
**The Big Data Analysis of the Research Contributions of
Egyptian Physicians, Indexed in "PubMed": from 1847–2023
as a Model of " Bibliometric Study"**

Part 1: October 2022–May 2023

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Abstract:

As the participation of intellectual production for international physicians, and other medical related scientists and specialists, provided into medical intellectual production, also the Egyptian Physicians contributed into this production since 1847 until now, Based on “PubMed”, one of the biggest databases in medical sciences.

Scope of this big data bibliometric study, is to analyze the patterns of these participations, based on: subjects, type of information materials, publishing data, journal titles, etc., We are planning to publish results of the whole 115 thousand contributions.

This study aims to provide a real picture of the share of Egyptian physicians in the universal intellectual production, after more than 150 years of the ongoing participations.

Method of research: we used the bibliographic and bibliometric research method in this research, as our method by analyzing all the Egyptian intellectual production of Egyptian physicians, in “PubMed”.

Scope: analyzing all Egyptian contributions, in “PubMed”, with all languages, publishing data, medical specialties, and all the published, from October 2022 to May 2023 (Part 1).

Results: The study produced a series of findings, the most important of which were:

The published research contributions of Egyptian Physicians in PubMed during the study period amounted to 10 thousand research, while the main topics of research exceeded 36 thousand topics. The number of authors reached about 40 thousand, of whom there were about 36 thousand Egyptians, while the number of other nationalities participating in scientific papers, reached about 4 thousand.

The journal titled “Scientific Reports” came as the most periodical, where Egyptian researchers published their researches.

England was at the forefront of publishing countries.

Keywords: Bibliometric analysis, big data, Egyptian physicians, PubMed publications, Research contribution.

1/1Introduction:

Scientific research and research contributions are a real measure of the extent of development in science.

Scientific research is one of the most important functions of universities and research institutions, but it is the main reason for their upbringing, survival.

Universities around the world are seeking to raise the rates of scientific publishing of researchers, with a significant return on the ranking of universities and research bodies in international classifications and a positive impact on their academic and research reputation, Researchers seek to obtain degrees and promotion in

their fields or for the purpose of specializing in precise fields, all of which are achieved through research contributions and sober scientific publications, The medical field is one of the most important areas that should be highlighted and most influential because of its serious contributions and repercussions on public health. We cannot lose sight of this great role of scientific research, in the medical field and related fields, Egypt's health care concept extends to the provision of diagnostic, therapeutic and rehabilitation services, the concept of maintaining public health within the framework of human development. Health care is based on specific bases, the most important of which are: the availability of health care to citizens in close proximity to their living and working places; the availability of certain quality; the citizen's ability to access it; and the affordability of its income. The most important features and indicators of health policy in the 2014 Constitution (Egypt Constitute, 2014) include increased attention to applied scientific research to benefit from its results in the development of the health service, such as: Health systems research, applied research and process research to identify and analyze service performance problems, select the most appropriate solutions and assess their efficiency and effectiveness.

Indicators on the health sector in Egypt:

Egypt's health system is one of the complex systems where health service providers are multiple, as well as multiple sources of funding, management and service.

The latest statistics of the Egyptian Cabinet, Information and Decision Support Centre indicate that the total public expenditure on the health sector by the 2021/2022 budget was about 108.8

billion pounds, with an increase of 15.3 billion Egyptian pounds. (approximately 16%) for the allocation of the health sector in the fiscal year 2020/2021 which amounted to about 93.5 billion pounds (Zahran, 2021)

Many indicators indicate the development of medical research in Egypt, where the National Authority for Quality Assurance and Accreditation in Egypt has obtained World Federation of Medical Education (WFME) as the first accreditation authority to receive this recognition in the Middle East, Africa and Arab States, which means the recognition of all faculties approved by NAQAAE in Egypt (The *National Authority for Quality Assurance and Accreditation*, 2019)

Egyptian educational institutions have obtained advanced positions in the British Times classification by impact ranking for this year 2023, as well as the QS classification for science sectors for 2023, and the Shanghai classification (*Shanghai Ranking*, 2022) for 2022, noting the inclusion of 37 Egyptian universities for 2023 by the Times; The inclusion of 34 Egyptian universities in the third target on good health in the classification as well as the inclusion of 32 Egyptian universities in the fourth goal of quality education in general in the sector of medical sciences, 25 Egyptian universities have obtained advanced positions in this classification At the level of QS classification of scientific disciplines for the year 2023, the classification saw the emergence of Egyptian universities in 33 of 54 subdisciplines and 9 universities were included in the medical sciences sector, where Cairo University achieved the Center (151–200) globally, followed by Ain Shams University (251–300), followed by Alexandria University (301–350), Mansoura University

(351–400), and Assiut University (401–450) (*QS World University Rankings, 2023*)

In the field of pharmacy and pharmacology, Cairo University led Egyptian universities, ranked 85 internationally, followed by Ain Shams and Alexandria Universities in 151–200 globally, and Mansoura University (201–250) globally, followed by Assiut and Beni Suef Universities in 301–350 globally according to the QS 2023 classification (*QS World University Rankings by Subject: pharmacy–pharmacology, 2023*)

These global classifications are based in the ranking of countries with advanced classification positions on several indicators, including the Scientific Research Index and the Reference Citation of published research for researchers of academic bodies and institutions and other indicators that rely on the maintenance of scientific research in the medical and other fields. The previous results of the classifications correspond to the large number of research in the current field of study, which reflects the veracity and interpretation of the results.

1/2 Study problem and questions:

Despite the importance of the topic of international intellectual production of Egyptian physicians, available in one of the most important medical database PubMed, this production did not get the attention of Arab studies analyzing intellectual productions, however, this production did not receive the attention of Arab studies analyzing intellectual production This topic has not been addressed by researchers despite the immense intellectual production of Egyptian physicians at the PubMed base and the importance of such production for its recognition and the most

important authors and institutions responsible for its dissemination and quality.

The study attempts to answer the following questions:

- 1- The amount of intellectual production of Egyptian physicians available in PubMed database?
- 2- What are the most widely published periodicals and countries for the research contributions of Egyptian physicians.
- 3- What publishing languages are the most commonly used by Egyptian physicians to disseminate intellectual production available in the PubMed database?
- 4- What are the main topics of research published for Egyptian physicians and indexed in the PubMed database?
- 5- What type of research contributions, for the Egyptian physicians in PubMed?
- 6- What are the most widely disseminated Affiliations for the research contributions of Egyptian physicians exposed in the PubMed database?
- 7- Who are the most widely physicians authored this intellectual production in the medical field published in the PubMed database?

1/3 Objectives of the study :

The study seeks to analyze the research contributions of Egyptian Physicians to the PubMed database over a period from October 2022–May 2023, and to learn about its main topics, specializations and main languages of publication, the research institutions to which the researchers belong, and the most widely published scientific periodicals of Egyptian physicians' research.

1/4 Materials and Methodology

The study relies on both bibliometric research method, the content analysis research method to recognize the intellectual production of Egyptian physicians detected in the PubMed database to produce numerical and qualitative indicators about this scientific production.

1/5 Data Collection

-The researchers relies on direct research of the PubMed database to identify the diverse study requirements and the Excel program was used to make tables and statistics for the study.

1/6 Study terminology:

PubMed: biomedical and life sciences journal literature, maintained at the U.S. National Institutes of Health's National Library of Medicine (NIH/NLM). Initiated in February 2000, the repository was developed and is managed by NLM” National Center for Biotechnology Information” (NCBI).

Big data analytics: is the use of advanced analytic techniques against very large, diverse big data sets that include structured, semi-structured and unstructured data, from different sources, and in different sizes from terabytes to zettabyte big data can be defined as data sets whose size or type is beyond the ability of traditional relational databases to capture, manage and process the data with low latency. Characteristics of big data include high volume, high velocity and high variety.

1/7 Review of Literature

Research was conducted to access studies relevant to the current study using the keywords "research contributions", "Egyptian physicians", "PubMed database" In the following data observatories:

– Ovid, Wiley online library, Oxford journals, Lww Total Access Collection with Neurology, Evidence Based Medicine Reviews, Medline DATE 1946

–Magazines and bibliographic evidence of Arab intellectual production in the field of libraries and information in different editions)

–In addition to the Dar al- Al-Mandumah,2023 database and the unified catalogue

–Egyptian University's online libraries, (2023).

The researchers found no study on the subject of searching for: Research contributions of Egyptian physicians, indexed to "PubMed" from the point of view of library science and information, However, there are four studies on the topic of the study, such as:

1- al-Masri ,1982) The study dealt with all 26 thousand medical articles published by Arab and Egyptian physicians, from 1873–1982.

2- This is a bibliometric analysis study, and also a reference citation study as for the second study made by (El-Berry, 2015) the study aimed to quantitatively analyze and compare the research publications, PubMed-indexed journals. According to their contributions to the total productivity, the 15 Egyptian faculties were ranked as follow; Cairo on the top followed by Assiut, Mansura, Zagazig, Cairo, Assiut and Mansura produced more than 52% of total publications, presented a progressive increase during the periods 2000–2004, 2005–2009 and 2010–2014. Most faculties have their publications with first author affiliated to them.

3- The third study made by (Shehata, Mahmoud, 2017) the study examines Egyptian publications and research collaboration in health sciences, using Thomson Reuters Incites over the period of 1980-2014. Egypt, in clinical, pre-clinical and health, the results of the study were 31 382, of which 27 693 articles were multi-authored, indicating a co-authorship ratio of 88, the Egypt's main partners were USA, Saudi Arabia, Germany, England and Japan. In addition, their colleagues in 166 countries during the period under study. These countries were grouped.

4- The fourth study made by (Uddin, Alharbi, 2023) The main objective of this study was to synthesize the progress, challenges and prospects of biomedical research in Saudi Arabia the search was performed by combining verified Medical Subject Heading (Mesh) terms: "biomedical research", "bibliometrics", "Saudi Arabia" The data collection was done from January to June 2022 by both author the Results of the study was: Out of 202 articles yielded from initial search, 13 articles met all of the inclusion criteria and were examined in details The outcome of analysis showed that with the augmentation of Research and Development (R&D) globalization in Saudi Arabia.

2 / 1 The study:

Part 1: October 2022-May 2023

The most important results of the study were presented only through the tables presented in the study, and Barcode was prepared at the end of the study with the full tables, where the study cannot present the full tables as a result of the magnitude of the results magnitude of the study.

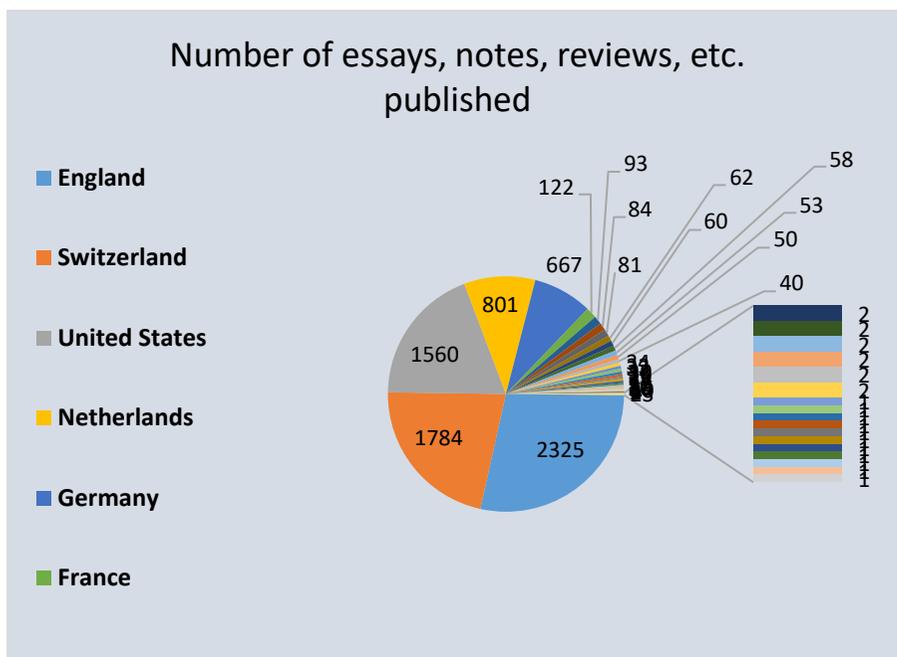
1- *Country of publication in this period in PubMed, as following:*

Table no. 1 (Country of publication in PubMed)

Country	Number of essays, notes, reviews, etc. published
England	2325
Switzerland	1784
United States	1560
Netherlands	801
Germany	667
France	122
India	93
New Zealand	84
Italy	81
United Arab Emirates	62
Egypt	60
Saudi Arabia	58
Korea (South)	53
Ireland	50
Japan	40
Canada	34
Poland	33
Brazil	32
Australia	30
Thailand	26
Iran	25
Spain	25
Denmark	23

Country	Number of essays, notes, reviews, etc. published
Scotland	22
Austria	20
Turkey	20
China	15
Treasure Island (FL)	10
Romania	6
Singapore	5
Bangladesh	4
Greece	4
Pakistan	4
China (Republic : 1949-)	2
Libya	2
Malaysia	2
Mexico	2
Norway	2
Oman	2
Qatar	2
Belgium	1
Bulgaria	1
Czech Republic	1
Ethiopia	1
Georgia (Republic)	1
Serbia	1
Slovakia	1

Country	Number of essays, notes, reviews, etc. published
Slovenia	1
South Africa	1
Sweden	1
Uganda	1



From the previous table we can see:

* 51 countries published the Egyptian’s contributions in PubMed.
 -The research contributions of Egyptian physicians in PubMed during the study period amounted to 10 thousand research, published in research and university institutions in 51 countries, foremost among which are research institutions in England with 2,325 research, due to the presence of the most prestigious and

high-quality medical institutions and universities in the medical field.

The University At the forefront of the research institutions that Egyptian researchers were keen to publish during the study period, Switzerland ranked second in the publishing countries for Egyptian physicians with 1784 research papers, perhaps due to the presence of many medical and technological institutions that occupy advanced positions in the international classifications such as ETH Zurich – Swiss Federal Institute of Technology, Swiss Federal Institute of Technology in Lausanne, University of Zurich and others, In the third ranking of publishing countries, the United States produced 1,560 research papers for Egyptian physicians. A large number of researchers were keen to publish them for their possession of universities and scientific institutions in various medical fields.

- United Arab Emirates came as the first Arab country, in ranking, to publish research contributions with 62 articles, and in the tenth place of publishing countries in general.

-Egyptian physicians are keen to publish in international periodicals regardless of the place of publication.

- Only one research paper, journals, books, etc., was published for each 11 countries such as Uganda, Sweden, South Africa, Slovenia that published the Egyptian's contributions.

2-Language of publications in this period, as following:

* English language was the only language used, to publish all contributions in this period in PubMed. This is the normal situation where English is the world's first publishing language in various fields Despite the diversity of topics and publications, all researchers

are keen to publish in English with their diverse scientific and research trends, this may be due to the dominance of American and European global research institutions in medical research fields despite rivalries from research institutions in Asia and from some other language-speaking countries.

3- Titles of journals and other information materials *in this period* in PubMed, *as following*:

Table no. 2 (Titles of journals, and other information materials in PubMed)

Titles	Number of essays, notes, reviews, etc. published
Sci Rep	389
Molecules	162
Environ Sci Pollut Res Int	146
Int J Biol Macromol	100
Heliyon	89
RSC Adv	83
Materials (Basel)	80
Life Sci	77
ACS Omega	66
Int J Mol Sci	64
Plants (Basel)	64
PLoS One	60
Polymers (Basel)	60
Sensors (Basel)	52
Pharmaceutics	51
Int Immunopharmacol	49

Titles	Number of essays, notes, reviews, etc. published
BMC Oral Health	46
Spectrochim Acta A Mol Biomol Spectrosc	45
Pharmaceuticals (Basel)	43
Inflammopharmacology	42
Chemosphere	41
Front Plant Sci	39
Biomed Pharmacother	38
Bioorg Chem	38
Food Chem	37
Vaccines (Basel)	37
BMC Chem	36
Diagnostics (Basel)	35
Int J Environ Res Public Health	34
Animals (Basel)	33
Front Vet Sci	33
Vector Borne Zoonotic Dis	1
Vet Anaesth Analg	1
Vet Med Int	1
Vet Rec	1
Vet Rec Open	1
Vet Res Forum	1
Vet Surg	1
Virchows Arch	1
Vox Sang	1

Titles	Number of essays, notes, reviews, etc. published
Water Air Soil Pollut	1
Water Res	1
Womens Health (Lond)	1
World J Cardiol	1
World J Clin Pediatr	1
World J Gastrointest Endosc	1
World J Gastrointest Surg	1
World J Oncol	1
World J Pediatr	1
World J Surg Oncol	1
World J Transplant	1
Wounds	1
Z Gesundh Wiss	1
Zhonghua Xin Xue Guan Bing Za Zhi	1
Zookeys	1
Zoonoses Public Health	1

MDPI. The International Society of Nucleosides, Nucleotides & Nucleic Acids (IS3NA), the Spanish Society of Medicinal Chemistry (SEQT) and the International Society of Heterocyclic Chemistry (ISHC) are affiliated with Molecules, Journal was founded 1996, Current Impact Factor is 4.6, This shows the desire of Egyptian researchers to publish scientific papers in this periodic. <https://www.mdpi.com/journal/molecules>

3- Environmental Science and Pollution Research, Environmental Science and Pollution Research (ESPR) serves the international community in all areas of Environmental Science and related subjects with emphasis on chemical compounds. It reports from a broad interdisciplinary outlook. Apart from the strictly scientific contributions as research articles.

4- International Journal of Biological Macromolecules is an international journal of research into chemical and biological aspects of all natural macromolecules. It presents the latest findings of studies on the molecular structure and properties of proteins, macromolecular carbohydrates, glycoproteins, proteoglycans, lignin's, biological poly-acids, and nucleic acids, The scope includes biological activities and interactions, molecular associations, chemical and biological modifications, Current Impact Factor is 8.2, This illustrates the interest of Egyptian physicians in publishing research contributions in this periodical.

<https://www.sciencedirect.com/journal/international-journal-of-biological-macromolecules>

5- Heliyon is an open access journal for all sciences, the Heliyon effect factor is 4.0 as of June 2023. Its thematic fields are medicine, dentistry, physics, astronomy, energy, neuroscience, environmental

sciences, materials science, chemical engineering, mathematics, chemistry, earth and planetary sciences, psychology, science and veterinary medicine, etc. 89 research contributions to Egyptian physicians published in this journal.

<https://www.sciencedirect.com/journal/heliyon>

6- RSC Advances is an online-only peer-reviewed scientific journal covering research on all aspects of the chemical sciences. It was established in 2011 and is published by the Royal Society of Chemistry, the 2022-2023 Journal's Impact factor IF of RSC Advances is 4.036, The Egyptian researchers published 83 research contributions.

<https://www.rsc.org>

7- Materials (Basel) is an international peer-reviewed, open access journal on materials science and engineering published semimonthly online by MDPI. The Portuguese Materials Society (SPM), Spanish Materials Society (SOCIEMAT) and Manufacturing Engineering Society (MES) are affiliated with Materials, the 2022-2023 Journal's Impact factor IF of Materials (Basel) is 3.4, The Egyptian researchers published 80 research contributions.

<https://www.mdpi.com/journal/materials>

8- Life Sciences is an international journal publishing articles that emphasize the molecular, cellular, and functional basis of therapy. and understanding of mechanism that is relevant to all aspects of human disease and translation to patients, the 2022-2023 Journal's Impact factor IF of Life Sciences is 6.1, The Egyptian researchers published 77 research contributions.

<https://www.sciencedirect.com/journal/life-sciences>

9- ACS Omega, is a global open-access journal for the publication of scientific articles that describe new findings in chemistry and interfacing areas of science , Indexed in: Web of Science-SCIE, Scopus, PubMed Central, CAS, Directory of Open Access Journals (DOAJ), and Sherpa Romeo, the Journal's Impact factor IF of ACS Omega is 4.132 The Egyptian researchers published 66 research contributions. <https://pubs.acs.org>

10- Zoonoses Public Health was the less frequent journal titles, and other titles, that published the Egyptian's contributions, started in the United States in 1963, Zoonoses and Public Health brings together veterinary and human health researchers and policy-makers by providing a venue for publishing integrated and global approaches to zoonoses and public health. It was established in 1963 as Zentralblatt für Veterinärmedizin Reihe B, which was one of the three sections formed by the split of the journal Zentralblatt für Veterinärmedizin. It was renamed Journal of Veterinary Medicine Series B: Infectious Diseases and Veterinary Public Health in 2000 and obtained its current name in 2007. It is published eight times per year by John Wiley & Sons and the editor-in-chief is Randall Singer (University of Minnesota). Zoonoses and Public Health offers authors the option to publish their articles Open Access: immediately free to read, download, and share. Impact factor of Zoonoses Public Health was 2.4 in (2022) Journal Citation Reports (Clarivate, 2023): 75/96 (Infectious Diseases (Science))29/143 (Veterinary Sciences (Science))

<https://onlinelibrary.wiley.com/journal/18632378>

4- Subjects of essays *in this period* in PubMed, *as following*:
Table no. 3 (Subjects of essays, research papers, etc. in PubMed)

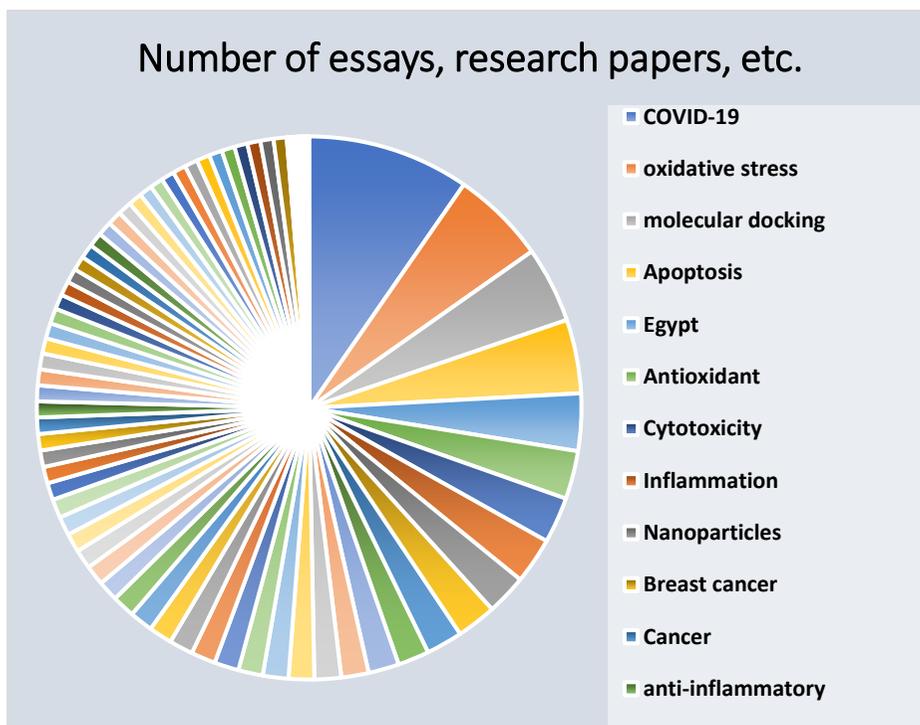
Subjects	Number of essays, research papers, etc.
COVID-19	285
oxidative stress	166
molecular docking	134
Apoptosis	130
Egypt	101
Antioxidant	85
Cytotoxicity	81
Inflammation	81
Nanoparticles	71
Breast cancer	70
Cancer	64
anti-inflammatory	55
Anticancer	54
Obesity	48
Children	47
Chitosan	45
Gene expression	45
Deep learning	43
Antimicrobial	43
hepatocellular carcinoma	43
Meta-analysis	42
Diabetes	41

Antibacterial	41
Histopathology	40
Silver Nanoparticles	36
Adsorption	35
Machine learning	34
Autophagy	33
Heavy metals	33
Vaccine	33
Antioxidants	30
Epidemiology	29
Drug delivery	29
Cisplatin	29
Growth	29
Depression	28
Immunity	28
Wound healing	28
Toxicity	28
Flavonoids	27
molecular dynamics	27
Systematic review	27
Diabetes mellitus	26
Diagnosis	25
antimicrobial resistance	25
antioxidant activity	25
Antibacterial activity	25
Alzheimer's disease	25

Multiple sclerosis	25
Survival	25
Antimicrobial activity	24
Antibiotic resistance	24
Docking	23
DFT	23
colorectal cancer	23
Immunohistochemistry	23
NF-Kb	23
Neuroinflammation	23
Mortality	23
Metabolomics	23
Neuroinflammation	23
Mortality	23
Metabolomics	23
Synthesis	23
site dependent absorption	1
small-scale fishery (SSF)	1
site-directed mutagenesis	1
smart cities	1
Site-specific target	1
smart grid	1
Sitophilus oryzae	1
smart home	1
Sitophilus zeamais	1

smart irrigation	1
Silica gel	1
Smart sensing	1
situation awareness (SA)	1
smart window	1
Siwa	1
smartphone application	1
Siwan traditional therapy	1
SME	1
Size	1
smectic stability	1
Size estimation	1
Silver phosphate	1
Size optimization	1
Sn/Mn–ZnFe (2)O(4)–CdFe (2)O(4)–Ag (3) PO (4) QDs	1
sjIA	1
Snail surveys	1
sjTRECc	1
SNAP II	1
Skeletal anomalies	1
SNARK	1
skeletal anteroposterior relations	1
SNEDDS	1
Skeletal deformities	1
SNHG3	1

skeletal muscle	1
SnO2 nanoparticles	1
Skeletal muscle atrophy	1
Skeletal patterns	1
sirtuin 1	1



From the previous table we can see:

*The main topics of research in PubMed was 36 thousand topics:
 1-Covid-19 was the most frequent subject pattern, that Egyptian's contributions were into, where the number of research papers and scientific research on this topic reached 285 scientific research, It is natural that the topic of Covid-19 will be ranked first in the interests of researchers in the world and in Egypt in the light of the

global crisis and the pandemic that has occupied the world's minds and the resulting unprecedented and intuitive health disasters in the light of the quest and the need of doctors to detect the causes of the epidemic and conduct experiments to come out with the appropriate treatment to stop the spread of this epidemic, The substantive term has been repeated 285 times.

2- Oxidative stress came in the second order of the most researched topics by Egyptian physicians, a normal situation given the great interest in this subject and the many pathological effects caused by oxidative stress, Oxidative stress leads to many pathophysiological conditions in the body. Some of these diseases include neurodegenerative diseases such as Parkinson's disease, Alzheimer's disease, genetic mutations, cancers, chronic fatigue syndrome, fragile X syndrome, cardiovascular disorders, atherosclerosis, heart failure, heart attacks and inflammatory diseases, the most prevalent disease in recent decades(Pizzino, 2017) Oxidative stress is a common disease at present and one of the most important factors that may lead to high levels of free seawards and stimulate oxidative stress:

Exposure to radiation of different types, such as X-rays, ultrasound, take certain types of medications, Ultraviolet overexposure, Exposure to different contaminants, Drink alcohol and use tobacco, Oxidative stress can be reduced by approaching a balanced lifestyle. Nutrition plays a critical role, and the best treatment against oxidative stress is antioxidants. Oxidative stress plays an important role in the pathogenesis of potentially severe conditions. In the long term, increasing the level of prooxidant factors can cause structural defects in mitochondrial DNA and alterations in enzymatic

functionality or cellular structures, with the appearance of functional, structural abnormalities or aberrations in gene expression. It has also been shown that in addition to metabolic products, other external agents can have a prooxidant effect, which has led to the conclusion that lifestyle and diet can play an important role in controlling oxidative stress (Sharifi-Rad, Mehdi, 2020)

Exposure to certain chemicals used in industries or exposure to insecticides.

Other factors, such as: dieting rich in sugars and fat, and having some health problems such as obesity, the substantive term has been repeated 166 times.

3- Molecular docking was the third ranked frequent subject, Molecular docking is a method that predicts how chemical compounds, especially organic ones, bind to protein. Molecular docking is widely used in structure-based drug design, where it can help identify potential drugs for treating a particular disease, Essentially, the aim of molecular docking is to give a prediction of the ligand-receptor complex structure using computation methods. Docking can be achieved through two interrelated steps: first by sampling conformations of the ligand in the active site of the protein; then ranking these conformations via a scoring function. Ideally, sampling algorithms should be able to reproduce the experimental binding mode and the scoring function should also rank it highest among all generated conformations, Molecular docking is one of the methods most commonly used in structure-based sediment design because of its ability to predict the binding body of small molecular walls for the appropriate target correlation

site. The characterization of binding behavior plays an important role in the logical design of the drug as well as in the clarification of basic biochemical processes (Yu Meng, – Xuan, 2012) the substantive term has been repeated 134 times.

4- Apoptosis is a genetically regulated form of cell death. It has a role in biological processes, including embryogenesis, ageing, and many diseases. The molecular mechanisms involved in death signals, genetic regulation, activation of effectors have been identified, the amount of apoptosis that occurs in developing and adult animal tissues can be astonishing. In the developing vertebrate nervous system, for example, up to half or more of the nerve cells normally die soon after they are formed. In a healthy adult human, billions of cells die in the bone marrow and intestine every hour. It seems remarkably wasteful for so many cells to die, especially as the vast majority are perfectly healthy at the time, they kill themselves. What purposes does this massive cell death serve (Alberts B, Johnson A, Lewis J, et al 2002), the substantive term has been repeated 130 times.

5- Egypt came in fifth place for objective terms for the research contributions of Egyptian physicians to the PubMed database. The substantive term has been repeated 101 times. Naturally, many of the topics dealt with by Egyptian researchers and their association with Egypt are related and addressed objectively and geographically from this aspect.

6- Antioxidants Materials that fight free radicals in the body, prevent or slow down cell damage caused by free radicals and unstable molecules in the body. Antioxidants play a role in fighting signs of aging and have an important role in enhancing the body's

immunity, can prevent or slow cell damage caused by free radicals. Free radicals are unstable molecules that the body produces as a reaction to environmental and other pressures. They can increase the risk of inflammation and various health issues; this topic came in sixth place for the most important topics dealt with by Egyptian physicians in their research contribution exposed to the PubMed database, many foods raw materials contain natural antioxidants which exert control of oxidative processes in the living cells. Among antioxidative agents are found enzymes such as superoxide dismutase, glutathione peroxidase and glucose oxidase-catalase. Among naturally occurring non-enzymic antioxidants are carotenoids, especially astaxanthin (e.g., in fish), tocopherols in oils and other phenolic compounds in plant material. Enzymic antioxidants are mostly inactivated in food processing but the non-enzymic ones can be active also in heat-treated food and might also be active after consumption of the food, as is claimed with beta-carotene, and vitamins A and E. Vitamin C is a generally reducing substance which acts synergistically with other antioxidants. T

Many foods raw materials contain natural antioxidants which exert control of oxidative processes in the living cells. Among antioxidative agents are found enzymes such as superoxide dismutase, glutathione peroxidase and glucose oxidase-catalase. Among naturally occurring non-enzymic antioxidants are carotenoids, especially astaxanthin (e.g., in fish), tocopherols in oils and other phenolic compounds in plant material. Enzymic antioxidants are mostly inactivated in food processing but the non-enzymic ones can be active also in heat-treated food and might also be active after consumption of the food, as is claimed with beta-

carotene, and vitamins A and E. Vitamin C is a generally reducing substance which acts synergistically with other antioxidants. The substantive term has been repeated 85 times.

7- Cytotoxicity can be defined as the adverse effects observed from reactions with structures or crucial processes for cell maintenance such as proliferation, survival, and normal biochemistry and physiology, Cytotoxicity studies are a useful initial step in determining the potential toxicity of a test substance, including plant extracts or biologically active compounds isolated from plants (Geffner, Jorge Raúl 1998), Cytotoxicity is one of the most important methods for biological evaluation as it has a series of advantages, along with the preferred and mandatory items. Given this information, the ability to accurately measure cytotoxicity can prove to be a very valuable tool in identifying compounds that might pose certain health risks in humans, this topic came in seventh place for the research contributions of Egyptian physicians in PubMed during the study period, The substantive term has been repeated 81 times.

8- inflammation is the body's immune system's response to an irritant. The irritant might be a germ, but it could also be a foreign object, Diseases or medical conditions that cause inflammation often have a name ending in "-itis." For example: Cystitis, Bronchitis, Otitis media Dermatitis, Infections are among the most important diseases at present that physicians try to control their causes and find appropriate treatment and conduct scientific research about, as they sometimes arise from accidentally attacking the body's cells by the immune system, causing harmful infections. These include, for example: Rheumatoid arthritis, where many

joints are permanently inflamed throughout the body, Psoriasis – Chronic Skin Disease, collectively known as chronic inflammatory diseases, these diseases can last for years or even for life. Their intensity and level of activity vary. This topic ranked eighth for the research contributions of Egyptian physicians in PubMed during the study period with 81 research contributions.

9-Nanoparticles can be defined as an atomic or microscopic molecule aggregation ranging from a few atoms (molecules) to a million atoms, each linked almost spherically to a radius of less than 100 nm. One half-drop particle will contain 25 atoms, mostly on the surface of the particle. This is different from the molecule, which may include a number of atoms because the dimensions of the nanoparticle are less than the critical dimensions needed for certain physical phenomena: the average free path that electrons cut between two consecutive collisions with shaken atoms, and this determines electrical conductivity, The recent evolution of nanotechnology has helped to change the medical rules in preventing, diagnosing and treating diseases and we are living through the age of nanomedical technology, where nanotechnology, for example, offers new methods for drug carriers within the human body (called nanoscale carriers) that are able to target different cells in the body. This technique can easily portray the body's cells as if we take a normal image, as well as those cells can be controlled and shaped in different forms, many types of nanoparticles are used in medical applications so that they act as carriers of the drug or imaging tools within the body, and currently use different types of nanoparticle liposome manufactured as delivery systems for anti-cancer drugs and vaccines (Khan, Ibrahim

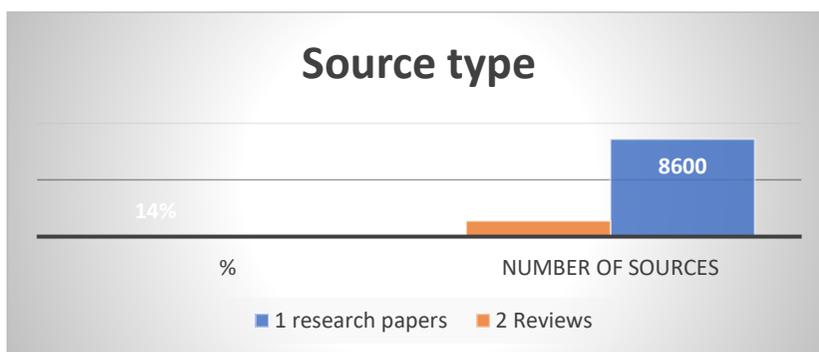
2017), This topic ranked ninth for the research contributions of Egyptian physicians in PubMed during the study period with 71 research contributions.

10- Sirtuin 1 and many other subjects, were ranked and frequented in 1 essay or research paper, etc., sirtuin is the name of a family of intracellular enzymes that are found in the organisms from all the three kingdoms of life (i.e., bacteria, archaea, and eukarya) and are the homologs of the yeast silent information regulator 2 (sir2) protein, the founding member of the sirtuin family (Peter F. Surai 2021)

5- source type *in this period* in PubMed, *as following*:

Table no. 4 (source type in PubMed)

Source type		Number of Sources	%
1	Research papers	8600	86%
2	Reviews	1400	14%
Total		10000	100%



From the previous table we can see:

The type of research contributions of Egyptian physicians uncovered by the PubMed database during the study period was limited to only two types of research, the original research papers

and divided into two types of research. Clinical trials and theoretical trials, while the article's presentations reached about 1,400 scientific reviews at 14%, while the number of scientific research reached 8,600 research at 86% of the 10,000 research contributions during the study period. This illustrates the keenness of researchers and doctors to publish articles and original research for various research purposes, including scientific promotions, enrichment of medical intellectual production, completion of previous research or presentation of distinct from them in related fields and others.

6- Affiliations, and corporate bodies *in this period* in PubMed, as *following*:

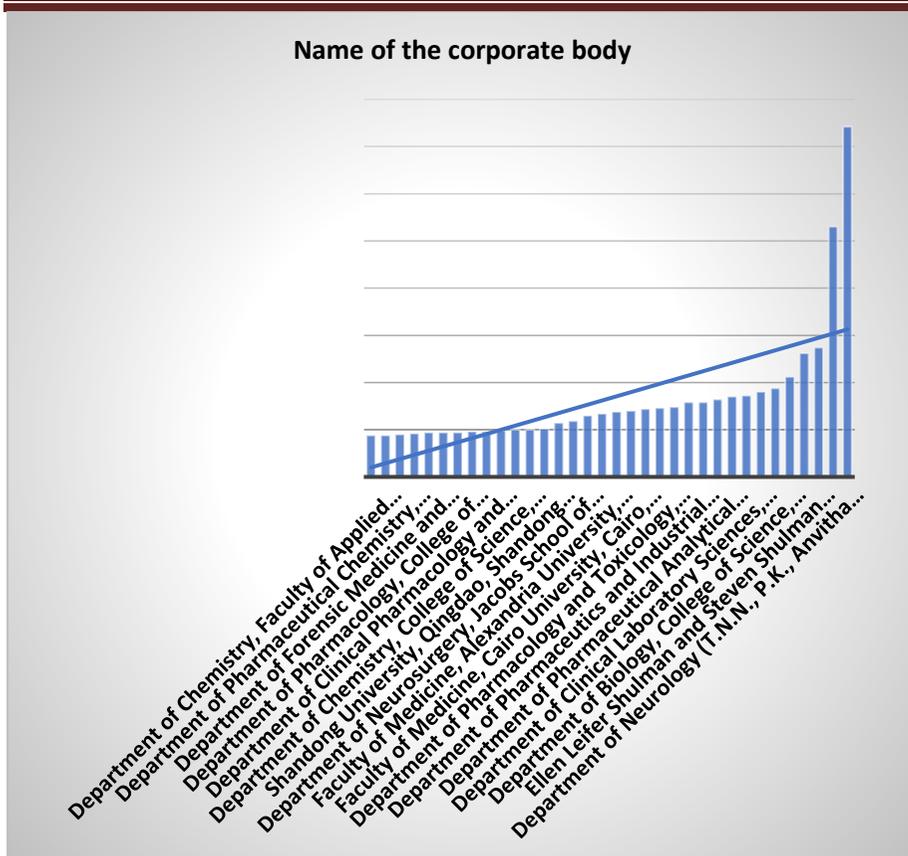
Table no. 5 (Affiliations, and corporate bodies in PubMed.)

	Name of the corporate body	Number of redundancy
1	Department of Neurology (T.N.N., P.K., Anvitha Sathya, H.C.L., Andreas	371
2	Department of Neurology (J.P.M., M.M.), Hospital de Egas Moniz, Centro Hospitalar	265
3	Ellen Leifer Shulman and Steven Shulman Digestive Disease Center, Cleveland	137
4	Brookhaven National Laboratory, Upton, New York 11973.	131
5	Department of Biology, College of Science, Princess Nourah Bint Abdulrahman	106
6	Biochemistry and Molecular Biology Department, Faculty of Pharmacy (Boys),	94

	Name of the corporate body	Number of redundancy
7	Department of Clinical Laboratory Sciences, College of Applied Medical Sciences,	90
8	Department of Pharmaceutical Chemistry, College of Pharmacy, King Saud	86
9	Department of Pharmaceutical Analytical Chemistry, Faculty of Pharmacy, Mansoura	85
10	Department of Pharmacology and Therapeutics, Faculty of Veterinary Medicine,	82
11	Department of Pharmaceutics and Industrial Pharmacy, Faculty of Pharmacy, Cairo	79
12	Department of Pharmaceutics and Pharmaceutical Technology, Faculty of Pharmacy,	79
13	Department of Pharmacology and Toxicology, Faculty of Pharmacy, Cairo University,	74
14	Department of Medical Biochemistry and Molecular Biology, Faculty of Medicine,	73
15	Faculty of Medicine, Cairo University, Cairo, Egypt.	72
16	Reference Laboratory for Veterinary Quality Control on Poultry Production, Animal	70
17	Faculty of Medicine, Alexandria University, Alexandria, Egypt.	69
18	Department of Biochemistry, Faculty of Pharmacy, Badr University in Cairo (BUC),	67

	Name of the corporate body	Number of redundancy
1 9	Department of Neurosurgery, Jacobs School of Medicine and Biomedical Sciences at	65
2 0	Department of Pharmacology and Toxicology, Faculty of Pharmacy, Mansoura	59
2 1	Shandong University, Qingdao, Shandong 266237.	57
2 2	Department of Biological Sciences, Faculty of Science, King Abdulaziz University,	51
2 3	Department of Chemistry, College of Science, Princess Nourah Bint Abdulrahman	50
2 4	International Medical Research Association (IMedRA), Cairo, Egypt.	50
2 5	Department of Clinical Pharmacology and Medicine, College of Medicine,	49
2 6	Central China Normal University, Wuhan, Hubei 430079.	48
2 7	Department of Pharmacology, College of Medicine, Chung-Ang University, Seoul,	48
2 8	Department of Forensic Medicine and Clinical Toxicology, Faculty of Medicine,	47
2 9	Department of Forensic Medicine and Toxicology, Faculty of Veterinary Medicine,	47
3	Department of Neurosurgery, Buffalo General Medical	47

	Name of the corporate body	Number of redundancy
0	Center, Kaleida Health,	
3 1	Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Kafrelsheikh	46
3 2	Department of Pharmaceutics, College of Pharmacy, Prince Sattam Bin Abdulaziz	45
3 3	Department of Chemistry, Faculty of Applied Sciences, Umm Al-Qura University,	44
3 4	Department of Chemistry, College of Science, King Faisal University, Al-Ahsa	44



From the previous table we can see:

* The Egyptian physicians and researchers cooperated with other researchers from different countries, as well as the Egyptian contributions, to process researches in wide topics and publish these researches in international journals.

* During the study period, more than 15,150 Affiliations and academic institutions contributed to the PubMed database's research.

1-We can see that: Department of Neurology at Boston Medical Center, Boston University, was the most body those Egyptian researchers cooperated with, the number of researches affiliated with this Department, were 371 researches.

<https://www.bumc.bu.edu/neurology>

2- Next ranked, from the previous table, was: Department of Neurology (J.P.M., M.M.), Hospital de Egas Moniz, Centro Hospitalar in Lisbon, Portugal, the number of researches affiliated with this Department, were 265 researches.

[.https://www.chlo.min-saude.pt](https://www.chlo.min-saude.pt)

3- Third ranked, from the previous table, was: Digestive Disease Center, Cleveland Cleveland Clinic's Digestive Disease & Surgery Institute (DDSI) provides patients with the most advanced level of medical and surgical care, primarily focused on the safe and proven treatment of disorders related to the gastrointestinal tract, the number of researches affiliated with this Center, were 137 researcher.

<https://my.clevelandclinic.org>

4- Brookhaven National Laboratory Primarily supported by the U.S. Department of Energy's (DOE) Office of Science, Brookhaven Lab Brookhaven National Laboratory delivers discovery science and transformative technology Primarily supported by the U.S. Department of Energy's (DOE) Office of Science is a multidisciplinary laboratory with seven Nobel Prize-winning discoveries the number of researches affiliated with this Center, were 131 researches.

<https://www.bnl.gov/about>

5- Department of Biology, College of Science, Princess Nourah Bint Abdulrahman in fifth ranking, The College of Science was established with the approval of authority No. 3030/B. on 23 March 1428 to include the departments (mathematical sciences-

physics- chemistry- biology) to prepare scientifically qualified resources, the number of researches affiliated with this Department, were 106 researches.

<https://www.pnu.edu.sa/en/Faculties/Science/Biology>

6- Biochemistry and Molecular Biology Department, Faculty of Pharmacy (Boys), Al-Azhar University, the department mainly teaches the subjects of biochemistry and clinical biochemistry in its different branches, both at bachelor's and postgraduate levels. On the other hand, the Department is interested in conducting advanced research in the areas of basic and clinical biochemistry, for example, assessing the levels of connotations of heart and circulatory function in some diseases, As for the objectives of the section of the teaching process, they are primarily aimed at familiarizing the student with the chemical and biological interactions occurring in the living tissue, In addition to giving him the ability to understand and interpret in a biological way many natural and pathological phenomena of the human body as well as supporting targeted scientific research and teaching biochemistry to Faculty departments and other faculties, The number of researches affiliated with the Department of Biochemistry - Faculty of Pharmacy - Al-Azhar University reached 94 during the study period.

7- Department of Clinical Laboratory Sciences, College of Applied Medical Sciences, The Faculty of Applied Medical Sciences was founded in 1979 to meet the need in Saudi Arabia for qualified cadres specializing in health care. The first faculty of applied medical sciences in the Kingdom at that time, there are more than 12 different bachelor's programs operating under seven main

departments. Moreover, there are postgraduate programs in many health disciplines.

– One of the objectives of the Department of Clinical Laboratories at King Saud University:

– Maximize the Department's scientific research outputs by investing in its existing infrastructure and supporting resources to encourage and increase the productivity of high-quality research.

– Improved partnership and strategic cooperation with health care sectors and national scientific institutions, which shows that 90 researches involved in research contributions in the current study belong to this section

<https://cams.ksu.edu.sa/ar/ClinicalLabsSciences>

8-Department of Pharmaceutical Chemistry, College of Pharmacy, King Saud, Pharmaceutical Chemistry Department, Faculty of Pharmacy, King Saud Established Pharmaceutical Chemistry Department in (1959), the Department conducts scientific research in the fields of pharmaceutical chemistry involving, inter alia, the course of drug exploration, the course of drug design using molecular modification programs, the course of drug construction and the field of analytical pharmaceutical chemistry, including the course of development of analytical methods of drugs, the course of pharmaceutical analysis, the course of study of drug metabolism, and hundreds of research since the department's creation has been published in numerous scientific journals with well-recorded profiles. This effort culminated in the department's second place in scientific research at the level of King Saud University, the number of researches with this Department, were 86 researches.

<https://pharmacy.ksu.edu.sa/en/pharmaceutical-chemistry-department>

9-Department of Pharmaceutical Analytical Chemistry, Faculty of Pharmacy, Mansoura, The Department's objectives are summarized as follows:

- Assisting researchers in the field of creativity and research production through follow-up to recent scientific periodicals, participation in local and international scientific conferences, holding periodic panel discussions, as well as encouraging researchers to publish international scientific publications. The Department in the ninth ranking of the bodies to which the number of researches were 85.

<https://pharfac.mans.edu.eg/>

10- Department of Pharmacology and Therapeutics, Faculty of Veterinary Medicine, Damanshour University, Damanshour, Egypt Provides a comprehensive resource on the basic and applied principles of veterinary pharmacology and therapeutics. Focuses on basic mechanisms of representative drugs from the important classes of therapeutic agents. Emphasizes pharmacodynamics and pharmacokinetics as well as their clinical application, the number of researches affiliated with this Department, were 82 researches.

<https://www.damanshour.edu.eg/>

* This means the internationalism of Egyptian physicians and researchers, keen on a pattern of research cooperation with international academic and research institutions

7- most productive authors *in this period* in PubMed, *as following*:
Table no. 6 (Productivity table of the most productive authors in PubMed)

Sequence number	Authors	Number of contributions
1	Batiha GE	71
2	Eldin SM	53
3	Al-Kuraishy HM	42
4	Abourehab MAS	39
5	Al-Gareeb AI	38
6	Farag MA	37
7	Mohamed A	37
8	Zhang Y	34
9	Ismail A	32
10	Abd El-Aty AM	31
11	Eldehna WM	30
12	Li Y	30
13	Emile SH	29
14	Liu Y	29
15	Ali MA	27
16	Wang Y	27
17	Wexner SD	27
18	Doghish AS	26
19	Hassan M	26
20	Li J	26
21	Mohamed AA	26
22	Al-Karmalawy AA	25
23	Agarwal V	25

Sequence number	Authors	Number of contributions
24	Horesh N	25
25	Liu X	25
26	Khan A	25
27	Chen Y	24
28	Garoufalia Z	24
29	Hussein MA	24
30	Ibrahim M	24
31	Ibrahim MA	24
32	Mahmoud AM	24
33	Zhang Z	24
34	Alexiou A	22
35	Ahmed S	22
36	Gefen R	22

From the previous table we can see:

* About 36 thousand Egyptian physicians participated in the research contributions of Egyptian physicians indexed in PubMed database, and about 4 thousand other nationalities physicians/researchers:

1- Dr. Gaber El-Saber Batiha came in the first ranking of the most productive authors produced by the PubMed database with 71 research contributions. He is a Lecturer in the Department of Pharmacology and Therapeutics, Faculty of Veterinary Medicine, Damanhur University.

2- Dr. Shaimaa M. Badr-Eldin Professor of Pharmaceutics, Faculty of Pharmacy, Cairo University; King Abdulaziz University in the second ranking of Egyptian doctors' research contributions in the PubMed database with 53 research contributions .

3- Dr. Hayder M. Al-Kuraishy was ranked third for research contributions with 42 joint research, he is a professor of in Clinical Neuropharmacology and Therapeutic Medicine; in Department of Pharmacology, College of Medicine Almustansiriya University, Baghdad - Iraq, Professor Fellowship Royal College of Physicians (FRCP), Royal College of Physicians (RCP), British society of rheumatology (BSR), American Association for Science and Technology (AASCIT)

4- Dr. Mohammed Abdelwahab Sayed Abourehab came fourth with 39 research contributions.

He is an assistant professor of pharmaceutics, department of Pharmaceutics, Faculty of Pharmacy, Umm Al-Qura University, has numerous research in the field of pharmaceutical biotechnology. The research specialization is concerned with the innovation, development and production of therapeutic methods such as vaccines and immunotherapies such as monoantibodies, cancer cell killer's viruses, and oriented immune cells. Many scientific research is geared towards this careful specialization as it is important in trying to treat cancer diseases, which shows the advanced arrangement of the researcher in publishing research in this field.

5- Ali I. Al Gareeb came fifth with 38 research contributions. He is a professor at College of Medicine, Mustansiriyah University,

according to semantic scholar, he produced large number of researches.

6- Farag MA was the sixth most productive author of scientific contributions came with a number 37 research contributions.

Department of Entomology and Plant Pathology, Auburn University, and Department of Chemistry and Biochemistry, Texas Tech University.

7- Yuanbo Zhang State Key Laboratory of Surface Physics and Department of Physics, Fudan University, Shanghai, he came the seventh most productive author of scientific contributions came with a number 34 research contributions

8- A. M. Abd El-Aty Professor, Department of Pharmacology, Faculty of Veterinary Medicine, Cairo University, he came in the tenth place of the most contributing researchers in the intellectual production of Egyptian doctors exposed by the PubMed database was 31 research contributions.

- About 30 thousand Egyptian physicians with one research contribution exposed in PubMed database.

8- titles of the research contribution *in this period* in PubMed, as following:

Table no. 7 (titles of the research contribution in PubMed)

Titles of the research contribution	
1	"Antibiotic prescribing etiquette" an elective course for medical students: could

2	"Day 25": a temporal indicator of stabilization of mortality risk among COVID-19
3	"To be or not to Be": Regulatory T cells in melanoma.
4	(18)F-FDG gallbladder uptake: observation from a total-body PET/CT scanner.
5	[2021 Asian Pacific Society of Cardiology Consensus Recommendations on the use of
6	[3+2] Cycloaddition Synthesis of New Piperazine-Linked Bis(chromene) Hybrids
7	1,25-Dihydroxycholecalciferol down-regulates 3-mercaptopyruvate sulfur
8	1,3-Dipolar Cycloaddition of 3-Chromonyl-Substituted Glycine Imino Esters with
9	1,4,9,9-tetramethyloctahydro-4,7-(epoxymethano)azulen-5(1H)-one, a natural
10	17 β -hydroxysteroid dehydrogenase type 2 activity, expression and cellular
11	18F-FDG PET/CT scan standardised uptake value (SUV) score for diagnosis, staging
12	1-Benzyl-5-bromo-3-hydrazonoindolin-2-ones as Novel Anticancer Agents: Synthesis,
13	2D Hierarchical NiMoO(4) Nanosheets/Activated Carbon Nanocomposites for High
14	2-Methyl-6-(4-aminophenyl)-4,5-dihydro-3(2H)-pyridazinone Synthons for Some New
15	2-Phenylquinazolin-4(3H)-one scaffold as newly designed, synthesized VEGFR-2

16	3',4'-Dihydroxyflavone mitigates inflammatory responses by inhibiting LPS and
17	35,000 years of recurrent visits inside Nerja cave (Andalusia, Spain) based on
18	3D Printed Graphene-Based Metamaterials: Guesting Multi-Functionality in One
19	3D printing of cellulose/leaf-like zeolitic imidazolate frameworks (CelloZIF-L)
20	3D printing of polylactic acid: recent advances and opportunities.
21	3D Surface Deviation Wear Analysis of Veneered PEEK Crowns and Its Correlation
22	3D Volume Assessment as an Objective Tool in Breast Asymmetry Management.
23	3-Dimensional Morphometric Outcomes After Endoscopic Strip Craniectomy for
24	3-Substituted-2,3-Dihydrothiazole as a promising scaffold to design EGFR
25	4-(5-Amino-pyrazol-1-yl)benzenesulfonamide derivatives as novel multi-target
26	4-(N-Phthalimido)phenyl Isonitrile as a Novel Convertible Isocyanide Analogue
27	5G Technology in Healthcare and Wearable Devices: A Review.
28	7-hydroxycoumarin modulates Nrf2/HO-1 and microRNA-34a/SIRT1 signaling and

29	A case control study of maternal and neonatal risk factors associated with
30	A cellular screening platform, stably expressing DENV2 NS5, defines a novel

From the previous table we can see:

-During the study period, Egyptian physicians, research contributions to the PubMed database amounted to 10 thousands of research. The number of addresses for this research reached 10 thousand titles. The PubMed database is keen to detect sober, authentic and unpublished research contributions that are similar to their titles and scientific content.

Conclusions:

- The international phenomena of Egyptian physicians' contributions, into journals from different countries (about 50 countries), and about 1700 journal titles, is widely noticed.
- The cooperation with different authors and researchers, from so many countries, affiliations, and from East to West, is considered as a behavior of contribution in research, between Egyptian physicians and other researchers at these countries.
- The subjects, Egyptian researchers participated in and went into scientific experiences, differ, and going through, wide varieties and alternatives in these subjects.
- The subject, Egyptian researchers participated in, mostly, was Covid 19. As this period, is the pandemic time for the global humanity.

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**For the whole tables

