

The Contributions of Turkish Hematology to the Global Literature: A Comparative Analysis

Türk Hematolojisi'nin Dünya Literatürüne Katkısı - Kıyaslamalı Analiz

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To the Editor,

One of the most important measurable indicators of academic productivity is a meaningful contribution to a well-compiled body of literature. Particularly in the field of hematology as an objective science, the strength of publications in peer-reviewed journals aligns closely with academic influence.

Determining Türkiye's position compared to other countries' scientific output based on measurable and reproducible criteria is essential for ensuring the continuation of effective medical solutions. Previous studies have shown a significant increase in Türkiye's scientific output over the past decades, highlighting the potential for further academic progress [1]. In this study, we aimed to objectively compare Türkiye's contributions to the hematology literature with those of the United States, the United Kingdom, and Germany. Our research was based on articles published in high-quality peer-reviewed hematology journals without restrictions on publication date or article type. We first retrieved data on journals included in the Science Citation Index or Science Citation Index Expanded categories from a reliable indexing system (<https://www.scimagojr.com/journalrank.php?category=2720>). The quartile rankings of the journals (Q1, Q2, Q3, and Q4) were also recorded. Next, using the publicly accessible PubMed database (National Center for Biotechnology Information, National Library of Medicine, USA), we downloaded data for articles published in these journals and affiliated with authors from Türkiye, the United States, the United Kingdom, and Germany. The downloaded datasets included the article metadata of PubMed identifier number (PMID), title, author details, journal, publication year, and author count in CSV format. The quartile data obtained from the aforementioned indexing system were merged with the journal names and incorporated into the dataset as an additional variable using the INNER JOIN method.

To assess the impact of each article, citation data were retrieved from the PubMed database using the 'pmdcite' Python tool available via GitHub (<https://github.com/dvklopfenstein/pmdcite>) and merged into the dataset. The use of bibliometric analyses to evaluate scientific performance is supported by previous studies, which have highlighted that most of Türkiye's scientific publications are produced by university-affiliated researchers and indexed in international citation databases [2].

All data were analyzed using IBM SPSS Statistics 26. The distribution of the variables was evaluated with the 'Explore' function for descriptive statistics, and Q-Q plots were used to determine whether continuous variables deviated significantly from normality. Non-normally distributed continuous variables were expressed as median values with interquartile ranges (IQRs; 25th to 75th percentiles). Differences between multiple independent groups were analyzed using the Kruskal-Wallis test. Pairwise comparisons were performed with Mann-Whitney U tests, with p value adjustments applied to evaluate the significance of observed differences. The chi-square test was employed to analyze differences between categorical variables. For visual emphasis, graphs of median values with IQRs were plotted for independent variables.

Using the data extraction method described above, a total of 125,253 articles were included in the study. The distribution of these articles by country was as follows: 77,230 (61.7%) from the United States, 23,362 (18.7%) from Germany, 17,250 (14%) from the United Kingdom, and 7141 (5.7%) from Türkiye. The overall and annual distributions of article counts by country are presented in Figures 1 and 2. Regarding the quartile rankings of the journals, 70,770 articles (56.5%) were published in Q1, 36,827 (29.4%) in Q2, 16,902 (13.5%) in Q3, and 754 (0.6%) in Q4 journals. While there was a general decrease in publication frequency from Q1 to Q4

journals across the other countries, Türkiye exhibited a reverse distribution, with the majority of its publications concentrated in Q3 journals. The inter-country differences in quartile distribution were statistically significant ($p<0.001$; Table 1, Figure 3). The median number of citations for articles published in these journals was 15 (IQR: 29.5-34) for Germany, 14 (IQR: 32.4-36) for the United States, 13 (IQR: 28.4-32) for the United Kingdom, and 5 (IQR: 11.1-12) for Türkiye. Post hoc analyses demonstrated that the primary source of this statistical difference was the group of publications from Türkiye ($p<0.001$; Table 1, Figure 4). Previous analyses have shown that Türkiye's citation performance is generally lower than that of European Union countries but comparable to some Eastern European countries [3]. Regarding the median number of authors per article, statistical analyses revealed a significant difference ($p<0.001$) between the four countries. Pairwise analyses showed that this difference was primarily due to Germany and Türkiye having higher median author counts compared to the United States and United Kingdom. The median author counts were as follows: Germany, 7 (IQR: 6.4-10); Türkiye, 6 (IQR: 4.4-8); United States, 5 (IQR: 6.2-8); and United Kingdom, 5 (IQR: 5.3-8) (Table 1, Figure 5).

Academic productivity and the contributions of researchers to the field of hematology vary by country of origin, level of development, and resources. There have been considerable efforts to establish qualitative and quantitative documentation of scientific improvement in this field. Bibliometric analyses are used to quantitatively evaluate scientific and scholarly publications.

To date, there are no established data on qualitative or quantitative scientific contributions in hematology regarding the national origin of researchers. The research presented in this brief report began as a consequence of self-assessment and curiosity, but took further shape with questions of where Türkiye stands in the field of hematology research and how the country's academic productivity could be improved.

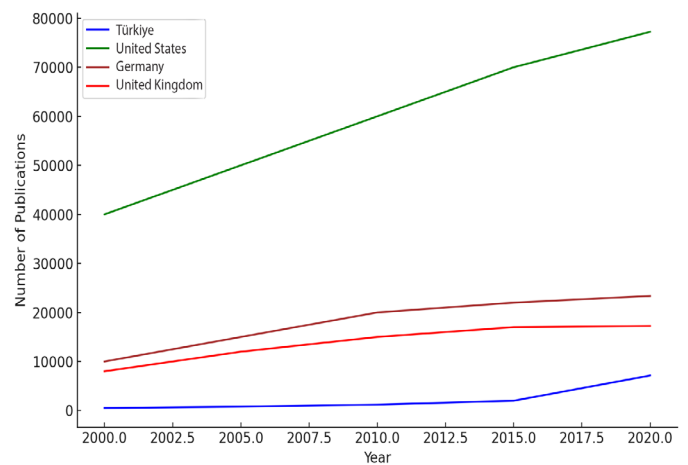


Figure 1. Annual publication trends by country. Graph generated based on study data.

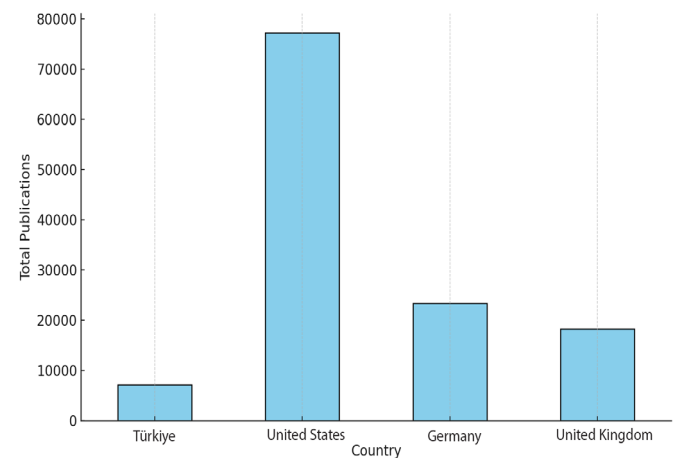


Figure 2. Total publications by country. Chart generated based on study data.

Table 1. Variables of interest by countries and publication numbers.

Variable	Türkiye	United States	Germany	United Kingdom	p
Publication count	7141 (5.7%)	77,230 (61.7%)	23,362 (18.7%)	17,250 (14%)	-
Q1	943 (13.2%)	44,474 (57.6%)	14,159 (60.6%)	11,914 (63.9%)	<0.001
Q2	2033 (28.5%)	23,477 (30.4%)	7046 (30.2%)	4271 (24.4%)	
Q3	4130 (57.8%)	8656 (11.2%)	2124 (9.1%)	1992 (11.4%)	
Q4	35 (0.5%)	623 (0.8%)	33 (0.1%)	63 (0.4%)	
Citation count	5 (IQR: 11.1-12)	14 (IQR: 32.4-36)	15 (IQR: 29.5-34)	13 (IQR: 28.4-32)	<0.001
Author count	6 (IQR: 4.4-8)	5 (IQR: 6.2-8)	7 (IQR: 6.4-10)	5 (IQR: 5.3-8)	<0.001
GDP per capita (US dollars)	13,106	82,769	54,343	49,464	0.040
Research and development expenditure (% of GDP)	1.32	3.59	3.13	2.90	0.012
Physicians per 1000 people	2.17	3.61	4.52	3.17	0.006

Q1, Q2, Q3, and Q4: Competitive rankings of journals within four quartiles; GDP: gross domestic product; IQR: interquartile ranking.

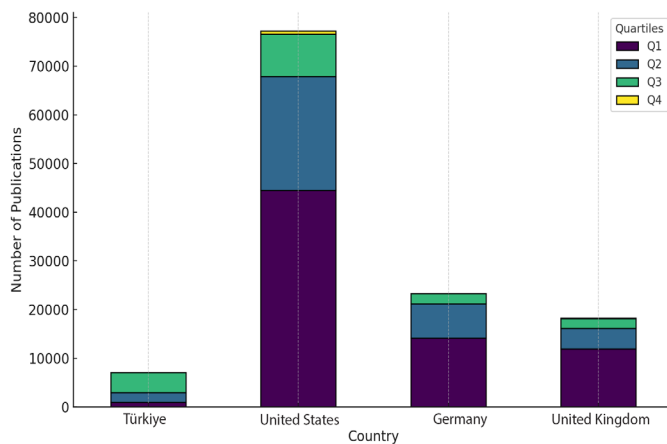


Figure 3. Distribution of publications by journal quartiles. Chart generated based on study data.

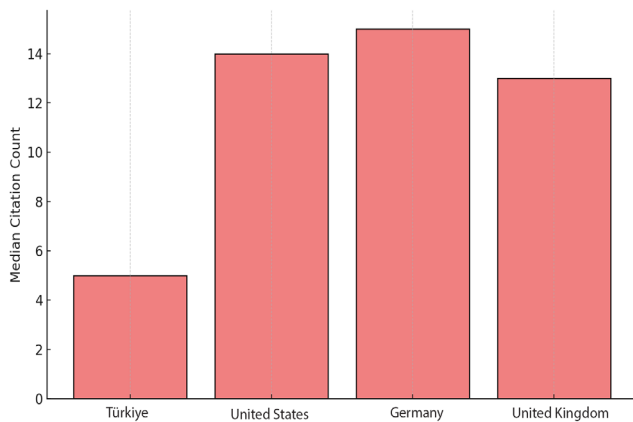


Figure 4. Median citation counts by country. Chart generated based on study data.

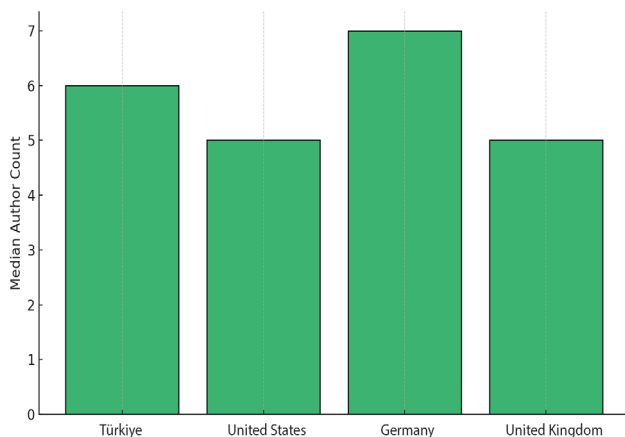


Figure 5. Median author counts by country. Chart generated based on study data.

The number of publications in this field varies widely across countries and the distribution of journal quartiles among these publications is uneven. The United States leads in the number of publications per year, with most articles appearing in Q1 journals. Although Germany produces fewer publications annually and has a lower number of Q1 journal publications, it has achieved the highest citation count, highlighting the complexity of the qualitative and quantitative assessment of scientific output. However, it is evident that Türkiye, with the lowest number of publications and a higher concentration of papers in Q3 journals, requires greater focus on improving its academic productivity and publication quality.

Low academic productivity and publication quality require further investigation. Potential contributing factors include a lower number of physicians per population, a high patient burden in clinical settings, and limited resources for scientific research. Collaborative efforts should be increased and additional strategies should be implemented to enhance research output and improve the overall quality of publications.

While interpreting these findings, it is important to consider the structural and economic variables that may influence a country's academic output. For instance, Türkiye's gross domestic product (GDP) per capita at the time of this research was markedly lower (\$13,106) compared to the United States (\$82,769), Germany (\$54,343), and the United Kingdom (\$49,464), suggesting economic limitations that may restrict the allocation of funding and institutional support for academic research. Moreover, Türkiye's expenditures on research and development (R&D) as a percentage of GDP (1.32%) were significantly lower than those of the United States (3.59%), Germany (3.13%), and the United Kingdom (2.90%). This discrepancy reflects structural limitations in Türkiye's ability to invest in scientific innovation, infrastructure, and long-term research programs (Table 1) [4].

Additionally, the number of physicians per 1000 people, which serves as a proxy variable for healthcare system capacity and physician workload, is notably lower in Türkiye (2.17) compared to Germany (4.52), the United States (3.61), and the United Kingdom (3.17). This may result in higher clinical demands per physician in Türkiye, reducing the time and energy that could otherwise be dedicated to academic productivity. The combination of economic constraints, lower R&D investment, and increased clinical burden appears to be a plausible explanation for Türkiye's relatively low performance in hematology publication metrics. Addressing these foundational disparities will be critical in any long-term strategy aimed at enhancing the quality and impact of scientific research from Türkiye (Table 1) [4].

In conclusion, our study reveals that Türkiye has not yet reached the desired level of maturity in hematology research in terms

of both the quantity and quality of publications compared to other countries. We have demonstrated that Türkiye lags significantly in both the quantity of its contributions to the literature and its performance in terms of quality metrics such as citation counts or the percentage of publications in high-impact journals. However, previous studies indicate that Türkiye's scientific output has increased significantly over the years, reflecting the potential for improvement [1,2]. Despite having a lower number of publications, we observed that Türkiye's median author count ranked below that of Germany but above the United States and United Kingdom. We hypothesize that Germany's higher median author count could be attributed to a culture of collaborative research, although this hypothesis is difficult to substantiate due to the inherent limitations of the dataset. Considering these findings, we believe that a critical self-assessment and immediate efforts to lay the groundwork for improving the quality and quantity of academic publications in Türkiye are essential.

Keywords: Hematology, Publications, Bibliometrics, Türkiye

Anahtar Kelimeler: Hematoloji, Yayın, Bibliyometrik, Türkiye

Ethics

Informed Consent: Patient consent is not required for this study.

Footnotes

Authorship Contributions

Concept: Ö.G.S., Y.G.M., F.D.; Design: Ö.G.S., Y.G.M., F.D.; Data Collection or Processing: Ö.G.S., Y.G.M., F.D.; Analysis or Interpretation: Ö.G.S., Y.G.M., F.D.; Literature Search: Ö.G.S., Y.G.M., F.D.; Writing: Ö.G.S., Y.G.M., F.D.

Conflict of Interest: No conflict of interest was declared by the authors.

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