Bibliometric Analysis of Studies on Mean Platelet Volume (MPV) in the Web of Science Database

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Abstract

Background: Mean platelet volume (MPV) was investigated by many medical disciplines for different disease groups. But, the use of MPV values in clinical practice is limited. In this study, it is aimed to make a bibliometric analysis of studies on MPV over the Web of Science database and also to reveal Turkey's contribution to this issue.

Materials and methods: This bibliometric analysis was performed in June 2021 as a result of a search for mean platelet volume (MPV) in all indexes in the Web of Science (WOS) database.

Results: The most of the MPV studies in the world were conducted on hematology (1256, 18.9%), general internal medicine (746, 11.2%), peripheral vascular diseases (579, 8.7%), cardiology/cardiovascular system diseases (537, 8%), experimental medicine research departments (376, 5.6%), and surgical sciences (342, 5.1%) in the fields of science/subject. The rank of emergency medicine is 64 (0.9%) in the world and 41 (2.1%) in Turkey. 17 of the 25 authors who published the most were Turkish.

Conclusion: In many studies, when the standard deviations are taken into account, the difference between the groups cannot be seen mathematically, even if they are statistically different. Therefore, the use of MPV values in clinical practice is limited. However, these studies suggest that academic promotion is aimed rather than contributing to the scientific literature.

Keywords: Mean Platelet volume, emergency medicine, Turkey, academic promotion

Introduction

Mean platelet volume (MPV) is a simple and cheap test that is calculated as part of a complete blood count and measures the mean size of platelets. High MPV levels indicates increased platelet activation, the number of large platelet and platelet hyperaggregability. Also high level of MPV indicates that larger and younger platelets are released into the circulation, as it increases when there is rapid platelet consumption. When level of MPV is low, platelets are usually smaller. [1]

MPV is a value similar to Mean corpuscular volume (MCV) for red blood cells and is expressed as femtoliter (fL).[1,2] MPV measurements are made in two ways. First one, with the measurement of platelet volume using optical technology, second one, it is determined by the geometric mean of the converted logarithmic normal platelet volume data in impedance technology systems. Therefore, the MPV value is an indicator that can change according to the type of instrument used and the measurement technique and does not have international standardization.[2] For example, while the normal MPV value was determined as 6-13.2 (fL) in an adult with a normal platelet count by impedance technology; 5.6-12.1 (fL) range may be normal when measured by optical methods. Therefore, the reference range of the laboratory that uses a specific hematological device should be checked.[2]

The bibliometric analysis method is carried out in order to present a scientific road map to all researchers who are interested in any subject, and thus to gain a macroscopic and holistic perspective on the subject.[3] Web of Science (formerly Web of Knowledge) is a website that provides subscription access to multiple databases that provide comprehensive citation data for many different academic disciplines.[4] When this database was searched, it was seen that the relationship of MPV was investigated by many medical disciplines for different disease groups. In this study, it is aimed to make a bibliometric analysis of studies on MPV over the Web of Science database and also to reveal Turkey's contribution to this issue.

Materials and Methods

Study Design:

The study was a retrospective observational study that did not include human subjects and therefore ethics committee approval was not required.

Process:

This bibliometric analysis was performed in June 2021 as a result of a search for mean platelet volume (MPV) in all indexes in the Web of Science (WOS) database accessed. 'Mean platelet volume' was written in the topic section and a search was made in the WOS. "Web of Science Categories: (All); Document Types: (All); Languages: (English); Timespan: (All); Indexes: (All)". A total of 6638 studies belonging to before and after 1997 were detected. As a result of this search, the number of publications (according to science/subject area, years, types and countries), WOS indexes (SCIE, SSCI, ESCI, Other), "H Index" of subjects, universities that contribute the most in Turkey and analysis of the data of top 25 authors who published extensively was performed.

Statistical Analysis:

Data are presented as the number and/or percentage of publications.

Results

As a result of the analysis, the total number of publications, WOS index distribution and H Index numbers are given in Table 1.

Table 1: Descriptive Data

PARAMETER	All World (n)	Turkey (n)
Total Number of Publications	6638	1880
WOS Index		
SCIE	5978	1595
SSCI	88	27
ESCI	620	279
Other	338	66
Subject H Index	123	52

The most of the MPV studies in the world were conducted on hematology (1256, 18.9%), general internal medicine (746, 11.2%), peripheral vascular diseases (579, 8.7%), cardiology/cardiovascular system diseases (537, 8%), experimental medicine research departments (376, 5.6%), and surgical sciences (342, 5.1%) in the fields of science/subject. In Turkey, the most of the MPV studies were conducted on internal medicine (393, 20.9%), cardiology/cardiovascular diseases (350, 18.6%), hematology (215, 11.4%), experimental medicine research department (120, 6.3%), pediatrics (97, 5.1%), and surgical sciences (83, 4.4%) in science/subject areas. The rank of emergency medicine is 64 (0.9%) in the world and 41 (2.1%) in Turkey. Distribution of the number of publications by Science/Subject fields is given in Figure 1.

When we look at the distribution of the number of publications by years, there were no publications on MPV in Turkey before 1997. From 1997 to 2021, the number of publications related to MPV is gradually increasing. (The data were obtained in June 2021, because of that the data for 2021 do not show the whole year.) It was seen the highest number of publication in 2020 (661, 9.9%) in the world, and
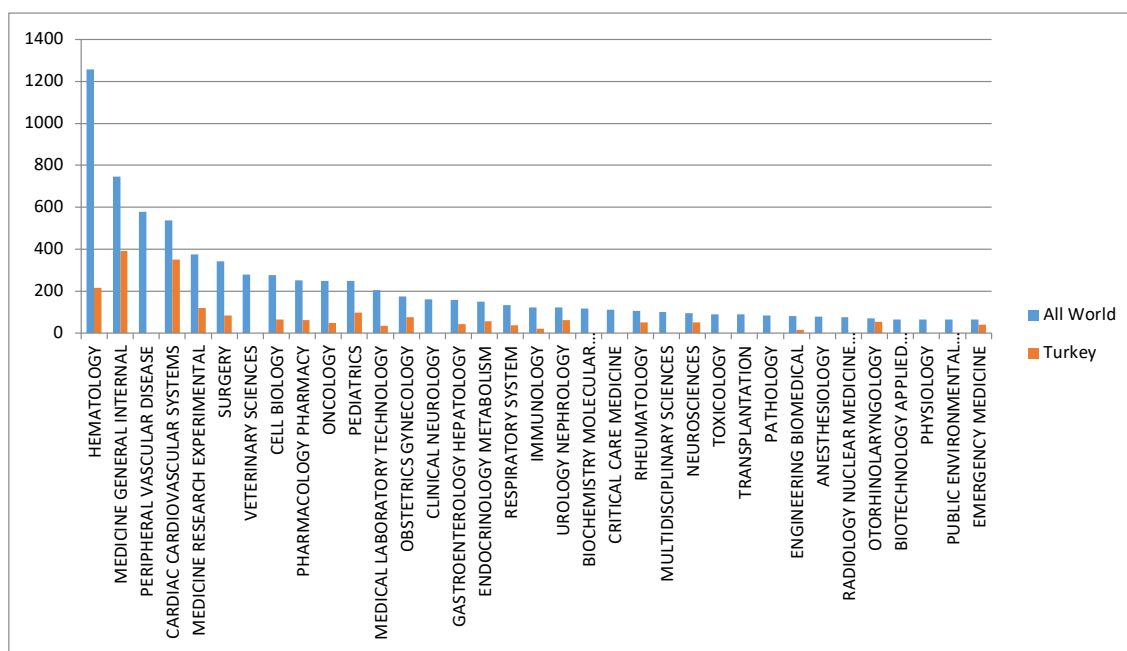

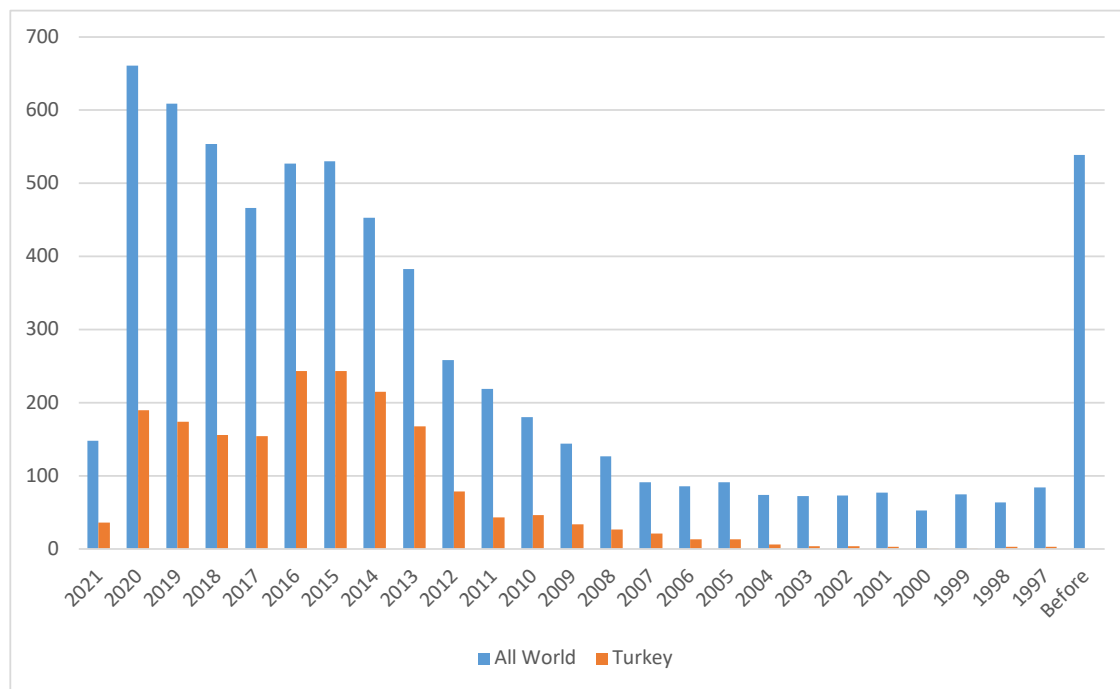**Figure 1:** Distribution of MPV publications by Science/Subject areas

Figure 2: Distribution of MPV publications by years

in Turkey in 2015 and 2016 (243, 12.9%). Distribution of MPV publications by years is given in Figure 2.

When the types of MPV studies are examined, it has been determined that the most of publications were original articles, letters to the editor and meeting summary presentations are made both in the world and in Turkey. The number and percentages of publications by type are given in Table 2.

Looking at the distribution of MPV studies by country, the highest numbers were observed for Turkey (1880,

28.3%), USA (1033, 15.5%), China (644, 9.7%), Italy (346, 5.2%) and England (306, 4.6%). The number of MPV studies by country is given in Figure 3.

Looking at the top 25 authors who make the most publications in the world about MPV; the first six authors were Turkish. At the same time, it was determined that 17 of the 25 authors who published the most were Turkish. The other authors of the top 25 were from Italy, China, South Korea and England. MPV studies in Turkey were mostly performed at Süleyman Demirel University (109, 5.7%), Gülhane Medicine Academy (91, 4.8%), Health Sciences University (87, 4.6%), Dicle University (63, 3.3%) and Erciyes University (54, 2.8%) (Table 3).

Discussion

Mean platelet volume, a measure of platelet size and activation, has been associated with various diseases in recent studies.[5,6] It has been found that MPV increases in some of these diseases and decreases in some cases.[5] Bone marrow failure, severe anemia, cancers, splenomegaly, inflammatory and autoimmune diseases can cause low MPV levels. However, high MPV levels can be seen in conditions such as heart diseases, diabetes, thrombocytopenia, myeloproliferative diseases, and preeclampsia.[7]

Increased MPV was observed in many clinical conditions. It is an independent high risk factor for death in patients after an acute ischemic cardiac event[8], it is associated with a higher risk of death for a long time after

Table 2: Number and percentage of MPV publications

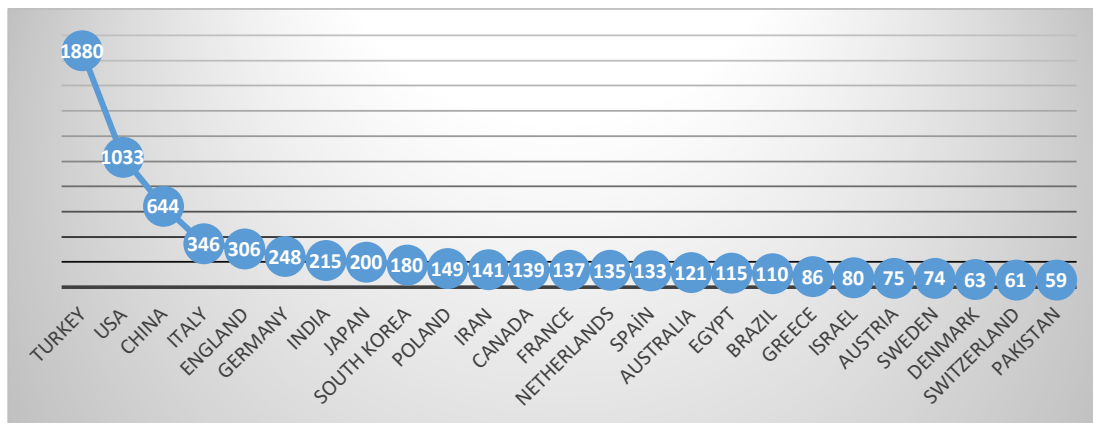|	All World		Turkey	
	n	**%**	**n**	**%**
ARTICLE	5521	83.17	1492	79.3
LETTER	413	6.22	269	14.30
MEETING ABSTRACT	350	5.27	98	5.21
REVIEW	249	3.75	27	1.43
PROCEEDINGS PAPER	143	2.15	12	0.63
EARLY ACCESS	64	0.96	9	0.47
EDITORIAL MATERIAL	45	0.67	6	0.31
NOTE	27	0.40	1	0.05
BOOK CHAPTER	10	0.15	1	0.05
CORRECTION	10	0.15	-	-
DATA PAPER	3	0.04	-	-
RETRACTED PUBLICATION	3	0.04	-	-
RETRACTION	2	0.03	-	-

Figure 3: Number of MPV publications by country

Table 3: The top 25 authors in the world

Name	Number of Publications (n)	(%)	H Index	Department	Country
VAROL E	81	1.22	22	Cardiology	Turkey
BEYAN C	62	0.93	11	Hematology	Turkey
BEYAN E	54	0.81	8	Internal Medicine	Turkey
BALTA S	41	0.61	26	Cardiology	Turkey
OZAYDIN M	38	0.57	27	Cardiology	Turkey
DEMIRKOL S	36	0.54	26	Cardiology	Turkey
LIPPI G	32	0.48	70	Biochemistry	Italy
DOGAN A	31	0.46	22	Cardiovascular surgery	Turkey
CELIK T	28	0.42	31	Cardiology	Turkey
WANG RT	28	0.42	26	Internal Medicine	China
SAHIN M	27	0.40	16	Endocrinology	Turkey
KAYA MG	25	0.37	28	Cardiology	Turkey
CHO SY	23	0.34	21	Infectious diseases	China
LI Y	22	0.33	14	Public Health	China
AKSOY F	21	0.31	13	Cardiology	Turkey
DEMIR M	21	0.31	13	Gastroenterology	Turkey
ZHANG Y	21	0.31	21	Gastroenterology	China
AKTAS G	20	0.30	13	Internal Medicine	Turkey
LEE HJ	20	0.30	16	Laboratory Medicine	China
MIKHAILIDIS DP	20	0.30	85	Biochemistry	England
UNLU M	20	0.30	21	Cardiology	Turkey
ZHANG J	20	0.30	18	Dermatology	China
COBAN E	19	0.28	18	Internal Medicine	Turkey
ICLI A	19	0.28	15	Cardiology	Turkey
CAYLI M	18	0.27	21	Cardiology	Turkey

transdermal cardiac intervention[9], it is associated with the risk of acute stroke[10], it is associated with the intensity of inflammation in tuberculosis[11], it is useful in determining the activity of Crohn's disease and distinguishing these patients from healthy individuals[12,13], it is responsible for the increased risk of diabetes and poor outcomes[14], the preoperative level is quite high in primary gastric cancer patients compared to healthy subjects.[15] Also, it is associated with tumor growth in patients with papillary thyroid cancer.[6] Decreased MPV was observed in increased activity of ulcerative colitis[17], active SLE in adult patients[18]. It is as an independent prognostic factor of survival of patients after intestinal tumor resection[19], as a useful marker in differentiating patients with neuroendocrine tumor of the pancreas from pancreatic adenocarcinoma.[20] In lung cancer, there are studies showing that low preoperative level is an independent negative prognostic factor in patients after total cancer resection[21], and that it is independently associated with the presence of cervical cancer.[22]

MPV, a routine and cheap test performed during complete blood counting, can provide important information about the course and prognosis of many inflammatory conditions. However, for the practical use of MPV, clinical laboratories should strive for standardization of both the preanalytical and analytical phases.[5] Although many studies are published every year that it is associated with many diseases, the measurement of MPV is still not well standardized. The standard technique that needs to be defined should include all the details of MPV to be measured at which optimal temperature, which anticoagulants should be used, how long after blood collection and with which technique.[23,24] For now, MPV should not be used to show active or severe states of diseases or as a mortality predictor until measurement techniques are standardized.[23]

In our study, it has been observed that thousands of MPV studies have been conducted in different diseases and medical disciplines, most of which are original articles and SCIE, especially in the last 10 years. MPV studies were performed on the fields of hematology and general internal medicine in the world, and general internal medicine and cardiology in Turkey. It has been determined that most of the MPV studies are from Turkey (n=1880) and the first 6 of the 25 authors (17 of whom are Turkish) who publish the most are Turkish researchers.

Limitation

Studies that were not indexed in the Web of Science database were not included in the study.

Conclusion

Although studies have been conducted in many medical disciplines and diseases related to MPV, it has been determined that it is not used as a definitive diagnostic criterion in clinical practice, but creates supportive predictions. In many studies, when the standard deviations are taken into account, the difference between the groups cannot be seen mathematically, even if they are statistically different. Therefore, the use of MPV values in clinical practice is limited. In addition, it will be interesting to determine the 'MPV threshold', which indicates the intensity of the inflammatory process, the presence of the disease, the increased risk of developing the disease, the increased risk of thrombotic complications, the increased risk of death and the presence of the disease, and more studies are needed on this subject.

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