LETTER TO THE EDITOR
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The Contribution of Turkish Hematology to 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, a positive science, the strength of publications in peer-reviewed journals aligns closely with academic influence.

Determining Turkey's position compared to other countries' schools of thought, using measurable and reproducible criteria, is essential for paving the way toward effective solutions. Previous studies have shown a significant increase in Turkey's scientific output over the past decades, highlighting the potential for further academic progress [1].

In this study, we aimed to objectively compare Turkey's contribution to hematology literature with that of United States of America, the United Kingdom, and Germany and present the results of this comparison.

Our study included articles published in esteemed and peer-reviewed hematology journals without restrictions on publication date or article type. To this end, we first retrieved journal data from a reliable indexing system (https://www.scimagojr.com/journalrank.php?category=2720) within the SCI or SCI-E categories. The quartile rankings of the journals (Q1, Q2, Q3, and Q4) were also recorded.

Next, using the publicly accessible PubMed (NCBI-NLM) database, we downloaded data for articles published in these journals and affiliated with authors from Turkey, the United States (USA), the United Kingdom (UK), and Germany. The downloaded datasets included article metadata (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 an inner join method.

To assess the impact of each article, citation data were retrieved from the PubMed database using the "pmidcite" Python tool available on GitHub (https://github.com/dvklopfenstein/pmidcite) and merged into the dataset.

The approach of using bibliometric analyses to evaluate scientific performance is supported by previous studies, which highlight that most of Turkey's publications are produced by universities and indexed in international citation databases [2].

All data were analyzed using SPSS Version 26. The distribution of variables was evaluated with the "Explore" function under 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 medians (IQR: interquartile range, 25th–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 on independent variables, median (IQR) graphs were plotted.
Using the data extraction method described previously, a total of 125,253 articles were included in the study.
The distribution of these articles by country was as follows: USA 77,230 (61.7%), Germany 23,362 (18.7%), UK 17,250 (14%), and Turkey 7,141 (5.7%). The overall and yearly distribution of article counts by country is presented in Figure 1 and Figure 2.
When evaluating the quartile rankings of the journals, 70,770 articles (56.5%) were published in Q1 journals, 36,827 (29.4%) in Q2, 16,902 (13.5%) in Q3, and 754 (0.6%) in Q4. While there was a general decrease in publication frequency from Q1 to Q4 journals across all countries, Turkey 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 the aforementioned journals was 15 (IQR: 29.5–34) for Germany, 14 (IQR: 32.4–36) for the USA, 13 (IQR: 28.4–32) for the UK, and 5 (IQR: 11.1–12) for Turkey. Post-hoc analyses demonstrated that the primary source of this difference was the Turkish group ($p < 0.001$, Table 1, Figure 4). Previous analyses have shown that Turkey's citation performance is generally lower than that of European Union countries but comparable to some Eastern European nations [3].
Regarding the median number of authors per article, statistical analyses revealed a significant difference ($p < 0.001$) between 4 countries. Pairwise analyses showed that this difference was primarily due to Germany and Turkey having higher median author counts compared to the USA and the UK. The median author counts were as follows: Germany 7 (IQR: 6.4–10), Turkey 6 (IQR: 4.4–8), USA 5 (IQR: 6.2–8), UK 5 (IQR: 5.3–8) (Table 1, Figure 5).
Academic productivity and contribution of researchers to the field of hematology varies by origin, level of development and resources. There have been a lot of efforts on establishment of qualitative and quantitative documentation of scientific improvements. Bibliometric analyses are used to quantitatively evaluate scientific and scholarly publications.
To date there is no established data on qualitative or quantitative scientific contribution in hematology regarding to national origin. However, this brief report is started with a consequence of a self- assessment and curiosity, then turned out a reality and awareness of where we are and how we should improve our academic productivity.
The number of publications varies widely across countries, and the distribution of 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 papers, it achieves the highest citation count, highlighting the complexity of qualitative and quantitative assessment of scientific output. However, it is evident that Turkey, with the lowest number of publications and a concentration of papers in Q3 journals, requires greater focus on improving 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 implemented to enhance research output and improve the overall quality of publications.
When interpreting these findings, it is important to consider the structural and economic variables that may influence a country's academic output. For instance, Turkey's gross domestic product (GDP) per capita was markedly lower ($13,106) compared to the USA ($82,769), Germany ($54,343), and the UK ($49,464), suggesting economic limitations that may restrict the allocation of funding and institutional support for academic research. Moreover, Turkey's expenditure on research and development (R&D) as a percentage of GDP (1.32%) is significantly lower than that of the USA (3.59%), Germany (3.13%), and the UK (2.90%). This discrepancy reflects structural limitations in Turkey's ability to invest in scientific innovation, infrastructure, and long-term research programs (Table1) [4].
Additionally, the number of physicians per 1000 people, which serves as a proxy for healthcare system capacity and physician workload, is notably lower in Turkey (2.17) compared to Germany (4.52), the USA (3.61), and the UK (3.17). This may result in higher clinical demands per physician in Turkey, reducing

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 Turkey'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 Turkey (Table 1) [4].

As a conclusion, our study revealed that Turkey has not yet reached the desired level of maturity in hematology in terms of both the quantity and quality of publications compared to modern schools of thought. We demonstrated that Turkey lags significantly behind in both the quantity of contributions to the literature and quality metrics such as citation counts and the percentage of publications in high-impact journals. However, previous studies indicate that Turkey's scientific output has increased significantly over the years, reflecting the potential for improvement [1, 2].

Despite a lesser number of manuscripts, we observed that Turkey's median author count ranked below Germany but above the USA and UK. 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 are essential.

References

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4. World Bank Database, https://databank.worldbank.org

Keywords: Hematology, Publications, Bibliometrics, Turkey
Anahtar Kelimeler: Hematoloji, Yayın, Bibliyometrik, Türkiye

Table 1. Variables of Countries and Publications

Variable	Turkey	USA	Germany	United Kingdom	p-value
Publication Count	7,141 (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	2,033 (28.5%)	23,477 (30.4%)	7,046 (30.2%)	4,271 (24.4%)	
Q3	4,130 (57.8%)	8,656 (11.2%)	2,124 (9.1%)	1,992 (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 (USD)	13106	82769	54343	49464	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

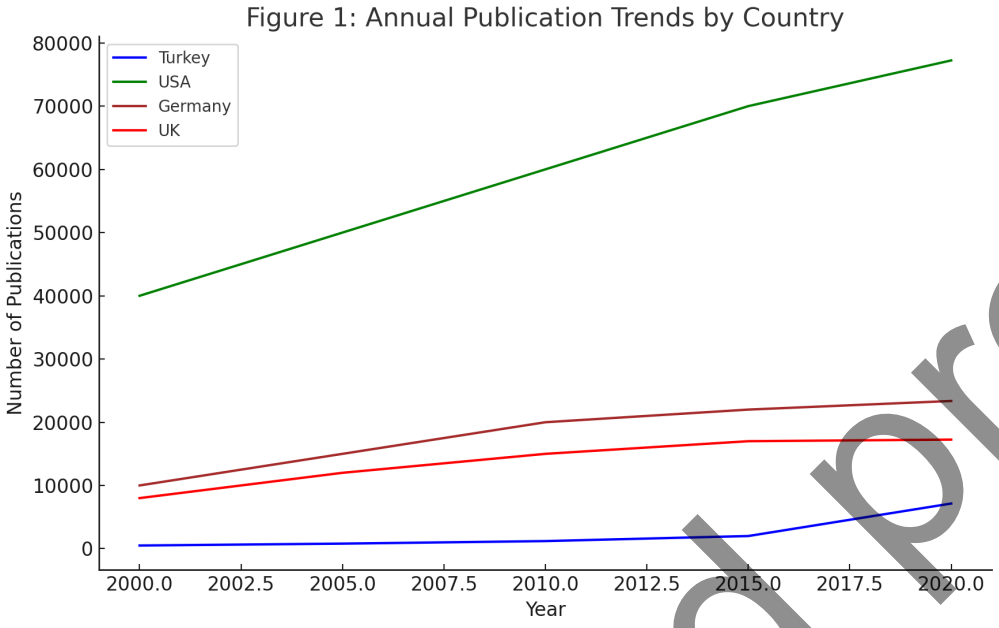

Figure 1: Annual Publication Trends by Country - Generated based on study data.

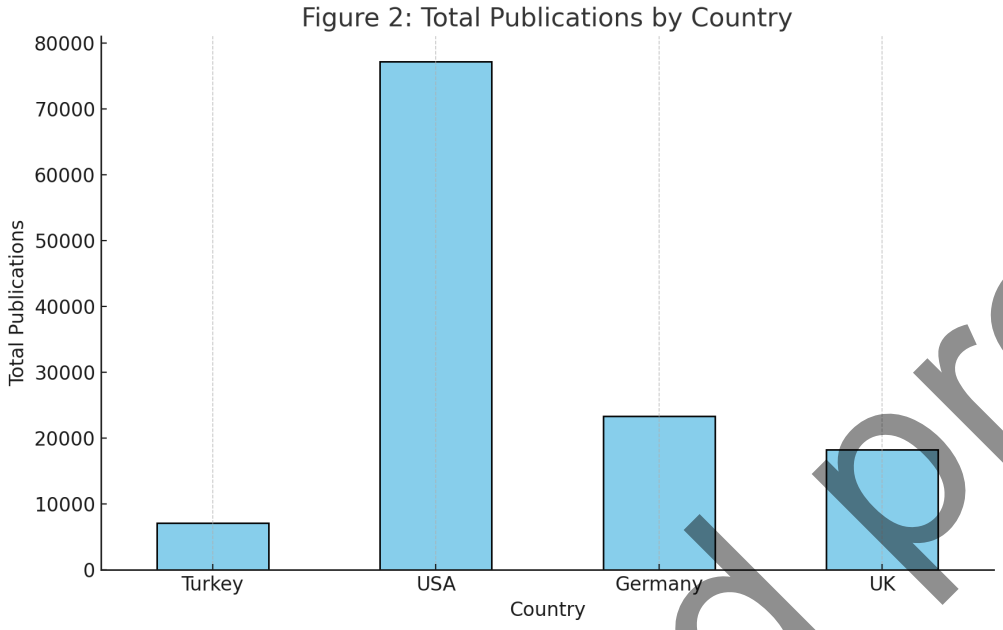

Figure 2: Total Publications by Country - Generated based on study data.

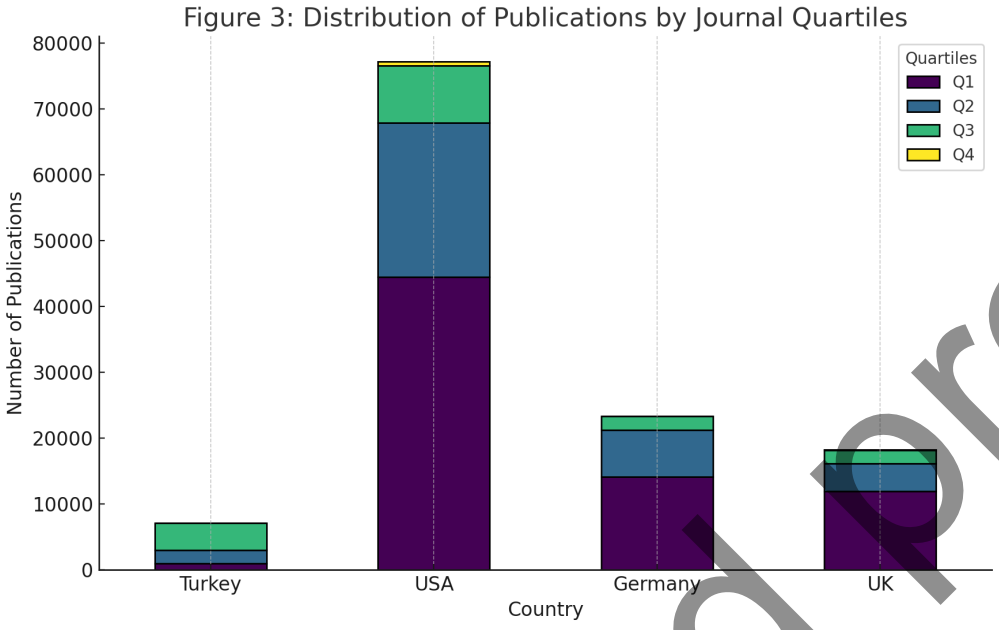

Figure 3: Distribution of Publications by Journal Quartiles - Generated based on study data.

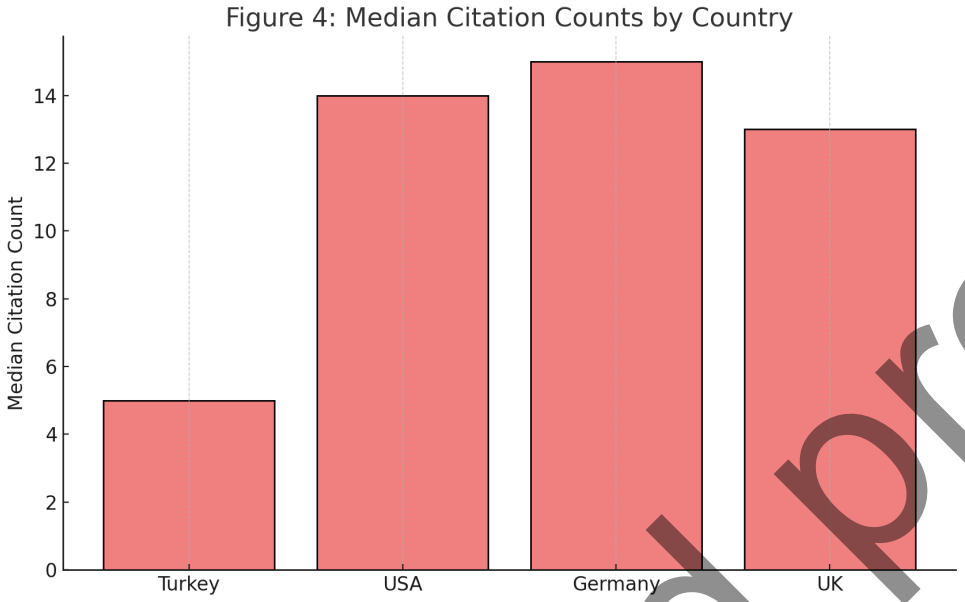

Figure 4: Median Citation Counts by Country - Generated based on study data.

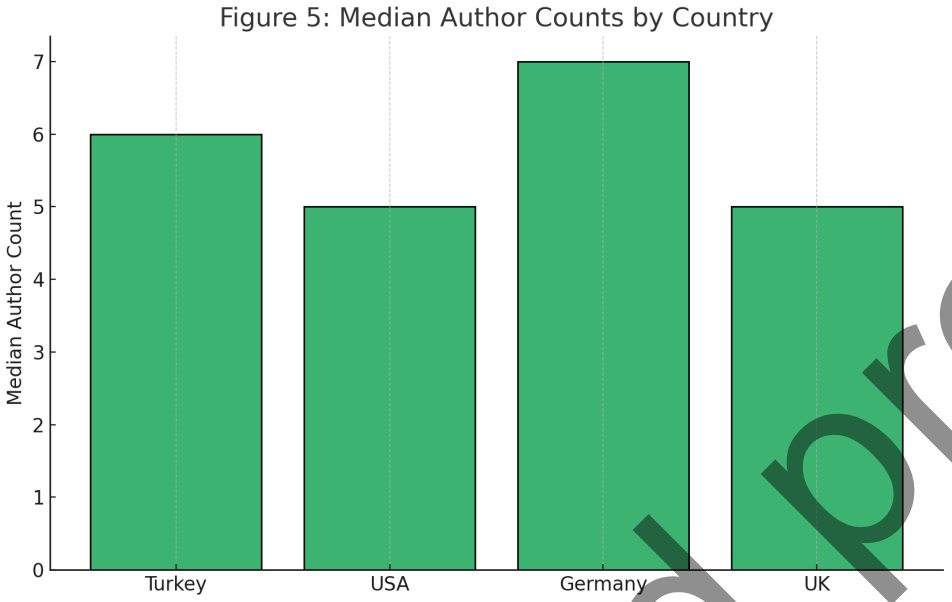

Figure 5: Median Author Counts by Country - Generated based on study data.