

# Analysis of Nuclear Medicine Research using Web of Science Database: A Global Perspective

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## Abstract

The study aimed to assess the Nuclear Medicine research output from 1991 to 2020. Totally 12632 data were mainly collected from the web of science database. These data were downloaded and analyzed by using MS Excel as per the objective of the study. The researcher has been done to discover the development and properties of large data output is the global level. The year-wise distribution of Nuclear Medicine research. The study revealed the year 2020 occupied the first position with 771 (6.10) records, followed by the year 2019 with 677(5.36) records compared to 1991 to 2020. Author-wise distribution of publication showed that Rubello, D occupied the first position with 81(0.64%) and Signore, A is the second position with 72 (0.57%) and others. In this study single author contributed 1776 (14.06) papers in this study. The relative growth rate and doubling time the growth of publications decreased trend, the corresponding doubling time was increased.

**Keywords:** Scientometrics; Nuclear Medicine; Web of Science; Authorship pattern; Relative Growth Rate and Doubling Time.

## INTRODUCTION

Scientometric analysis in research centers and universities should be considered for different reasons. The main purpose of scientometric

studies is to become aware of an existing situation, to compare the different subject areas and universities, and to improve the academic ranking of universities and institutions Identifying top scientists, institutions, universities and other factors related to publications can help make better academic communications and cooperation's possible. Since scientific communication acts as a key role in achieving new insights, measurement and valuation of scientific publications have always attracted the attention of scientometric experts. Scientometric is a quantitative statistical analysis of scientific documents based on four main variables: authors, citations, references, and publications. Scientometrics is the interdisciplinary knowledge that reviews the widescope of fields

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in multi-dimensional quantitative research. Quantitative evaluation of scientific activities is an important factor for the development and can help Policymakers to provide more solutions to research problems.

Nuclear medicine is a branch of medicine in which patients are given radioactive substances (to be taken internally) either to diagnose or to treat a disease. This differs from traditional radiology and radiotherapy techniques, where radiation is normally applied from an external source. Nuclear medicine has become quite widespread since its inception in the 1950s, and nuclear medicine departments can be found in most medium and large hospitals. A common use of nuclear medicine therapy is in the treatment of thyroid cancer. Nuclear medicine is more frequently used in the diagnosis of disease.

## REVIEW OF LITERATURE

Vijayakumar, Sivasubramaniyan, and Rao (2019) carried out the "Bibliometrics analysis of the Indian Journal of Nuclear medicine during the period 2014-2018". The data came from the Scopus bibliographic data base for the study. The main objectives of the study are authorship patterns, the most prolific authors, most productive countries. They reported 513 papers published in the study period. 2017 was the most productive year, with 114 (22.22%) publications. The highest citation was received in the year 2014 with 195 (36.25%). The high frequented keywords are "Human" which is the topper with 434 (84.60%) publications. The most productive journal in India with 388 (75.63%) publications.

*Mini Devi (2015)* initiated a study entitled "Scientometrics analysis of the growth of literature in Nuclear Medicine". The data were retrieved from the Web of Science database core collection provided by Thomson Reuters from 1999 to 2014. Some aim was used in this study, such as relative growth rate, doubling time, growth of publications, and exponential growth of publications. This study may cover medical policymakers to facilitate researcher-friendly infrastructure and other essential supporting facilities.

*Venkatesan and Thanuskodi (2014)* observed nuclear power generation research seen through

Scopus research from 1980 to 2012 retrieved from the Scopus data base. A total of 9512 papers were published in nuclear power Generation research. The study aims to analyze the Year-wise growth of publications, country-wise distribution, subject-wise, highly cited papers, and institution-wise distribution, etc. The result of the study observed the highest number of papers was published in the year 2008 and it was 745. The most productive author was identified as Anon with 116 articles published. In the most productive countries, the USA has the first position with 24% publications. This study revealed that the contribution of nuclear power generation research is gradually rising.

*Gupta (2012)* carried out hereditary blood disorder research during 2002-2011. The data came from the Scopus data base for the study. The study results showed that Hemophilia is the most productive journal. 2010 is the most productive journal with 123 publications. The study concluded that the Indian government has already taken some steps in this direction, but they are not adequate to take care of all patients associated with hereditary blood disorders in India.

## OBJECTIVE OF THE STUDY

- a. To analyze the growth of publication of nuclear medicine research output during the year 1991-2020 and find the annual growth rate of publications in nuclear medicine research;
- b. To find out the Relative Growth Rate (RGR) and Doubling Time (Dt) of year-wise distribution and
- c. To identify the author Vs Publications in nuclear medicine research.

## METHODOLOGY

This study has been assumed with the purpose of finding the Nuclear Medicine research in scientometrics. It also focuses on the past area of Nuclear Medicine publications in scientometrics based on the sample data. In this study, data were downloaded from the Web of Science database. The study period was from 1991-2020. A total of 12632 records were downloaded and analyzed by using MS office Excel 2010 format using.

## DATA ANALYSIS



Fig. 1: Growth of Publications in Nuclear Medicine.

Figure 1 reveals that from 1991 to 2020, 12,632 publications were published on Nuclear Medicine research. The highest number of publications is 771 published in 2020. The lowest publications of 170 were published in 1992. But it is seen in the table that there is an increasing trend of growth literature in the study period.

### Annual Growth Rate of Nuclear Medicine Publications

Annual Growth Rate (AGR) of Nuclear Medicine

research publications during the study period. Annual growth rate denotes the percentage change of a particular variable viz., publications within a specific period in a context.

The Annual Growth Rate (AGR) was calculated using the formula:

$$AGR = \frac{\text{Endvalue} - \text{Firstvalue}}{\text{Firstvalue}} * 100$$

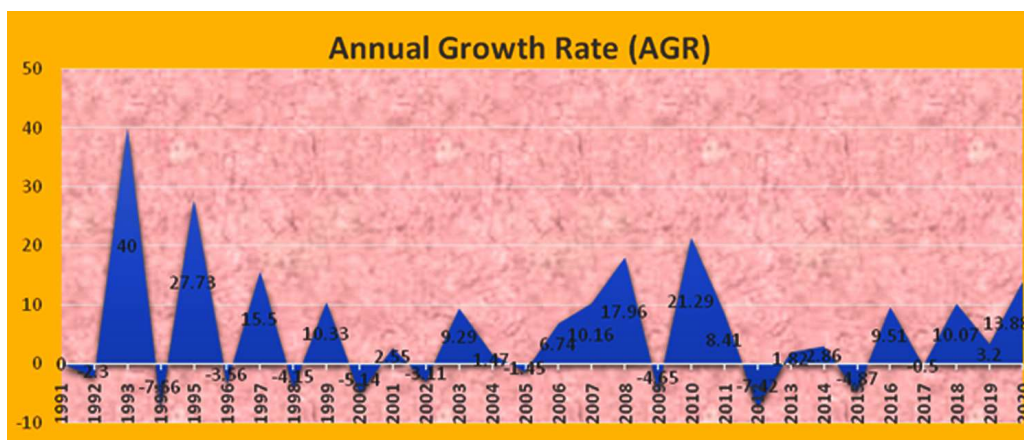


Fig. 2: Annual Growth Rate of Publications.

Figure-2 shows that the annual growth rate of the calculated total output of the annual publication ranges from -2.30 to 13.88 over the 1991-2020 study period. The annual growth rate was 40.00 in 1993, which increased and decreased to -7.56 in 1994.

Since then, there has been variation over the next year as illustrated in Figure 2. there is on for the fluctuation is that there is no stable growth of output every year.

## RELATIVE GROWTH RATE AND DOUBLING TIME

The analysis of the growth of the nuclear medical research publication is one of the essential aspects of this discussion. This analysis aims to identify the development of present research trends and opportunities. However, the explosion of the Nuclear Medicine literature has made it very difficult for scientists to keep up with the latest developments in their fields. Therefore, the main

responsibility of librarians is to provide information seekers to meet the information needs of scientists in various fields. Published literature is taken as a measure of knowledge in a field, and the growth of nuclear medical literature is determined by calculating relative growth rates and doubling the time for publications. In the research format, the details of this model were illustrated. The table predicts the comparative growth rate and doubling time of volume years for the total research output of nuclear medicine..

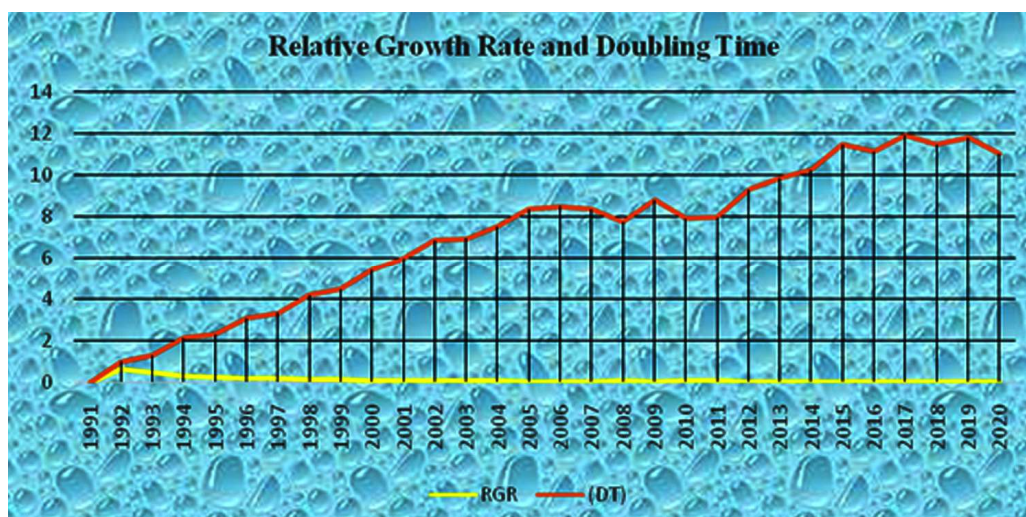


Fig. 3: Relative Growth Rate and Doubling Time.

Figure-3 denoted the Relative Growth Rate (RGR) of Nuclear Medicine research for the study period. The Relative Growth Rate and Doubling Time of publications were given in the above table. It can be seen that the relative Growth Rate of publication decreased from the rate of 0.68 in 1992 to 0.06 in the year 2020. The mean relative growth for the first ten years (i.e. 1991 to 2000) showed a growth rate of 0.272 whereas the mean relative growth rate for the second ten years (i.e.2001 to 2010) decreased to 0.091 and last ten years (i.e. 2011 to 2020) decreased

to 0.066. The corresponding Doubling Time between different years gradually increased from 1.02 in 1992 to 2015. In the last seven years, there is no constant growth of output. The mean Doubling Time's first Ten years (i.e. 1991 to 2000) was only 2.73 which increased to 7.689 next ten years (i.e. 2001 to2010) and the last ten years increased 10.60 (i.e. 2011 to 2020). Thus, as the rate of growth of publication decreased trend, the corresponding Doubling Time was increased.

## AUTHORSHIP PATTERN OF NUCLEAR MEDICINE RESEARCH

The Authorship Pattern Vs Number of Publications revealed that the Authorship Pattern in Nuclear Medicine literature fluctuates from single-authored publications to 78 authored publications during the study period 1991-2020. As per the analysis of the table, the highest number of research output by single-authored was 1776 (14.06%) contributions followed by double authored contributions was

1651 (13.07%) and three authored contributions were 1590 (12.59%). The largest collection had been designed by publications with single-authored to six authored. It was also concluded that only one publication was contributed by 78 authors. It displays that collaborative research ruled over specific research in the study. There were some anonymous contributions found with 314 publications (2.49%) in the authorship pattern of Nuclear Medicine Research.

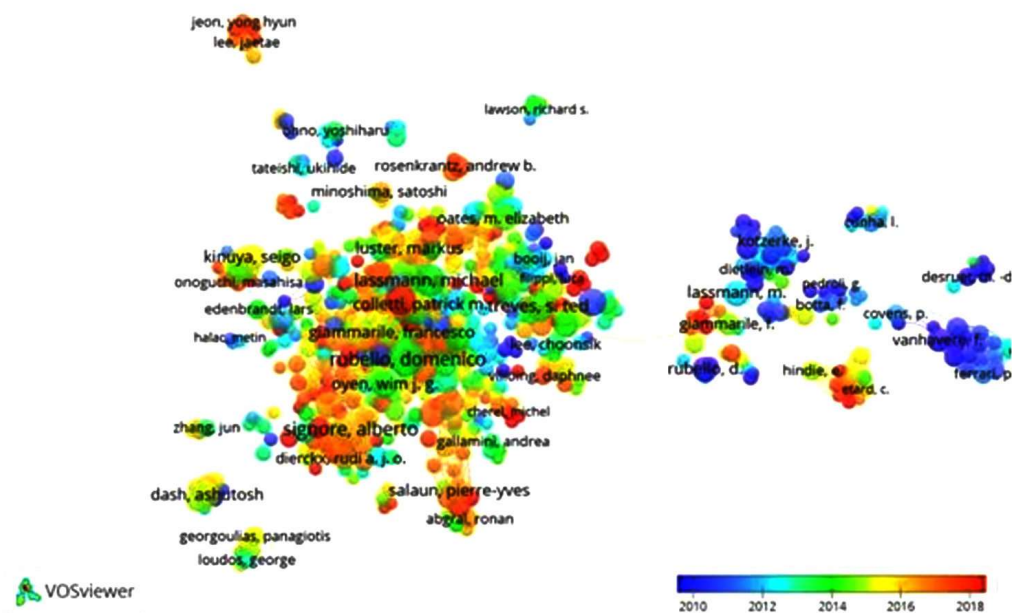


Fig.4: Authors Vs Publications in Nuclear Medicine Research.

Figure 4 was concerned with Authors Vs Number of Publications. There were 61819 authors of nuclear medical literature for the study period from 1991 to 2020. In place of the authors, only 50 authors were considered and listed in the table. Rubello, D of Hospital Santa Maria Della Misericordia from Italy became the topper amongst all the authors. He published 81 (0.64%), followed by the H-Index value of 25, Signore, A from Italy's published 72 (0.57%) and the h-index value is 23 and Lassmann, M from Germany become the third topper with 64 publications (0.51) and the h-index is 26, respectively. It was also noted that most of the authors belonged to European countries.

## CONCLUSION

The results bring in by a scientometric study are of practical value to researchers and planners in the management of research actions in the discipline and from the point of view of nuclear medicine, this study may lay concrete on the way for medical policymakers to facilitate a research-friendly atmosphere by providing more money, infrastructure and other essential supporting facilities that improves and enhances the research being conducted in the field.

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