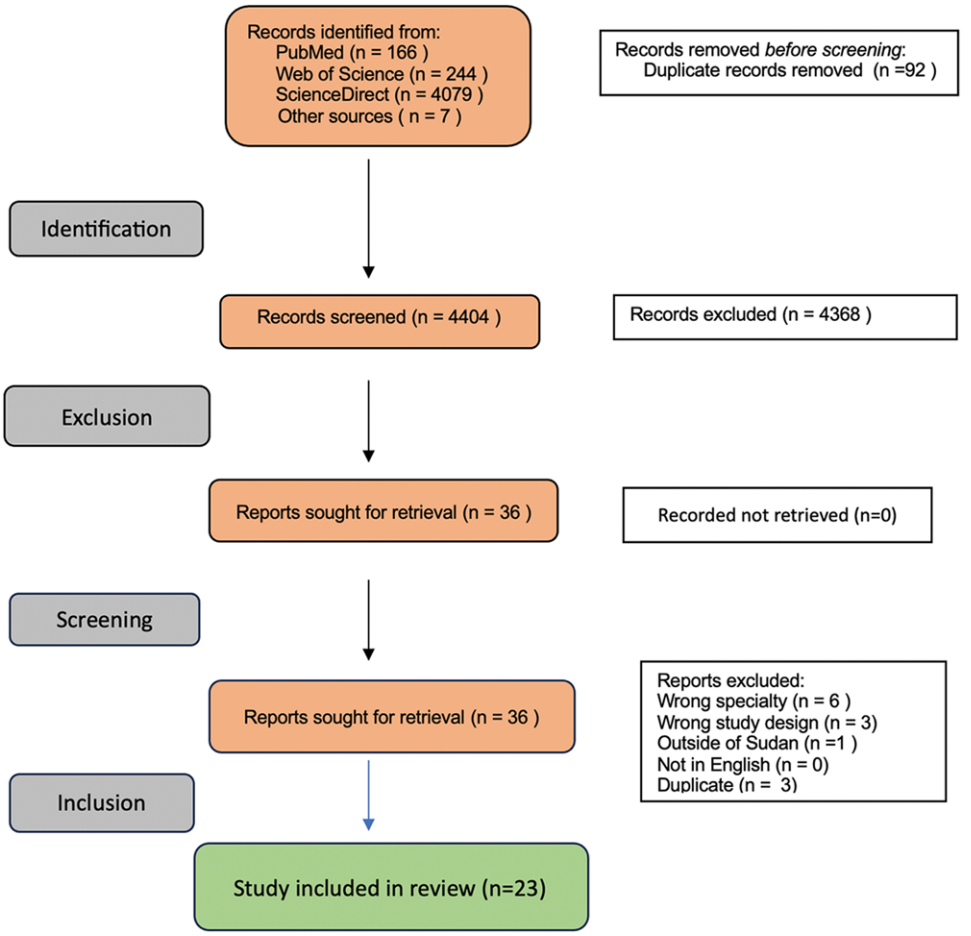


**Fig. 1.** The process followed to select included articles.

**Table 1. Demonstration of Articles Involved in the Review**

| No . | Author | Year | Study Types | Journal Access | Plastic Specialty | Study Area/Affiliation of Main Authors | State |
|---|---|---|---|---|---|---|---|
| 1 | Suliman[7] | 2004 | Case series | Subscription | Burn | Khartoum Bahri Teaching Hospital | Khartoum |
| 2 | Hamid et al[8] | 2016 | Retrospective study | Subscription | Craniofacial | Faculty of Dentistry, University of Khartoum | Khartoum |
| 3 | Abdelrahman et al[9] | 2020 | Narrative | Subscription | Hand surgery | Faculty of Medicine, University of Khartoum | Khartoum |
| 4 | Abdelrahman et al[10] | 2011 | Retrospective study | Subscription | Pediatric plastic surgery/hypospadias | Elribat University Hospital | Khartoum |
| 5 | Abdin et al[11] | 1985 | Case report | Subscription | Craniofacial | Faculty of Dentistry, University of Khartoum | Khartoum |
| 6 | Bakhiet et al[12] | 2023 | Case report | Subscription | Pediatric plastic surgery | Elobeid Teaching Hospital | North Kordofan |
| 7 | Ali et al[13] | 2021 | Cross-sectional survey | Subscription | Craniofacial | Dental Clinic, Omdurman Dental College | Khartoum |
| 8 | Abdesamie et al[14] | 2007 | Retrospective study | Subscription | Burn | Faculty of Medicine, University of Khartoum | Khartoum |
| 9 | Mohammad et al[15] | 2012 | Prospective study | Subscription | Burn | Khartoum Teaching Hospital | Khartoum |
| 10 | Hamadelnil et al[16] | 2022 | Prospective study | Subscription | Hand surgery | Omdurman Teaching Hospital | Khartoum |
| 11 | Mohamed et al[17] | 2019 | Prospective study | Subscription | Craniofacial | Soba Teaching Hospital | Khartoum |
| 12 | Mohamed et al[18] | 2014 | Retrospective study | Subscription | Breast reconstruction | Soba Teaching Hospital<br>Khartoum Teaching Hospital | Khartoum |
| 13 | Mahmoud et al[19] | 2018 | Retrospective study | Subscription | Breast reconstruction | Soba Teaching Hospital | Khartoum |
| 14 | Salih et al[20] | 2017 | Prospective study | Subscription | Hand surgery | Khartoum Teaching Hospital | Khartoum |
| 15 | Ali et al[21] | 2018 | Retrospective study | Subscription | craniofacial | University of Khartoum | Khartoum |
| 16 | Abdelrahman et al[22] | 2019 | Case series | Subscription | Reconstruction | University of Khartoum<br>University of Gezira | Khartoum<br>Gezira |
| 17 | Abdelrahman et al[23] | 2019 | Review | Subscription | Reconstruction | University of Khartoum<br>University of Gezira | Khartoum<br>Gezira |
| 18 | Bakhiet et al[3] | 2023 | Retrospective study | Subscription | Reconstruction | Elobeid Teaching Hospital | North Kordofan |
| 19 | Osman[24] | 1969 | Case series | Subscription | Breast reconstruction | Khartoum Teaching Hospital | Khartoum |
| 20 | Mohamed et al[25] | 2009 | Prospective study | Subscription | Breast reconstruction | University of Khartoum | Khartoum |
| 21 | Suleman et al[26] | 2005 | Retrospective study | Subscription | Craniofacial | Omdurman Maternity Hospital<br>Alribat Maternity Hospital<br>Khartoum Bahri General Hospital | Khartoum |
| 22 | Gismalla et al[27] | 2017 | Retrospective study | Subscription | Reconstruction | Gezira Mycetoma Center | Gezira |
| 23 | Mahamoud AY and Mahmoud SM[28] | 2014 | Prospective study | Subscription | Abdominoplasty | Soba University Hospital<br>Khartoum Teaching Hospital<br>Omdurman Teaching Hospital<br>Omdurman Military Hospital | Khartoum |

Data analysis was performed using GraphPad Prism, version 9.

Finally, after the preliminary data collection and review, the authors contacted the Sudanese plastic surgeons after making a Google Form survey regarding publications' lack, challenges, and difficulties. Their responses were tabulated and presented with this review.

## RESULTS

A total of 23 articles were extracted and found in the field of plastic surgery. The articles were designed and are listed in Table 1. Regarding the timeline of publications, we found that Osman published the first article in 1969,[24] and the most recent article was published in 2023. Only two articles were published during the 20th century, in

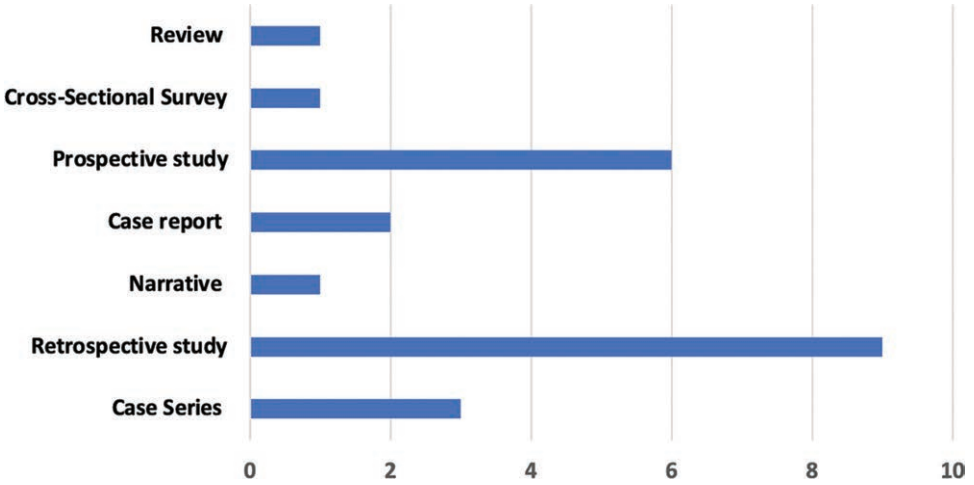


**Fig. 2.** Types of study designs for articles.

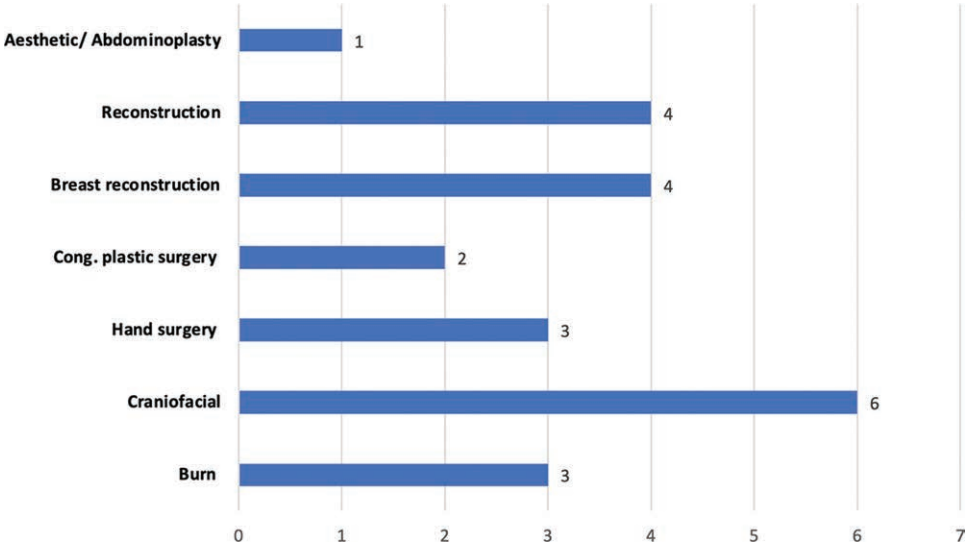


**Fig. 3.** Plastic surgery specialty for articles in the review.

1969 and 1985, respectively, showing a long gap between them; 13 articles were published in the second decade of the 21st century, four in the first decade, and five in the third decade. The most significant number of articles was published in 2019 (n = 3).

Retrospective studies were the most common type of study design (n = 8), followed by prospective studies (n = 6). Regarding the publishing journals, the number of subscription journals was six (30%), whereas that of open access was 17 (70%). The least common types of studies were narrative, review, and cross-sectional surveys, which were conducted once. The study design is illustrated in Figure 2.

Most published articles were in the craniofacial category (n = 6), whereas the least published specialty was aesthetic articles. Details on other specialties are shown in Figure 3. The setting or institutions where these studies were performed included 30 facilities. The most common site was Khartoum Teaching Hospital. The other facilities are shown in Figure 3. Most research was conducted in Khartoum state, the capital of Sudan, whereas three studies were conducted in Gezira state and two in North Kordofan.

After the results of this systematic review, a self-administered survey was conducted among plastic surgeons in Sudan. An online Likert scale survey was sent to the surgeon to determine the barriers and challenges in writing and publishing articles in the plastic surgery field (Table 2). Most of the participants agreed that they have a lack of training, skills, mentors, and teamwork skills in conducting the research. Additionally, financial issues and self-interest are considered as difficulties to publication.

## DISCUSSION

Medical research contributes significantly to the advancement of medicine, prevention of diseases, and

**Table 2. Sudanese Plastic Surgeon Perceptions regarding Challenges and Difficulties in Writing and Publishing Research [N = 19]**

| Responses | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | Mean Likert Score |
|---|---|---|---|---|---|---|
| Lack of research training and skills | 2 (10.5%) | 5 (26.3%) | 5 (26.3%) | 3 (15.8%) | 4 (21.1%) | 3.1 |
| Lack of mentorship and teamwork | 1 (5.3%) | 3 (15.8%) | 6 (31.5%) | 5 (26.3%) | 4 (21.1%) | 3.4 |
| Insufficient financial support | 2 (10.5%) | 3 (15.8%) | 2 (10.5%) | 9 (47.4%) | 3 (15.8%) | 3.4 |
| Technical and logistic support* | 11 (57.9%) | 2 (10.5%) | 3 (15.8%) | 2 (10.5%) | 1 (5.3%) | 1.9 |
| Lack of self-interest and motivation | 3 (15.8%) | 2 (10.5%) | 1 (5.3%) | 4 (21.1%) | 9 (47.4%) | 3.7 |
| Lack of communication and linkages with other institutions | 3 (15.8%) | 4 (21.1%) | 2 (10.5%) | 3 (15.8%) | 7 (36.8%) | 3.4 |
| Lack of financial incentives | 2 (10.5%) | 4 (21.1%) | 3 (15.8%) | 3 (15.8%) | 7 (36.8%) | 3.5 |

*Computers and the internet.

improvement of health, thus improving the quality of healthcare.[29,30] It is the most effective method for disseminating evidence-based information to physicians and healthcare practitioners.[31] The publication of evidence plays a crucial role in increasing awareness of diseases and new treatment options.[32,33] Scientific medical publications and innovations in Africa, especially low-income and developing countries, are few and limited.[34] The limitations of publications in the medical field include many factors such as time and financial burdens, increasing complexity of rules, deficiency of local supportive infrastructure, need for more research training, and less satisfaction from participation and data gathering.[31] Jahan et al investigated barriers to conducting research among healthcare professionals. One-third of the participants cited lack of financial support (32.3%), allocated time for research (31.8%), and financial incentives (30.3%) as major barriers.[32] Another study conducted by Khalaf et al concluded that inadequate research time, inadequate financial incentives, and insufficient statistical support are the primary obstacles faced by physicians in conducting research.[35] This survey among Sudanese plastic surgeons demonstrates that lack of self-interest, financial incentive, mentorship, teamwork, and lack of communication are the major barriers to conducting research in the field of plastic surgery.

The fields of plastic and reconstruction surgery have grown rapidly over the last few decades. Consequently, the publishing of scientific articles, manuscripts, and reports has increased.[36] However, publications on plastic and reconstruction surgery in sub-Saharan Africa and Africa seem unsatisfactory.[2] Sudan, as a part of the Sub-Saharan country, has limited publications in this field. This situation needs to be investigated to determine the factors and causes of the lack of publications.

According to this study, there are very few publications on plastic surgery in Sudan. We found 23 previously published studies in Sudan in the field of plastic and reconstructive surgery, most of which were conducted in the 21st century. This publication number is very small compared with that of other regional studies. A study by Almarghoub et al determined that the number of publications on plastic surgery in Saudi Arabia over the last 5 years was 142 published articles.[32]

The most familiar study design used in this review was retrospective, followed by prospective. In addition, there have been some case series and case reports. These kinds of descriptive hospital-based study designs are of great value in presenting the situations and types of work in developing countries. No trial was conducted in the retrieved studies. The University of Khartoum was the predominant institution to publish more articles (57.1%). This finding is expected because it is the largest university in Sudan and has numerous research centers and capabilities. Unsurprisingly, most publications (85.7%) were from the Khartoum region, where the University of Khartoum was located. It is a center of knowledge and has efficient large hospitals and centers fully prepared with experienced surgeons, facilitated by staff and finances that enable medical publication.

## CONCLUSIONS

Over the past decade, international research output has dramatically increased. However, this has not been the case in the plastic surgery field in Sudan because only 23 articles were published in this study. This dearth of Sudanese plastic surgery articles cannot be explained by the results of this study. However, this could be due to the small number of plastic surgeons present in Sudan, and further studies are needed to explain this finding. Moreover, most publications were from the Khartoum region, so we suggest that more regions should be encouraged to research by motivating young surgeons. After establishing the local board for training and the increase in plastic surgeons, we look forward to seeing what the next decade will bring about regarding publications on plastic and reconstructive surgery in Sudan.

***Mohamed Daffalla-Awadalla Gismalla***
Faculty of Medicine, University of Gezira
Medani, Sudan
Faculty of Medicine, Albaha University
Al Baha, Saudi Arabia
E-mail: mohadaff22@gmail.com

## DISCLOSURE

*The authors have no financial interest to declare in relation to the content of this article.*

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