A literature analysis of scientific research on gender incongruence in Muslim nations

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Abstract
This study aims to chart and review the unexplored transgender research portfolio of Muslim countries using bibliometric method. Data retrieved from the Scopus database were analyzed using CiteSpace, VOSviewer, Biblioshiny, and Scientopy software. It was found that barring Turkey and Iran, transgender research has been minimal in most Muslim countries. The collective productivity is gradually but surely rising. Around 84% of the publications have been collaborative efforts. The keyword analysis revealed that gender dysphoria, human immunodeficiency virus, LGBT, and vaginoplasty were the most frequently used keywords. The socio-economic circumstances of the transgender community are generally deplorable in most Muslim nations. Overall, there is a dire need for high-quality multifaceted transgender research in the Muslim world to raise general awareness. Resolving disputes on gender dysphoria or sex reassignment surgeries and reinstating the social rights of the transgender community should be the utmost priority of future research in Muslim countries.

Keywords
Gender incongruence, Muslim countries, transgender research, mapping review, bibliometric analysis, Scopus

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Introduction
Gender incongruence is experienced when a person’s behavior or inner feelings are out of accord with their biological sex; a natal male exhibits feminine attributes and a female manifests masculine behavior.1 This is in sharp contrast to the cultural standards of most human societies, where individuals born as males are considered to be men and females as women. Hence, gender incongruent individuals in human societies are referred to as atypical, non-binary, gender-non-conforming or most commonly transgender, etc.2,3 Data from numerous contemporary studies have shown that transgender people have been universally abused, stigmatized, derided, maltreated, loathed, and scorned, either overtly or covertly.4-6 The 2011 National School Climate Survey conducted in the USA reported that as many as 90% of the transgender students had suffered harassment, and 25% had experienced physical assault merely because of their gender expression.7

To date, no definitive extrinsic or intrinsic stimuli or motivators have been identified that can fully explain why...
transgender people are as they are.8,9 This uncertainty about transgender etiology has caused skepticism about its legitimacy and is the root cause of the universal debate and controversy that surrounds it.10

On account of the surrounding ambiguity, controversies, and complexities, transgenderism has gained colossal media attention, public interest, and awareness over the last 2–3 decades, at the global level. During this time, academic literature and multi-disciplinary research output on this subject have also increased exponentially to highlight the social, economic, behavioral, and health aspects of the long-ignored transgender community.8,9

Majority of the aforementioned transgender information has come to light because of research and studies conducted in various western countries. A previous bibliometric study by Sweileh11 on the international transgender research profile of various countries showed that the USA, UK, Canada, some European, and Latin American countries were among the most prolific countries. The USA alone had contributed 43.4% of the total publications investigated. On the other hand, East Asian, African, Middle Eastern, and Eastern European countries had not contributed much.11 western countries have also initiated and implemented many social, political, and legal reforms to end the stigmatization and discrimination of the transgender community. Laws protecting transgender rights have also helped to restore their standing in western society to a degree.12

Only a few Muslim countries have publicly share data, albeit a highly conservative one regarding their transgender populations. For example, based on the clinical diagnosis of gender dysphoria, the incidence of Iranian male-to-female (MTF) and female-to-male (FTM) transgender was reported as 1:145,000 and 1:136,000 respectively, between the periods of 2002 and 2009.13,14 Similarly, Pakistani sources claimed their transgender population constitute 2% of the total population.15 Transgender people constitute a palpable proportion of the population in Islamic countries, although, the exact population size of transgender people in the Muslim world is unknown owing to missing data.16

To our knowledge, no study has explored, analyzed, or reported the overall research performance of the Muslim world in transgender research. We planned this study to ascertain the transgender research activity in Muslim countries by bibliometric analysis. The researchers believe their study will help in identifying the high priority as well as under-researched areas of transgender study and will prove a valuable roadmap for future research in this field of study for Muslim researchers.

Research questions

1. What were the publishing and citation trends in transgender research from 1976 to 2020?

2. What were the authorship and collaboration patterns of researchers affiliated with the Muslim world in transgender research?

3. Which keywords have been frequently used in transgender research originating from the Muslim world?

4. Which journals have been frequently preferred by the researchers affiliated with the Muslim world for publishing transgender research?

5. Which countries, organizations, and authors have been most productive in transgender research?

Methodology

The bibliometric method of research analysis and mapping method was chosen for the study. Bibliographic data of literature relevant to the topic of the study were retrieved from the Scopus database for analyses, and keywords were selected based on the prior knowledge of the researchers as well as after an extensive review of the relevant literature. A four-phased data retrieval and filtration strategy, as shown in Figure 1, was followed to analyze the maximum number of relevant transgender studies. The names of the 57 member states of the Organization of Islamic Cooperation (OIC) were retrieved from the official website of the OIC,16 and added to the search string to restrict the search results to the Muslim world. A published work was considered to be a Muslim world contribution as long as one of the authors was affiliated with a Muslim country. Eventually, a
comprehensive search query was designed. The following search query was used after applying Boolean search operators and document type filters to retrieve the maximum results relevant to the study:

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“TITLE-ABS-KEY (="Transgender" OR “transman” OR “transwoman” OR “gender identity disorder” OR “gender dysphoria” OR “transsexual” OR “gender atypical” OR “gender non-conforming” OR “non-binary” OR “genderqueer” OR “gender fluidity” OR “gender-affirming” OR “gender variant” OR “hijra” OR “hijrah” OR “hejr” OR “hejra” OR “khusra” OR “mak nyak” OR “waria” OR “male-to-female” OR “MTF” OR “female-to-male” OR “FTM” OR “metodioplasty” OR “Penile construction” OR “Hormone replacement therapy” OR “phalloplasty” OR “Vaginal construction” OR “vaginoplasty” OR “Facial feminization surgery” OR “Facial masculinization surgery” OR “hormone replacement surgery” OR “sex change surgeries” OR “sex reassignment surgery” OR “gender affirmation surgery” OR “LGBT” OR “effeminate man” OR “gender expression” OR “sexual transition” OR “trans community” OR “castrated man” OR “gender diversity” OR “Gender attribution” OR “androgyne” OR “femme” OR “butch” OR “transphobia” OR “Top surgery” OR “bottom surgery” ) AND AFFILCOUNTRY ( azerbaijan OR jordan OR afghanistan OR albania OR “UNITED ARAB EMIRATES” OR indonesiia OR uzbekistan OR iran OR pakistan OR bahrain OR brunei OR bangladesh OR benin OR burkina OR tajikistan OR turkey OR turkmenistan OR iran OR pakistan OR brunei OR bangladesh OR benin OR burkina OR tajikistan OR turkey OR turkmenistan OR (_excludE ( PUBYEAR, 2021 ) ) AND ( EXCLUDE ( DOCTYPE, “le” ) ) OR EXCLUDE ( DOCTYPE, “sh” ) ) OR EXCLUDE ( DOCTYPE, “no” ) ) OR EXCLUDE ( DOCTYPE, “ed” ) ) OR EXCLUDE ( DOCTYPE, “bk” ) ) OR EXCLUDE ( DOCTYPE, “er” ) ) OR EXCLUDE ( DOCTYPE, “tb” ) ) OR EXCLUDE ( DOCTYPE, “Undefined” )."
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Initially, 7097 bibliographic records consisting of all document types were retrieved from the Scopus database. One hundred six records were excluded after applying a document type filter to limit the document types to articles, review articles, conference papers, books, and book chapters. No language and date filters were applied. Manual abstract and title scanning excluded a further 6691 records. Only 300 highly relevant records were then assessed for eligibility and eventually selected for the final analysis. The study used different data processing and visualization tools, including VOSviewer, CiteSpace, Biblioshiny, and Microsoft Excel, and ScientoPy, to reveal the true research landscape of transgender research in the Muslim world.

Figure 2. Growth of transgender publications and citations in Islamic world over time.

Results

Data analysis results shown in Figure 2 indicate that the transgender research output in the Muslim world has been progressively increasing over the years. The first publication on the topic was published in 1976, and till the beginning of the 21st century, it was a neglected topic among Muslim researchers. Few (N=8) studies had been published before the start of the new millennium. However, the topic has gained much attention in recent decades, and
an upward trend in the publications can be observed. Around 65% (N=195) of the total publications were produced in the last 5 years (2016–2020). The year 2008 witnessed the highest number of citations (N=400) of transgender publications of the Muslim World. Notably, a downward trend of citations was observed during the last 5 years of the study period. This can be attributed to the incomplete citation life cycle of recent publications.

**Authorship pattern**

Study results showed that collaborative studies with two authors (N=50) was the most common authorship trend in transgender research in the Muslim world, followed by three author studies (N=43). Only 41 publications (14%) had a single author. Interestingly, four authors collaborated to conduct 35 transgender research studies, and 25, 28, and 24 transgender studies resulted from the joint efforts of five, six, and seven authors, respectively. The lowest number of studies were published in collaboration with 10 authors. Eleven or more authors collaborated to publish 25 publications. It is interesting to note that the collaborations of 10 authors attracted the highest number of citations (N=331) with an average 55.16 citations per publication. On the other hand, single-author studies only received 4.6 citations per publication. Figure 3 shows the authorship patterns of transgender research in Muslim countries.

**Most cited articles in transgender research**

Table 1 lists the most cited articles, along with their publication details. The highest number of citations (n=217) were received by an article by Feldblum et al. titled “Savvy Vaginal Gel (C31g) for Prevention of HIV Infection: A Randomized Controlled Trial in Nigeria” published in the PLoS One in the year 2008, with an average of 18.1 citations per year. A paper published in The Lancet in 2015 titled “HIV Risk and Preventive Interventions in Transgender Women Sex Workers” by Poteat et al. recorded the best citation average of 34.4 per year. The Lancet and the Journal of the International Aids Society were the only journals with at least two papers listed in the top 10 most-cited papers list. Interestingly, four of the articles listed in Table 2 had received a 100 or more citations.

**Frequently used keywords**

The most researched transgender topics identified in the study were visualized by mapping the co-occurrences of the authors’ keywords (N=689). Only 71 keywords met the threshold of a minimum of three occurrences. In Figure 4, the distance and size of the bubble indicate the frequency of keyword occurrences and associational links. The network visualization of occurrences of keywords shows that transgender, gender dysphoria, HIV, LGBT, and vaginoplasty were the most frequently used keywords. A total of eight clusters represented by different colors can be visualized in the Figure 4. They form the overall layout of the topics discussed in transgender research in the Muslim world. They are (1) Cluster 1 (red) related to transgender, gender dysphoria, sex reassignment surgery, and HIV prevention; (2) Cluster 2 (green) representing LGBT, homosexuality, LGBT health, and topics related to transgender health and education; (3) Cluster 3 (blue) representing HIV, transgender women, stigma, and sexual minority; (4) Cluster 4 (light green) focusing on terms like...
vaginoplasty, transsexual, and gender reassignment; (5) Cluster 5 (purple) representing keywords related to the sexual and gender minorities, and men who have sex with men; (6) Cluster 6 (light blue) representing Islam’s relationship with transsexualism and sex; and lastly (7) Cluster 7 (yellow) representing topics related to sexual orientation, and sex workers.

Gender dysphoria was the most common keyword followed by transgender during the period 2001–2020 as shown in (Figure 5). Furthermore, keywords HIV and gender identity disorder occurred more than 40 times. Interestingly, the top three most prevalent keywords during the last 5 years of the study period (from 2016 to 2020) were the same as those during the 2001–2020 period, as can be seen in the two different panels of Figure 5.

Three factor analysis (keywords, countries, and sources)

Figure 6 presents the three-factor analysis of keywords (left), countries (middle), and journals (right). The results indicate the relationship among subject areas (keywords), sources, and countries on transgender research. It can be seen in Figure 6 that the top five subject areas (gender dysphoria, transgender, HIV, transgender women, and transsexualism) had a relationship with five sources (Turk Psikiyatri Dergisi, International Medical Journal Malaysia, Archives of Sexual Behavior, PLoS One, Journal of the International Aids Society, and BMC Public Health), and they had a strong relationship with the top five Muslim countries leading in transgender research (Turkey, Iran, Indonesia, Malaysia, and Pakistan).

Most influential journals publishing transgender research

Table 2 displays the most influential journals publishing transgender research during the period of the study. It is interesting to note that all top 10 research journals publishing transgender research are impact factor journals and 7 out of the 10 journals come under the Quartile 1 and 2 categories. The Journal of the International Aids Society, published by John Wiley and Sons, had published the highest number of studies (n=8) on transgender issues. The journal is categorized in the top quartile of the Journal Citation Report (JCR) of Clarivate Analytics and had a 5.55 impact factor in 2019 JCR. PLoS One, Archives of Sexual Behavior, and the Journal of Sexual Medicine, had all published seven research publications each on the topic. The best citation impact of 33 was recorded for the
publications published in the *Culture, Health and Sexuality* journal, followed by publications published in *PLoS One*, with the citation impact of 32.43. Interestingly, all top 10 influential journals are based in the United States of America, Turkey, and the United Kingdom.

**Most influential countries and organizations producing transgender research**

Table 3 provides details of the countries and organizations that were most actively producing transgender research during the period of the study. The contribution of different countries and organizations was estimated by the country and institute affiliation of the authors. At least one author affiliation with a particular country or institute was chosen to be the minimum requirement. It was found that Turkey led the Islamic countries with the highest number of research publications \((n=71)\) on transgender issues. Furthermore, the Turkish publications received the highest number of citations \((n=372)\). Iran \((n=46)\), Malaysia \((n=42)\), Indonesia \((n=38)\), and Pakistan \((n=38)\) followed Turkey in terms of number of publications. The best citation impact of 29.25 was recorded to the Bangladeshi publications, followed by Nigerian publications with a citation impact of 22.31. On the other hand, organizations based in Iran were the most active publishers, followed by organizations based in Turkey and Malaysia. Publications affiliated with the University of Indonesia had the highest citation impact of 12.8, followed by the Institute of Human Virology in Nigeria which had a citation impact of 6.1. Furthermore, the University of Indonesia’s publications received the highest number of citations \((n=115)\).

Data in Figure 7 reveals that Turkey and Iran have been the top producers of transgender research over the years. Indonesia seems to have replaced Malaysia as the third most active country during the last 5 years (2016–2020).

**Figure 4.** Keywords overlay map of transgender research.

**Figure 5.** Author keyword analysis from 2001 to 2020.
International collaboration

The results of data analysis identified the global collaboration pattern of transgender research originated from Muslim countries, as shown in Figure 8. Muslim countries had the highest level of collaboration with the USA, followed by the UK and Australia. Instances of international collaboration between a Muslim country and another ranged from 1 to 14. The highest number of studies (14) resulted from the collaborative efforts of Malaysia and the USA, followed by Nigeria and the USA (12). Indonesia collaborated with the USA and Netherland for seven studies each.

Discussion

The aim of the study was to conduct a bibliometric analysis of publications originating from Muslim countries to investigate their transgender research profile. Publication records from 1976 to date were assessed. The Scopus database was selected as a data source as it is one of the most comprehensive data sources of peer reviewed scientific literature and boasts the largest collection of abstracts and citations in the world. It provides access to 75 million items from more than 24,600 serials and 194,000 books from approximately 5000 publishers. The database also has 16 million author profiles and 7000 institution profiles. The findings of the study are discussed in detail as follows:

Published and citation trends in transgender research

The bibliometric analysis of the relevant literature revealed that the transgender research activity, though slow to start, had progressively increased in Muslim countries over the years. This increased activity has grown steadily and sustainably since the last decade of the 20th century, with the most dramatic increase seen from 2007 to 2020. This surge in activity is similar to the one seen at the global level during this period. However, the transgender research output of Muslim countries has been much lower than that of the rest of the world.

The first contemporary research article on transgender issues was published by a German scientist in 1913. In contrast, the Muslim world produced its first transgender work in 1976, lagging behind the rest of the world by nearly 63 years and 74 publications. Many factors can account for this hesitant start and low productivity. First of all, Muslim culture traditionally shies away from any discussion regarding the sex, gender, or transgender issues. Therefore, it is no surprise that transgender people receive minimal acceptance and understanding in their societies. Secondly, Muslims, in general, perceive transgender people as intersex, homosexuals, or suffering from mental health issues. This is contrary to the basic scientific knowledge and understanding of the condition, that is,
transgender people suffer from gender identity or expression issue and are not the same as intersex.\textsuperscript{2,3,21} There have been reports that adolescents or adults who identified themselves as transgender are mocked for being intersex, and suffered emotional and physical persecution for being mistaken as homosexuals. In most Muslim societies, trans children are either ignored, made to feel unwelcome, or harshly treated by families, and thus forced to forgo their reversed gender expression.\textsuperscript{22} Consequently, transgender people are forced to live a suppressed life of pretense to meet social.\textsuperscript{22–24}

Since the start of the 21st century, transgender issues have slowly gained recognition and importance among Muslim scientists, like the rest of the world. The study results have highlighted an upward trend in research activity indicating that transgender issues have the potential to become an important field of research in Muslim nations in the future.

\begin{table}[h]
\centering
\caption{Top most influential journals publishing transgender research.}
\begin{tabular}{lcccccc}
\hline
Journal & TP & TC & CI & Country & Publisher & IF & Q \\
\hline
Journal of the International Aids Society & 8 & 122 & 15.25 & United Kingdom & John Wiley & Sons Ltd. & 5.553 & Q1 \\
Archives of Sexual Behavior & 7 & 61 & 8.71 & United States & Springer & 3.13 & Q1 \\
PLoS One & 7 & 227 & 32.43 & United States & Public Library of Science & 2.74 & Q2 \\
Culture, Health and Sexuality & 5 & 165 & 33.00 & United Kingdom & Routledge & 1.96 & Q2 \\
Journal of Homosexuality & 5 & 27 & 5.40 & United States & Routledge & 1.87 & Q2 \\
Journal of Sexual Medicine & 5 & 95 & 19.00 & United Kingdom & Elsevier Inc. & 3.29 & Q2 \\
Turk Psikiyatri Dergisi & 5 & 16 & 3.20 & Turkey & Turkish Association of Nervous and Mental Health & 0.47 & Q4 \\
Anadolu Psikiyatri Dergisi & 5 & 4 & 0.80 & Turkey & Cukurova University, Faculty of Medicine & 0.32 & Q4 \\
BMC Public Health & 4 & 9 & 2.25 & United Kingdom & BioMed Central Ltd. & 2.52 & Q2 \\
International Journal of STD and Aids & 4 & 98 & 24.50 & United Kingdom & SAGE Publications Ltd. & 1.4 & Q4 \\
\hline
\end{tabular}
\end{table}
Most productive countries, organizations, and authors in transgender research

The results of the study showed that transgender research activity has been heterogeneously distributed across the Muslim world. Turkey was the most productive country with the largest number of publications and citation scores among all Muslim countries, followed closely by Iran, Malaysia, Indonesia, Pakistan, and Nigeria come next. Contributions from the Arab countries were notably scarce. On the other hand, Iranian public universities were collectively ranked at the top of the list of most prolific organizations for producing the largest volume of transgender publications. Other highly productive institutions were from Turkey, Malaysia, Indonesia, and Nigeria.

Our keyword analysis showed that Turkish and Iranian publications were diverse and broad in spectrum and spanned all conventional fields of study, including but not limited to sociology, biology, religion, ethics, medical, psychiatric, genetic, sexology, plastic surgery, endocrinology, pharmacotherapy, and neurology. These publications were comparable to those from most western countries. In contrast, the bulk of research from other Muslim countries was mostly centered on the poor socio-economic status of the transgender population or their high susceptibility to sexually transmitted diseases.25–27 Furthermore, the subject population was more clearly defined in the Turkish and Iranian.28–30 While most studies from southeastern countries had collected data from a generalized transgender population, which may have included a mix of intersex people, cross-dressers, or transgender people with or without gender dysphoria25–27.

Up until now, multiple categories of transgender people have been identified based on their behavioral characteristics.31 Therefore, it is important that study designs clearly define the specific transgender population being targeted for data collection. Additionally, it was noticed that a sizable proportion of Turkish and Iranian studies dealt with sex change or reassignment therapy (SRT), and the postsurgical evaluations of gender dysphoria patients. Gender dysphoria (GD) or previously known as gender identity disorder has received substantial attention in these two countries, even during a slow research period 1976–2000, as shown in our thematic evolution of.32–35 Currently, SRT is the standard of care treatment for gender dysphoria and is practiced in most western countries. However, SRT is highly controversial and has been extensively debated among Muslim scholars.

Iran was the first Islamic country to sanction SRT in the 1980s, followed by Turkey in 1988, and Egypt in 2005.23,36–38 As of now, only these three Muslim countries offer SRT legally. Interestingly, Iran is second only to Thailand, in performing the largest number of transgender surgeries on national and international transgender people with GD.36,38

The socio-cultural, geopolitical, and theological differences among Muslim countries can also help explain the varying degree of attention to transgender matters. For example, Turkey, although a predominately Muslim country, is essentially a secular state and is geographically located between Europe and Asia. A strong European influence and minimal religious boundaries could explain why Turkey has led and excelled in transgender research while other Muslim countries have lagged.

Authorship and collaborative patterns of researchers

The authorship and collaboration pattern analyses showed significant international collaboration between Muslim countries and the rest of the world. This was particularly seen in publications emerging from Malaysia, Indonesia, Nigeria, and Turkey. Much of the internationally guided

| Rank | Country       | TP  | TC  | CI  | Rank | Organization                                      | Country    | TP  | TC  | CI  |
|------|---------------|-----|-----|-----|------|--------------------------------------------------|------------|-----|-----|-----|
| 1    | Turkey        | 71  | 372 | 5.24| 1    | University of Malaya                             | Malaysia   | 14  | 76  | 5.4 |
| 2    | Iran          | 46  | 205 | 4.46| 2    | Hacettepe Universitesi                           | Turkey     | 14  | 63  | 4.5 |
| 3    | Malaysia      | 42  | 212 | 5.05| 3    | Tehran University of Medical Sciences             | Iran       | 13  | 43  | 3.3 |
| 4    | Indonesia     | 38  | 219 | 5.76| 4    | Iran University of Medical Sciences               | Iran       | 13  | 56  | 4.3 |
| 5    | Pakistan      | 34  | 273 | 8.03| 5    | Mashhad University of Medical Sciences            | Iran       | 9   | 17  | 1.9 |
| 6    | Nigeria       | 16  | 357 | 22.31| 6   | Institute of Human Virology                      | Nigeria    | 9   | 55  | 6.1 |
| 7    | Bangladesh    | 12  | 351 | 29.25| 7   | University of Indonesia                          | Indonesia  | 9   | 115 | 12.8|
| 8    | Lebanon       | 7   | 23  | 3.29| 8    | Istanbul Universitesi                            | Turkey     | 8   | 38  | 4.8 |
| 9    | Egypt         | 6   | 24  | 4.00| 9    | Shahid Beheshti University of Medical Sciences    | Iran       | 7   | 32  | 4.6 |
| 10   | Saudi Arabia  | 5   | 32  | 6.40| 10   | International Islamic University Malaysia         | Malaysia   | 5   | 9   | 1.8 |
research in these countries has been in the context of sexually transmitted diseases such as HIV and Hepatitis, or raising awareness regarding the lesbian gay bisexual and transgender (LGBT) community. Studies have reported that the transgender population in most developing Muslim countries has been highly marginalized and lived a substandard life due to widespread stigmatization. They had limited educational and employment opportunities and lacked basic healthcare resources. Consequently, a vast majority of transgender people there were compelled to do menial jobs in order to make a living. According to several reports, the worldwide transgender population is at remarkably high risk of contracting HIV (with estimated risk ~27%).

Prevention of HIV in this highly susceptible population is a major public health issue and is, therefore, considered to be a high priority research topic. It is no surprise that most of these studies with multiple authors are published in top-ranking journals. The citation analysis of these publications also shows that 8 out of the 10 most cited articles represent studies that have either reported the high prevalence of HIV or other sexually transmitted diseases among transgender and homosexual men in Muslim societies or raised awareness regarding HIV transmission and prevention.

Study results revealed a reasonable level of cooperation with international scientists and a low level of collaboration with other Muslim scientists. This was probably due to an overall low level of research activity in majority of the Muslim countries. It has also become evident that collaborative work in the field of transgender research is highly desired by both Muslim and international scientists. There has been a dearth of reliable scientific studies owing to the small transgender sample size. Many clinical studies on SRT have yielded mixed data on their safety, efficacy, and long-term consequences. Future joint projects would allow for larger study populations and sample sizes as well as nurture innovations and creativity. Collaborative projects among Muslim scientists would also promote inter-faith understanding and help resolves controversies on transgender affairs.

**Significance of the study**

This study has evaluated the transgender research profile of Muslim countries and revealed useful information that has never been reported before.

Our analysis identified a broad gap in the research quality and output of majority of the Muslim countries. For example, gender dysphoria, a fundamentally important
issue concerning transgender, has been ignored in many Muslim countries, barring Turkey, Iran, and Egypt. SRT is universally approved as the standardized treatment for gender dysphoria, however, it is considered highly controversial and is banned in most Muslim countries. Cross-disciplinary research and further investigation is needed for the successful resolution of these controversies surrounding SRT.

During the process of literature mapping, the scarcity of transgender originating from Arab countries was noticed. Our unpublished data have shown the presence of a substantial transgender population in these countries, however, it lacks any social, legal recognition, sympathy, or medical attention. It is imperative that young Arab scientists take steps to initiate research studies to help identify and address the needs of the transgender communities living in their respective countries. Policymakers in Muslim countries should also pay heed to the pitiful circumstances of the transgender community by introducing and enforcing equal rights policies and by encouraging multi-disciplinary research projects to promote further understanding of transgender issues.

Limitations of the study and future research directions

This study was limited to Scopus indexed publications on “transgender.” It was out of the scope of the study to determine whether the incorporated research work was conducted in relevant countries or not. Other databases like PubMed, Google Scholar, Web of Science, EBSCO, etc., could also provide another set of records on searching, which is out of scope of this study; future work in this domain may verify the present findings with the data from these sources. A qualitative study is also required to investigate the factors, reasons, and issues behind the low productivity of authors affiliated with the Muslim world. A comparative study of research productivity of the Muslim world and the rest of the world would also be worthwhile.

Conclusion

Our bibliometric analysis of publication records on transgender research in Muslim countries has illustrated that transgender research is slowly but surely growing there. Turkey and Iran are the leading contributors to high-quality multidisciplinary transgender research within the Muslim world, followed by Malaysia, Indonesia, Pakistan, and Nigeria, albeit with a relatively narrower research scope. The transgender community is notably under-represented in the Arab and other Muslim countries, as evidenced by the sheer lack of publications from these countries.

High HIV prevalence among the transgender community in southeastern Muslim countries has raised international concerns and has prompted some quality collaborative work. However, the gender dysphoria issue has been glaringly under-researched or neglected in many Muslim societies owing to religious controversies. Except for Turkey, Iran, and Egypt, no other Muslim country allows SRT whereby their transgender people can normalize their gender and sex discord and live normally like mainstream men and women.

Overall, our article has clearly demonstrated a dire need for further research on the transgender issue in Muslim countries. Scientific studies and research work highlighting the transgender etiology, gender dysphoria, SRT, addressing the needs of the transgender community, as well as raising public awareness and empathy should be a top priority for Muslim scientists. Collective research efforts can eventually bring social reforms and policies to reinstate the human rights of the long-ignored transgender community in the Muslim world.

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Significance for public health

Transgender people are humans, and their health issues are public health issues. Despite their high prevalence, trans people are highly marginalized, suffer violence, hatred, and discrimination everywhere. Multiple studies show that transgender individuals have two to three times higher risks of mental health issues and are 30%-50% more likely to contract HIV than the cis-gender people. Prevention of HIV in this highly susceptible population is a major public health issue in many countries in the world. While a great deal of social reforms favoring transgender people is taking place in the west, transgender community continue to suffer in the Muslim countries. This study, for the first time, identified a broad gap in their research quality and output in a vast majority of Muslim countries. Information revealed in this article will encourage Muslim nations to ramp up research, public awareness to alleviate the sufferings of desperate humans—which are key agenda of public health science.

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