Studying of Research Related to COVID-19 Vaccine in Iran and the World: A Thematic Analysis and Scientific Collaborations

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ABSTRACT

Background and Aim: The purpose of the present study is thematic analysis and scientific collaborations of research related to COVID-19 vaccine in Iran and the world based on scientific products indexed in Web of Science (WOS).

Materials and Methods: The present study is a descriptive-analytical study with a scientometric approach and using the methods of content analysis and techniques of co-word analysis, hierarchical clustering, Strategic graph and social network analysis. The research population is scientific products related to COVID-19 vaccine in the world and in Iran. Data analysis was performed by HistCite, Bibexcl, Gephi and SPSS software; and the data mapping is done by VOS viewer.

Results: Between 2019 and 2021, 6005 related studies were retrieved. Unites states is followed by India and China, and the United Kingdom has the most Links. Iran’s rank is 10th with 196 studies. Hierarchical clustering in global research led to the formation of 3 clusters (vaccine development strategy, medical prevention and immunotherapy) and in Iranian research led to the formation of 4 clusters (immunotherapy, diagnosis and treatment cycle, medical prevention and immunology). From scientific collaborations at the country level in world and Iranian studies, 5 clusters were formed, at the level of institutions, 17 and 10 clusters, respectively, and at the level of researchers, 10 and 8 clusters, respectively.

Conclusion: Analysis and comparison of world and Iranian studies leads to a better understanding of the prevailing currents, Gaps and discourse in order to increase the quantity and quality of studies, followed by controlling and the eradication of COVID-19 in the shortest possible time.

Keywords: Coronavirus, COVID-19, SARS-CoV-2, vaccine, vaccination, co-word, co-authorship, map knowledge, social network analysis

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Introduction

New coronavirus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was first identified in Wuhan, China, and was confirmed by the World Health Organization (1) followed by rapid spread throughout the world. The disease is highly contagious and unknown in terms of origin, symptoms, routes of transmission and spread, prevention, diagnosis, treatment, effective medications, mortality rate, and vaccination (2, 3). Therefore, researchers in diverse scientific fields designed and conducted related studies in the world (4) as the number of valid investigations grew considerably in citation databases in a short time (5).

Coronavirus is one of the viruses first transmitted among animals and then to humans. It was named due to crown-like spikes (protein spikes) on the surface (6, 7). The signs of this disease, including fever, cough,
fatigue, sputum, headache, hemorrhage, diarrhea, dyspnea, and lymphopenia present in 2-5 days and are similar to Influenza and SARS (8). However, being a contagious and severe respiratory failure in some people leading to mortality is among the unique signs of this disease (9, 10).

Design and development of an efficient vaccine was the priority of governments, scientific centers, and researchers since the beginning of the pandemic because of the increasing number of affected individuals and mortality, the lack of influential treatments, and the presence of asymptomatic carriers in society (11, 12). In other words, vaccination along with hygienic protocols are considered the most reliable, most cost-effective, and most influential preventive measures against fatal infectious diseases. A vaccine is a biological preparation that provides active acquired immunity against a special disease (12). Diverse types of vaccines entail live-attenuated, inactivated, subunit, recombinant, polysaccharide, conjugate, and toxoid vaccines (13).

Complete information concerning antigenic properties, adjuvant, as well as vaccine production and delivery system, should be available for designing a vaccine (14). The availability of SARS-CoV-2 genomic and structural data allowed the production of various vaccines for this virus (15). Therefore, efforts for vaccine development started at the beginning of the pandemic and are still ongoing as over 100 vaccines are currently being tested in terms of efficacy in animals. Moreover, many vaccines are under clinical trial in humans and some have reached the final test step. About 15 vaccines have been approved and are being inoculated as governmental vaccination programs (16).

According to the latest international records, 11 SARS-CoV-2 vaccines are currently in phase III clinical trial. Several vaccines, namely Russian Sputnik, American Pfizer and Moderna, English Oxford, and Chinese Sinovac received approval for injection. In this regard, numerous studies have been published since the beginning of the pandemic on different phases, including laboratory evaluations, design and production, animal tests, clinical trials, mass production, public vaccination, and other issues. Iranian researchers also played role in these investigations.

Currently, Iran has the eleventh rank among 16 SARS-CoV-2 vaccine producers in the world regarding the number of vaccines despite international sanctions. According to the Ministry of Health and Medical Education, 12 teams are working on the production of SARS-CoV-2 vaccine, including the Execution of Imam khomeini’s Faraman and Barekat Institute, Pasteur Institute of Iran, Razi Vaccine and Serum Research Institute, some universities of medical sciences, Ministry of Defense and Armed Forces Logistics, and several science-based companies and institutes. Eight projects have been reported to be more active now (17).

In such conditions, researchers in diverse domains, such as biochemistry, molecular biology, immunology, virology, experimental medicine, medical research, pharmacology, and infectious diseases cooperate for investigation and vaccine production against SARS-CoV-2. Consequently, interdisciplinary domains, research cooperation, and novel research fields will emerge in national and international research and technology domains that might lead to changes in the future.

Interdisciplinary fields resulting from emerging scientific collaboration present the most relevant and most effective researchers in the field of SARS-CoV-2 vaccine research (18). On the other hand, researchers develop the scientific future of their specialty. The regular identification and assessment of scientific outcomes are of high priority for obtaining knowledge concerning the existing conditions (19, 20). In this regard, drawing the map (structure) of scientific domains has attracted attention as one of the most important aspects of Scientometrics studies in recent decades (21).

Scientometrics is aimed to evaluate science structure in scientific domains and benefits from variable techniques, such as co-citation, co-word, and co-authorship. The main concepts of a specific field could be recognized using co-citation and a suitable understanding is provided, in addition to the evaluation of changes during the time (22). In the co-word method, utilizing common concepts in title, abstract, keywords, and text in scientific publications demonstrates the closeness of the concepts and subjects of these studies. As a result, the structure, concepts, and components of a scientific field could be determined (23).

The considerable difference between co-word and co-citation analyses from He viewpoint is that co-citation requires citing references (citing papers, citing authors) and cited reference (cited author, cited document) (24). On the other hand, research-academic centers and researchers share their ideas in scientific collaboration and promote scientific publications qualitatively and quantitatively (25). Therefore, evaluating the co-authorship of scientific publications in different countries considers the aspects and extend of scientific collaboration, countries, organizations, and researchers that are remarkable in terms of scientific outcome (26). Here, we review the studies performed with the mentioned approaches in the field of the SARS-CoV-2 vaccine.

A Scientometrics investigation by Suruliniath et al. in 2020 evaluated the research outcomes in SARS-CoV-2 and coronavirus vaccine domains. The latter study analyzed 7181 investigations in the field of corona-
virus vaccine indexed in the Web of Science during 1971-2020. A total of 4402 studies in 2020 showed growth in investigations. Documents published in Vaccine journal had the highest number of 203 papers followed by Virology and Nature with 104 and 96 publications, respectively. The most productive countries were the United States of America, China, India, and England with 2178 (H-index: 114), 1068 (H-index: 75), 678 (H-index: 26), and 614 (H-index: 53) papers, respectively (27).

Another study by Suruliniath et al. in 2021 aimed to draw the science map of highly cited researches in the SARS-CoV-2 vaccine domain. A total of 433 investigations on the COVID-19 vaccine that had 52567 citations were assessed. The mean number of citations for each study was 121.4. Studies in this field peaked in 2020 with 97 research that received at least 500 citations and the highest number of citations (14623) in 2021. The USA had the largest share (229 studies) and received 29027 citations followed by China with 2250 citations for 13 studies, and Lancet with 1528 citations for 20 investigations, Nature journal with 4314 citations for 35 studies, Germany with 3404 citations for 33 investigations, and Netherland with 28 citations for 28 publications.

The mentioned study indicated that India recorded 705 citations for 9 investigations. The National Institute of Allergy and Infectious Diseases from the USA had 39 studies and 6076 citations, followed by University of California with 31 studies and 4118 citations, the University of Hong Kong with 23 research and 3546 citations, New York Blood Centre with 21 studies and 2931 citations. Virology journal with 5724 citations for 53 studies, Science journal with 4163 citations for 13 research, the National Academy of Sciences of the United States of America with 3113 citations for 20 investigations, Nature journal with 2250 citations for 13 studies, and Lancet with 1528 citations for 8 papers had the best records. Among these studies, 18 publications had one author and 2906 investigations had several authors (28).

Ahmad et al. in a Scientometrics study evaluated research trends in SARS-CoV-2 vaccine studies. The latter study conducted on 12 January 2020 in WOS analyzed 916 investigations performed by 4392 authors and published in 376 journals. Their findings demonstrated that most retrieved studies were articles (372 research, 40.6%). The authors with the highest number of studies were Dhama K and Hotez PJ (10 research, 1.1%). The most active institute was Oxford University (24 research, 2.6%) and the most important journal was Human Vaccine and Immunotherapeutics (43 research, 4.7%). The most common keywords entailed “COVID-19” (597 studies, 65.2%) and “Vaccine” (521 studies, 56.9%). The USA was the most productive country (352 studies, 38.4%) (29).

In the study completed by Ay et al., on 20 January 2021, total of 2765 research with 24202 citations existed on the Web of Science. Immunology, internal medicine, and experimental medicine research were had the highest ranks. Active universities in this field encompassed the universities of Harvard, California, and London. Biomolecular Structure Dynamics publicished the highest number of studies. The USA was the most active country among the contributing countries followed by China and India (30).

Therefore, considering the high prevalence of SARS-CoV-2, the increased number of patients and mortality, and the importance of using vaccines for managing this crisis, followed by increased research related to the SARS-CoV-2 vaccine from various perspectives and based on background review that have only provided a kind of report on studies in this field, and considering over the past few decades, the study of scientific maps and collaboration as one of the most important aspects of measurement studies of science, has gained great importance in various fields (31), the present study aimed to identify and analyze the main and newly emerged research subjects, in addition to the international and national scientific collaboration in SARS-CoV-2 vaccine investigations based on co-word, co-authorship, and indices of Web of Science. Recognizing the science structure in this field allows government, the Ministry of Health, scientific centers, researchers, and interested people to conduct and guide their studies toward applicable subjects and higher knowledge. In other words, the present study aimed to analyze and compare the concepts and words of studies indexed in the WOS database and the scientific collaboration of researchers in investigations on SARS-CoV-2 in the world ad Iran. In this regard, we answer the following questions:

1. How is the condition of studies on the SARS-CoV-2 vaccine in the world and Iran in terms of study design, language, countries, institutes, cooperating researchers, research fields, and journals?

2. What are the clusters and subjects of researches on the SARS-CoV-2 vaccine in the world and Iran based on co-word analysis and hierarchical clustering? What is the position of obtained clusters regarding maturity and development in the strategic chart?

3. How are the networks of a scientific corporation in studies on SARS-CoV-2 vaccine in the world and Iran?

4. Who are the best researchers of Iran and the world in studies on the SARS-CoV-2 vaccine based on the central indices of social networking?

Materials and Methods

This descriptive-analytical research was performed with the Scientometrics approach and content analysis method along with co-word analysis,
hierarchical clustering, strategic chart, co-authorship, and social network analysis. Co-word analysis utilized in the current study was one of the content analysis methods. In network analysis, centrality indices that show the location of a node relative to other nodes in scientific maps are used. The statistical population of the present study included all investigations on the COVID-19 vaccine in WOS in categories related to medicine and health domains during 019-2021.

For the accurate recognition and retrieval of related researches, diverse combinations and names of COVID-19, as well as the words and terms related to the vaccine were identified using a thesaurus and medical subject headings (MeSH). Next, applying Boolean operators, truncation, and the following multistage search approach, the studies in the considered field were retrieved on 16 April 2021, including 6005 studies in text format in the world and 196 studies in text format in Iran:

\[(\text{TS}="\text{COVID-19}\)") OR (\text{TS}="\text{coronavirus disease 2019}\)") OR (\text{TS}="\text{novel coronavirus}\)") OR (\text{TS}="\text{2019 ncov}\)") OR (\text{TS}="\text{coronavirus 2019}\)") OR (\text{TS}="\text{new coronavirus}\)") OR (\text{TS}="\text{Sars-Cov 2}\)") OR (\text{TS}="\text{nCoV-19}\)") AND (\text{TS}=\text{Vaccin}\)*)\]

It should be noted that Clarivate Analytics has determined the maximum download records as 500. Therefore, data extraction was performed in 14 steps. Following the retrieval of related records and data integration, data were analyzed by the Histcite, Bibexcel, Gephi, UCINET, and SPSS software according to the aims and questions of the research. The maps were drawn utilizing the VOSviewer software version 1.6.10. The subjective maps and analysis were carried out following the control and integration of keywords by thesaurus generation in the software as similar and identical keywords, and single and plural forms were merged and non-specialized keywords were removed.

Hierarchical clustering is applied for co-word analysis, which can determine the clusters related to each keyword and indicate the relationships between them. As a result, hierarchical clustering was performed using the SPSS software. In the hierarchical clustering method, similar to a tree, each small branch is a component of a larger branch and finally, all these are connected to the tree trunk hierarchically. In summary, the following steps should be passed:

1. Each item should be regarded as a cluster.
2. Among all possible cluster pairs, the two clusters with lower ESS are selected.
3. The two selected clusters are combined.
4. Steps 2 and 3 are repeated until all items are in one cluster or the number of clusters reaches the considered number.

In order to execute and finalize the co-occurring analysis, first, some necessary items, including co-occurring matrix are prepared. Afterwards, the co-occurring matrix is converted to a relationship matrix. To prepare the matrix, keywords with the frequency of 2 and 26 were selected for studies from Iran and other countries, respectively. Finally, rectangular matrices of 69×69 and 70×70 were made for investigations in Iran and other countries, respectively. The diagonal cells of matrices were considered zero and these matrices were converted to relationship matrices. The clustering of concepts was completed by the SPSS software version 26.

In the next step, the strategic chart of subjective clusters was depicted. To this aim, the centrality and density of clusters were obtained by the UCINET software after forming separated matrices for the keywords of each cluster retrieved by a hierarchical chart. A strategic chart is a description of internal relations and correlations between distinct clusters. In this chart, the horizontal axis is commonly utilized to present centrality (the relationship between clusters) and the vertical axis is used to give density (the internal relations of each cluster).

**Results**

A total of 6005 studies published in the considered field during 2019-2021 were retrieved by searching the WOS and using the HistCite software. These papers had 29473 authors affiliated to 7988 universities and scientific institutes from 147 countries. Table 1 represents different factors of these studies, including the design, language, countries, involved institutes and researchers, and research domains. Each related study had a mean citation of 10.05. The H-index of this field was found as 109 in the WOS.
The considerable point is the 10th rank of Iran among contributing countries with 196 studies. After limiting the retrieved results to Iran, 196 related investigations conducted during 2019-2021 that had 1583 authors affiliated to 635 universities and scientific institutes with the cooperation of 76 countries were retrieved from the mentioned databases. Table 2 summarizes the design, language, countries, involved institutes and researchers, research domains, and journals of studies in this field in Iran. Any related publication received 6.87 citations on average. Moreover, the H-index of this field in Iran was 16 in the WOS.

### Table 1. Status of Studies on COVID-19 vaccine in the world

| Doc. Type          | First place (number, percent) | Second place (number, percent) | Third place (number, percent) | Fourth place (number, percent) | Fifth place (number, percent) |
|--------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
|                    | Article (300, 50)              | Review (1578, 3.26)            | Editorial Material (721, 12)   | News Item (215, 6.3)            | Letter (208, 5.3)              |
| Language           | English (5837, 97.2)           | German (51, 0.8)              | Spanish (40, 0.7)             | French (18, 0.3)               | Turkish (11, 0.2)              |
| Country            | United States (1584, 9.30)     | India (730, 12.2)             | China (663, 11)               | England (591, 9.8)             | Italy (396, 6.6)               |
| Researcher         | Dharma K, Mahase E (36, 0.6)   | Baric RS (25, 0.4)            | Kumar A (24, 0.4)             | Tiwari R (22, 0.4)             | Kumar S, (21, 0.3)             |
| Institute          | Harvard Med Sch (104, 1.7)     | Univ Oxford (103, 1.7)        | Univ Washington (85, 1.4)     | Chinese Acad Sci (66, 1.1)     | London Sch Hyg & Trop Med (64, 1.1) |
| Funding Sponsor    | UNITED STATES DEPARTMENT OF HEALTH HUMAN SERVICES (506, 8.373) | NATIONAL INSTITUTES OF HEALTH NIH USA (492, 8.142) | NATIONAL NATURAL SCIENCE FOUNDATION OF CHINA NSFC (210, 3.475) | EUROPEAN COMMISSION (156, 2.581) | NIH NATIONAL INSTITUTE OF ALLERGY INFECTION DISEASES NIAID (140,2.317) |
| Journal            | BMI-BRITISH MEDICAL JOURNAL (151, 2.5) | VACCINES (133, 2.2)          | NATURE (102, 7.1)             | VACCINE (96, 6.1)              | FRONTIERS IN IMMUNOLOGY (95, 1.6) |
| Research Area      | GENERAL INTERNAL MEDICINE (874, 14/463) | IMMUNOLOGY (830, 13/735)     | PHARMACOLOGY (599, 9.912)     | RESEARCH EXPERIMENTAL MEDICINE (577, 9.548) | BIOCHEMISTRY MOLECULAR BIOLOGY, SCIENCE TECHNOLOGY OTHER TOPICS (519, 5.588) |

### Table 2. Status of Studies on COVID-19 vaccine in Iran

| Doc. Type          | First place (number, percent) | Second place (number, percent) | Third place (number, percent) | Fourth place (number, percent) | Fifth place (number, percent) |
|--------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
|                    | Review (114, 58.2)             | Article (72, 36.7)             | Editorial Material (7, 3.6)    | Letter (3, 1.5)                 |                              |
| Researcher         | Rezaei N (8, 1.4)              | Abadi ATB (4, 2)               | Akbari A, Hemmat N, Iravani S, Khodavirdipur A, Lotfi M, Naghadaripour M, Nosrati H, Pormohammad A, Rahimi F, Ranjbar R, Sadeghi S, Sahebkar A, Soltani S, Soufi GJ, Zandi M (3, 1.5) |
| Institute          | Shahid Beheshti University of Medical Sciences, Tehran University of Medical Sciences (41, 20.9) | Tabriz University of Medical Sciences (20, 10.2) | Shiraz university of medical sciences (19, 9.7) | Iran University of Medical Sciences, Mashhad University of Medical Sciences (18, 9.2) | Trabiat Modares University (15, 7.7) |
| Funding Sponsor    | TEHRAN UNIVERSITY OF MEDICAL SCIENCES (4, 2.041) | CGIAR, NATIONAL INSTITUTE OF GENETIC ENGINEERING AND BIOTECHNOLOGY | HAMADAN UNIVERSITY OF MEDICAL SCIENCES HAMADAN IRAN, NATIONAL INSTITUTE FOR HEALTH RESEARCH NIHR, NATIONAL INSTITUTES OF HEALTH NIH USA, RESEARCH COUNCIL OF SHIRAZ UNIVERSITY OF MEDICAL SCIENCES SHIRAZ IRAN, | | |
In the next step of the study, all investigations extracted from WOS were entered in VOSviewer software for drawing and analyzing the clusters and subjects related to the COVID-19 vaccine separated based on Iran and other countries. Here, you can find the science map of world and Iran studies, as well as their keywords based on central indices.

**World studies**

Seven clusters of words and concepts were identified following co-word analysis. The study with the most citation was “Cryo-EM structure of the 2019-nCoV spike in the prefusion conformation” by Goldsmith JA, Corbett KS, Wang NS, Wrapp D, Hsieh CL, Abiona O, Graham BS, and McCallan JS published in Science journal in 2020. Figure 1 demonstrates the map of the concepts of studies on the COVID-19 vaccine throughout the world. The larger circles show the higher application of those concepts for describing the studies and their colors indicate the cluster of concepts. In addition, the closeness of keywords in this map reveals how interrelated the concepts are.

Hierarchical clustering was performed and dendrograms (hierarchical clustering) of subjects were drawn using the SPSS software and co-occurrence matrices. The hierarchical clustering of investigations on the COVID-19 vaccine is depicted in Figure 2. The clusters have been divided into several parts for higher resolution. In this figure, the height of each cluster shows the points at which the two intended clusters are combined. Moreover, the red vertical lines are the indicator lines of interpretation depicted based on the ideas of specialists (26).
Cluster 1: Vaccine development strategy
According to Figure 2, the keywords of studies formed three clusters, which will be discussed in the following parts.

**Cluster 1: vaccine development strategy.**

The results of the co-word analysis showed that cluster 1 was the largest cluster with keywords ACE2, Antibodies, BCG, Cancer, Immune response, Infection, Clinical trial, Convalescent plasma playing role in the formation of this cluster.

**Cluster 2: immunotherapy.**

The keywords of this cluster, including Adjuvant, Epitope, Immunology, Prevention, Remdesivir, Safety, Vaccine hesitancy, and Immunization indicated that this cluster could be named as immunotherapy.

**Cluster 3: medical prevention.**

Considering the identification and evaluation of the subjects in cluster 3, such as Trained immunity, Virology, MERS, COVID-19 pandemic, and Chloroquine, the name medical prevention seemed suitable.

Following forming a matrix for each of the clusters and entering in the UCINET software, the centrality score and density of clusters were determined and a strategic chart was drawn using these scores (33). The scores of density and centrality are presented in Table 3. It should be noted that the origin was set at 10.88 and 0.52 considering the mean centrality and clusters density, respectively.

| Cluster number | Cluster title               | Density | Centrality |
|----------------|------------------------------|---------|------------|
| 1              | Vaccine development strategy | 0.57    | 22.47      |
| 2              | Immunotherapy                | 0.42    | 8.42       |
| 3              | Medical prevention           | 0.58    | 1.75       |

The first cluster, the vaccine development strategy cluster, had the highest centrality of 22.47 and the third cluster had the highest density of 0.58. In other words, the first cluster, which has the most repeated keywords has the highest centrality in terms of penetration, relation with other subjects, and links. In the strategic chart, the horizontal and vertical axes indicate centrality and density, respectively.
Considering the variation in the subjects of this field and the drawn strategic chart (Figure 3), clusters are in the regions of first, second, and third. As the strategic chart shows, cluster one is located in the first region and cluster three is located in the second region. It is noteworthy that clusters in the second region are not central but are developed. However, they are in a lower rank, compared to the clusters located in the first region. Cluster 2, located in the third region, was in the lowest rank in terms of importance and effect in the research field. In other words, the clusters in the third region are emergent and might be eliminated because they are less important subjects and attract less attention due to low centrality and density.

B. Iran studies: Following the co-word analysis of studies in Iran on the COVID-19 vaccine, seven clusters of words and concepts were identified. The research with the highest citations titled “COVID-19, an emerging coronavirus infection: advances and prospects in designing and developing vaccines, immunotherapeutics, and therapeutics” conducted by “Sharun, K; Dhama, K; Tiwari, R; Dadar, M Malik, YS; Singh, KP; Chai-cumpa, W” in journal Human Vaccines & Immunotherapeutics was published in 2020. Figure 4 demonstrates the concepts map of Iran’s studies on COVID.

In the next step, the dendrogram (hierarchical clustering) of the research subjects in Iran was drawn.
Cluster 1: Immunotherapy

Cluster 2: Diagnosis and treatment cycle

Cluster 3: Medical prevention

Cluster 4: Immunology
Cluster 4: Immunology
As demonstrated in Figure 5, the keywords of evaluated investigations formed four clusters.

**Cluster 1: Immunotherapy.**

The results of the co-word analysis revealed that keywords ACE2, Clinical trial, Drug, Immunity, Influenza, Therapeutics, and Treatment played role in the formation of cluster 1.

**Cluster 2: Diagnosis and treatment cycle.**

The keywords of the smallest cluster, including Diagnosis, Pathogenesis, Vaccine, and Virus indicated that this cluster could be regarded as diagnosis and treatment cycle.

**Cluster 3: Medical prevention.**

The evaluation of subjects in cluster 3, such as Antiviral, Cancer, Convalescent plasma, MERS, Outbreak, Pandemic, Prevention, SARS, and Vaccination demonstrated that medical prevention was a suitable name.

**Cluster 4: Immunology.**

The name immunology seemed suitable for this cluster based on 49 subjects in cluster 4, including Adjuvant, Angiotensin-converting enzyme, Antibodies, Antiviral drug, BCG, Chloroquine, Cytokine storm, Hydroxychloroquine, Immunization, Immunoinformatic, Immunology, and Immunotherapies.

The scores of density and centrality of clusters are shown in Table 4. It should be noted that the origin of the graph was set at 2.08 and 0.79 considering the centrality mean and clusters density, respectively.

**Table 4. Density and centrality of the clusters obtained from the co-word analysis of Iran studies**

| Cluster number | Cluster title                  | Density | Centrality |
|----------------|--------------------------------|---------|------------|
| 1              | Immunotherapy                 | 0.66    | 1.33       |
| 2              | Diagnosis and treatment cycle | 1       | 2          |
| 3              | Medical prevention            | 0.5     | 4          |
| 4              | Immunology                    | 1       | 1          |

Figure 5. Hierarchical clustering of studies on COVID-19 vaccine in Iran
The third cluster or medical prevention had the highest centrality of 4 and clusters two and four had the highest density of 1. It means that the third cluster, which has the most repeated keywords has the highest centrality in terms of penetration, relation with other subjects, and links with other keywords. In the strategic chart, the horizontal axis indicates centrality and the vertical axis shows density. The strategic chart is drawn based on the mentioned scores.

According to Figure 6, clusters are in the second, third, and fourth regions with clusters two and four being located in the second region. The clusters of the second region are not central but developed. However, these clusters are in a lower rank than the clusters of the first region. Cluster one located in the third region is in the lowest rank regarding importance and effect in the intended research field. In other words, clusters in the third region are emergent because have a low centrality and density and have attracted low attention. The third cluster is located in the fourth region of the strategic chart. Clusters in the fourth region of the chart are central clusters but are not developed and matured yet.

In the next step of the study, the institutes and authors of all studies extracted from WOS based on being from Iran or other parts of the world were entered in VOSviewer software for drawing scientific collaboration maps in the COVID-19 vaccine domain. Here, you can find the map of scientific collaboration in studies performed in Iran and the world.

**World studies**

five clusters of countries were identified following the co-authorship analysis of the studies at the level of the cooperation of countries in this field in the world (Figure 7).

**Studies in Iran**

five clusters of countries were identified in the co-authorship analysis of studies at the level of the cooperation of countries in this field in Iran (Figure 8).
We present the map of the scientific collaboration of institutes in studies in Iran and other parts of the world.

**Studies in the world**

Seventeen clusters, including the scientific centers and institutes, were recognized based on the co-authorship analysis of studies at the level of the cooperation of organizations in this domain in the world (Figure 9).

**Studies in Iran**

Ten clusters of the involved scientific centers and institutes were recognized based on the co-authorship analysis of studies at the level of the cooperation of organizations in this domain in the world (Figure 10).
We present the map of the scientific collaboration of researchers in studies in the world and Iran. Ten clusters of authors were identified based on the co-authorship analysis of studies in this domain in the world at the level of authors' cooperation (Figure 11).

Studies in Iran

Sixteen clusters of authors were identified based on the co-authorship analysis of studies in this domain in the world at the level of authors' cooperation (Figure 12).
The authors of studies on COVID-19 vaccine in the world were analyzed based on centrality indices, relations, and the social network developed between researchers using the VOSviewer software along with Bibexcel and Gephi (Table 5). One of the useful indices for the analysis of social networks is Freeman centrality, including degree centrality, closeness centrality, and betweenness centrality. Centrality shows the types and number of the relations of a network member with other network members (34). Degree centrality is an indicator node of the number of links with other nodes in the network (35, 36).

Closeness centrality assesses the distance of a node with other nodes in the network and indicates the mean length of the shortest pathway between that node and other nodes in the network (34). Betweenness centrality of a node is the times a node is located between the shortest pathways between node pairs. Nodes with high betweenness centrality in a premium situation play the role of a broker for linking the nodes and groups. It is regarded as a strength index that directly and indirectly controls the data in the network.

Moreover, the value of betweenness centrality is 0-1. In 0 condition, nothing happens in the network by eliminating the node and all nodes remain linked and even the short distances between them are not eliminated. However, in condition 1, the node is in a strategic situation, which can be a candidate turning point with a unique situation (37). Table 5 shows the five best world researchers in this field based on each of the centrality indices.

| Researcher | degree Centrality | Researcher | closeness Centrality | Researcher | betweenness Centrality |
|------------|-------------------|------------|----------------------|------------|------------------------|
| Dhama K    | 30                | Iacobucci G| 1                    | Liu Y      | 1815.93                |
| Tiwari R   | 22                | Mahase E   | 1                    | Khan S     | 1475.12                |
| Kumar P    | 20                | Liu Y      | 0.34                 | Atyeo C    | 1326.13                |
| Malik YS   | 20                | Shi PY     | 0.31                 | Baric RS   | 976.14                 |
| Patel SK   | 18                | Wang L     | 0.31                 | Shi PY     | 972.26                 |

Some of the important indices in the scientific collaboration network of the world are reported here. The five best Iranian researchers in this field are presented in Table 7 in the order of centrality indices.

| Average Degree | 7/274 |
|----------------|-------|
| H index        | 8     |
| Network density| 0.059 |
| Ratio of components | 0.059 |
| Components     | 5     |
| Network connection| 0.867 |
| Network focus  | 0.153 |
| Network separation| 0.133 |
| Standard deviation distance| 1.984 |
| Network diameter| 11    |
| Average route length in the network| 4.295 |
| Network compression| 0.273 |
| Network size | 0.727 |
Some of the important indices in the scientific collaboration network of researchers in Iran are reported here.

Table 7. Five best Iranian researchers on COVID-19 vaccine based on centrality indices

| Researcher | closeness Centrality | Researcher | betweenness Centrality |
|------------|----------------------|------------|------------------------|
| Mansournia | Akbari | 1 | Mansournia | 682.1 |
| Soltani | Nabavi | 1 | Baradaran | 351.66 |
| Rezaei | Ghaffari | 1 | Eftekhari | 320.1 |
| Sahebkar | Hedayati | 1 | Nosrati | 250 |
| Jalali Nia | Sharifi | 1 | Rezaei | 206/1 |

Table 8. Important indices in the scientific collaboration network of researchers in Iran

| Average Degree | 6.268 |
|----------------|-------|
| H index       | 20    |
| Network density | 0.065 |
| Ratio of components | 0.281 |
| Components   | 28    |
| Network connection | 0.224 |
| Network focus | 0.189 |
| Network separation | 0.776 |
| Standard deviation distance | 1.454 |
| Network diameter | 8 |
| Average route length in the network | 2.555 |
| Network compression | 0.224 |
| Network size | 0.122 |

Discussion

Our results demonstrated that during 2019-2021, 6005 studies by 29473 authors affiliated to 7988 scientific institutes from 147 countries were indexed in the WOS. Iran with 196 related studies by 1583 authors affiliated to 635 universities and scientific institutes with the cooperation of 76 countries has the tenth-ranked among the involved countries. Investigations in the world have been identified to have diverse designs. According to Table 1, more than 80% of publications were in journals and other studies were recorded in the “others” group.

Furthermore, data analysis revealed that the dominant language for science production in this domain is English and covers 97.2% of the studies. In addition to English, research in this field has been published in 14 other languages, the most important of which are German (0.8%), Spanish (0.7%), and French (0.3%). On the other hand, the evaluation of studies in Iran demonstrated that all were published in English and four designs of “evaluation, article, editor’s note, and letter to the editor”. Harvard Medical School and the University of Oxford in the world and Shahid Beheshti University of Medical Sciences and Tehran University of Medical Sciences in Iran had the highest cooperation. K. Dhama and E. mahase in the world and N Rezaei and ATB Abadi in Iran had the most studies. United States department of health human services provided the best financial support of researches in this field in the world and Tehran University of Medical Sciences provided the best support in Iran.

Co-word clustering of the studies in the world and Iran on COVID-19 vaccine using the VOSviewer led to the formation of seven clusters. Four out of these seven identified clusters (yellow, green, red, and purple) entailed diverse concepts and words, namely “Infection, Pneumonia, Pandemic, Spike protein, SARS, Protein, Transmission, Chloroquine, Convalescent plasma, and ACE 2”. Therefore, these clusters were in a central and remarkable position because of repeated and common keywords with the most important interests of researchers of this domain in the world being in this cluster. Three of the seven clusters identified in Iran studies (blue, red, and purple) encompassed keywords “Spike protein, SARS, Infection, Pneumonia, Pandemic, Treatment, Convalescent plasma, ACE 2, and Cytokine storm” had a central and considerable position.

Hierarchical clustering in investigations in the world resulted in the formation of three clusters, including vaccine development approach, medical prevention, and immunotherapy. Among the three identified clusters related to world studies, the clusters vaccine development strategy and medical prevention were developed. On the other hand, the immunotherapy cluster is an emergent cluster with less important clusters that attract less attention. The hierarchical clustering in studies in Iran led to four clusters, namely immunotherapy, diagnosis and treatment cycle, medical prevention, and immunology.

Among four identified clusters, “diagnosis and treatment cycle” and “immunology” clusters were
developed but not central clusters. On the other hand, the immunotherapy cluster is emergent with less important subjects. The medical prevention cluster is central but not developed. In other words, this cluster is not mature yet.

Scientific collaboration in the country at the level of world and Iran studies led to five clusters. Although the USA, India, and China had most investigations, most links were for England and the USA, as shown in Figure 3. Moreover, clusters green and blue are of a central role because remarkable nations are in these clusters. It is noteworthy that Iran, China, Canada, and Saudi Arabia are in the same cluster. Iran cooperated with 76 countries in this field. In addition, Iran had the most cooperation with the USA and India in this domain.

Furthermore, the results of the current study revealed that 17 and 10 clusters resulted from scientific collaboration at the level of institutes in the world and Iran, respectively. According to Figure 5, most studies and links were related to the University of Oxford and Harvard Medical School. Clusters orange, green, and pink were in a central and important position because active institutes were in these clusters. In terms of citation, the three institutes National Institute of Allergy and Infectious Diseases, Fred Hutchinson Cancer Research Center, and Pasteur Institute were in the third ranks.

In the domain of Iran studies, although Tehran University of Medical Sciences and Shahid Beheshti University of Medical Sciences equally had the most studies and relationships, Shahid Beheshti University of Medical Sciences received the highest citations. As could be seen in Figure 6, clusters yellow and pink are regarded among important and central clusters due to possessing active Iranian institutes. Moreover, 10 and 8 clusters were formed by scientific collaboration at the level of researchers in studies in the world and Iran, respectively.

In the network of the cooperation of world researchers, although K. Dhama and E. Mahase had the most investigations and S. Ralph had the most studies and links. Regarding citations, S. Jason with seven investigations was in the first rank. Clusters brown and red were the important and central clusters in the cooperation of researchers due to the best researchers being in these clusters. According to the findings, K. Dhama, R. Tiwari, and P. Kumar had the best ranks in terms of centrality among world researchers.

In terms of closeness centrality, G. Iacobucci, E. Mahase, and Y. Liu had the best ranks. In addition, Y. Liu, S. Khan, and C. Atyeo were ranked 1-3 in betweenness centrality. In the cooperation network of researchers in Iran, Nima Rezaei received the most citations. Amin Talebi and Farid Rahimi made more relations, compared to other researchers, and formed a cluster with two nodes. However, other clusters had one member. Among Iran researchers, Mansournia, Soltani, and Rezaei had the highest centrality, and Akbari, Nabavi, and Ghaffari had the highest closeness centrality. Furthermore, Mansournia, Baradaran, and Eftekhar had the highest betweenness centrality.

Concerning the remarkable countries in the production and publication of studies, the results of the present investigation were in line with the findings of Surulinathi et al. (27) and Ahmad et al. (29). In addition, our results in terms of active researchers and institutes in this field were consistent with the findings of Ahmad et al. (29) and Ay et al. (30). In terms of the location of published studies and active institutes in the COVID-19 vaccine domain, the findings of the current investigation were congruent with the research of Ahmad et al. (29). Immunology, internal medicine, and experimental medical studies had the highest share in COVID-19 studies, especially in Iran. The latter finding is also consistent with the study performed by Ay et al. (30).

Conclusion

Considering the high prevalence of COVID-19 and increased mortality throughout the world, research on the COVID-19 vaccine in different aspects has become the priority of governments, scientific centers, and researchers in the world. Analysis and comparison of studies in the world and Iran in the field of COVID-19 vaccine in terms of subject and scientific collaboration lead to a better understanding of involved groups aimed to elevate investigations quantitatively and qualitatively followed by COVID-19 control in the shortest possible time. In other words, subjective analysis of studies and scientific collaboration can clarify the common subjects, in addition to identifying the existing limitations and activists. Consequently, the present situation is understood, and scientific, managerial, and executive policies are enhanced. As a result, novel research pathways might emerge.

Considering the importance of the COVID-19 vaccine and the published studies in this field, practical steps could be taken to further benefit in line with the international science borders. Some of these steps may entail identifying distinct aspects, procedures, tools, and technologies in the field of the COVID-19 vaccine based on the recognized words and concepts. Afterwards, planning and preparation could be completed using these steps in related execution and research projects. Based on the current study, the following recommendations could be made for future studies:

Subjective analysis of studies in this field in other indexing databases, such as Scopus and Google
Scholar to evaluate research in this domain in the world and Iran comprehensively.

Analysis of the content, concepts, and words of scientific documents related to COVID-19 vaccine in scientific databases in Persian in Iran and comparison of the structure of studies in Iran and the world.

Analysis of the content, concepts, and words of scientific documents in obtained domains and clusters from Iran and the world to identify the existing limitations.

**Acknowledgment**

We would like to extend our gratitude to Dr. Alireza Norouzi who guided the authors of the present study.

**Conflict of Interest**

The authors did not report any conflict of interest.
مطالعه پژوهشی، مربوط به واکس کووید 19 در ایران و جهان:

تحلیل موضوعی و همکاری‌های علمی

سیم جعفری باقی آبادی. رازیه فرشید و آزاد. گروه علم اطلاعات و دانش شناسی، دانشگاه صنعتی، دانشگاه تهران، تهران، ایران.

چکیده

زمینه و اهداف هدف پژوهش: قراردادی مربوط به موضوعی و همکاری‌های علمی پژوهش‌های مرتبط با واکسن کووید 19 در ایران و جهان Web of Science و Web of Co—Authors با روش تحلیل محتماً و قیفی که در مورد سلسله پژوهش‌های مرتبط با واکسن کووید 19 در جهان و ایران ابزار SPSS و UCINET ، Gephi، Bibexcel، و HistCite به کامل انجام شده است. تحقیق و تأثیر از این است. 

نتایج

درجه ترمیم، از این است. 

کلید واژه‌ها: آنتی‌بیوتیک، سیستم ترومبین، واکسیناسیون، واکسن کووید 19، SARS-CoV-2، پژوهش‌های مرتبط با واکسن کووید 19 در جهان و ایران.

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مقدمه

پس از شناسایی کرونا ویروس جدید، ایجاد اصطلاح CoV-2 در شهر ووهان استان هوبی در چین با تایید WHO و CoV-2 در شرایط شریعتی آن در سرتاسر جهان از این بیماری بسیار مرگباری از جوان‌ها و پیران‌ها، زنان و مردان در بیمارستانهای Asia می‌باشد و همچنین برای اینبایکی‌ها، ایجاد ایجاد این بیماری در دنیای درون‌نشسته و دارای دانش محضی بوده (۲ و ۳) به پژوهش‌های مربوط به این بیماری و جهان را طراحی و آزمون‌های مختلف می‌باشد.

SARS-CoV-2 از دیگر پژوهش‌ها و دسته‌بندی‌های مختلف یک سایت نسبتاً معترض Citation Databases کوتاهی، تعداد پژوهش‌های مربوط به روش جشن‌گیری داشته است. (۵)

در مقاله میکروب شناسی پزشکی ایران Majallah-i mikrub/shināsht-i pizishkāt-i Īrān.
با توجه به افزایش بیروزی مبتلاها و ممکن برای کاهش سرعت و عدم وجود درمان‌های جدی در بیهویی صرعی این بیماری و وجود ناقلین بدون علائم در جامعه از سوی دیگر، طراحی و تولید یک واکسن کارآمدی از همان ابتدا تعیین به اولویت نخست در چهارم، مراکز علمی و پژوهشگران جهانی علمی متعدد در تمام جهان تلاش و همکاری کرده‌اند تا بهمکاری پژوهشگران و آنالیتیک‌های بین‌مللی و سایت‌هایی مانند WHO و IMF بکار برده شود.

در ادامه می‌توان گفت که پیشرفت‌های آگاهانه و پیشرفت‌های پژوهشی در زمینه مقابله با این بیماری به وقوع واکسینه آزاد، و ایجاد واکسنی که توانایی مقابله با این بیماری را داشته باشد، بسیار مهم است. در این راستا، ابتدا به اهداف و بحران‌های زمانی و فضایی این بیماری اشاره می‌شود. به طور کلی، این بیماری در سال‌های اخیر به‌طور گسترده‌ای تا بیش از یک میلیون نفر در جهان درگیر شده است و همچنان در حال انجام است. همچنین، واکسن‌های جدید و غیرانتهایی در حال تولید و آزمون در سراسر جهان به‌صورت تجربه‌بندی و تجربه‌پیمایش، به منظور تولید واکسن‌های بهتر و احداث واکسن‌های جدید استفاده می‌شود.

در سیر زمانی واکسن‌های جدید و غیرانتهایی در حال تولید و آزمون در سراسر جهان به‌صورت تجربه‌بندی و تجربه‌پیمایش، به منظور تولید واکسن‌های بهتر و احداث واکسن‌های جدید استفاده می‌شود.

با توجه به افزایش بیروزی مبتلاها و ممکن برای کاهش سرعت و عدم وجود درمان‌های جدی در بیهویی صرعی این بیماری و وجود ناقلین بدون علائم در جامعه از سوی دیگر، طراحی و تولید یک واکسن کارآمدی از همان ابتدا تعیین به اولویت نخست در تمام جهان تلاش و همکاری کرده‌اند تا بهمکاری پژوهشگران و آنالیتیک‌های بین‌مللی و سایت‌هایی مانند WHO و IMF بکار برده شود.

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سمه جغفری باقی آبادی و راهی فرشید | مطالعه پژوهش‌های مرتبت با واکسن کووید 19 در ایران و جهان

۴۳۶

در ادامه به پرور دو پژوهش انجام شده با رویکردهای

سیره مطالعات و تحقیق‌های مربوط در سالم Surulinthi نمایش داده شد. در سال ۲۰۲۰ از محورهای خویش‌های پژوهشی در جهت واکسن کروناویروس و SARS-CoV-2 انجام شد. پژوهش فوق به بررسی تحلیل و مطالعه در جهت واکسن کروناویروس-که از ۱۹۹۱ در نمایش داده شده است. ۲۰۲۰ تا در ۲۰۲۰ رشد مطالعات در این زمینه چاپ می‌گردد. پژوهش دو تا ۲۰۲۰ با تمرین انتشار (۲۳) مقاله را نمایش می‌دهد و در خلال در حال انجام مطالعه با پژوهش‌ها و پژوهش‌های دیگر در این زمینه می‌باشد. تا سال ۲۰۲۰ این پژوهش در این زمینه انجام شده است.

در مطالعه‌ای دیگر، SURULINTHI (۲۷) مطالعات دیگری شامل مطالعات پژوهشی در این زمینه است. در سال ۲۰۲۱ دو پژوهش در مطالعه A و B در دو زبانه ۲۲۴ با بررسی و بررسی در این زمینه انجام شده است. در مجموع ۲۱۱ مطالعه درایافت Covid-19 که از این پژوهش در سال ۲۰۲۰ انجام گرفته‌اند، ۱۳۰ مقاله را نمایش می‌دهد و در خلال در حال انجام مطالعه با پژوهش‌ها و پژوهش‌های دیگر در این زمینه می‌باشد. تا سال ۲۰۲۰ این پژوهش در این زمینه انجام شده است.

در مطالعه‌ای دیگر، SURULINTHI (۲۷) مطالعات دیگری شامل مطالعات پژوهشی در این زمینه است. در سال ۲۰۲۱ دو پژوهش در مطالعه A و B در دو زبانه ۲۲۴ با بررسی و بررسی در این زمینه انجام شده است. در مجموع ۲۱۱ مطالعه درایافت Covid-19 که از این پژوهش در سال ۲۰۲۰ انجام گرفته‌اند، ۱۳۰ مقاله را نمایش می‌دهد و در خلال در حال انجام مطالعه با پژوهش‌ها و پژوهش‌های دیگر در این زمینه می‌باشد. تا سال ۲۰۲۰ این پژوهش در این زمینه انجام شده است.
نتیجه‌های علمی و همکاری به عنوان یکی از مهم‌ترین و جوهر مطالعات سنجشی علم، اهمیت بسایری در حوزه‌های مختلف کسب کرده است (21). مطالعه زانوی حاضر نشان می‌دهد که کلیدهای علمی گرد و بزرگ در حوزه کرونا و ایران در مطالعات واکسن SARS-CoV-2 فیش Web هم‌خورا و بازیگر ابتکار و نمایش هرکی می‌باشد در این سال، و ارتقای و عقلانیت، از اوزه‌های مرتبه با و اکسن در SARS-CoV-2، در جهان و ایران از نظر قابل اثر، زبان، کشور، مؤسسات و پژوهشگران مشترک کننده حوزه پژوهش و نشریات دارای جه ویژه‌ای هستند.

SARS-CoV-2 در جهان و ایران براساس تحلیل همبستگی و خوشنویسی SARS-CoV-2 در جهان و ایران براساس تحلیل همبستگی و خوشنویسی سلسه مارکی کدام است؟ خوشنویسی جهانی و تحلیل میزان طبقه بندی در این حوزه پژوهش‌های مرتبه با واکسن SARS-CoV-2 در جهان و ایران چگونه است؟

امتحاک کدام است؟

مواد و روش‌ها
پژوهش حاضر از نوع توصیفی-تحلیلی با رویکرد‌های پژوهشی و پروری از روش تحلیل محتوا و فنون تحلیل محتوا، واریانس و خوشنویسی سلسه مارکی بازاریابی، همبستگی و تحلیل شبکه اجتماعی انجام شده است. روش تحلیل همبستگی که در Content مقدماتی برای روش‌های در این بررسی یافته داشته و روش‌های در Analysis نشان داده باید یک نمونه از Node (موجودیت) بر اساس گره‌های ترکیبی در نقش‌های علمی است. استفاده از نشاندهندگی گره‌های مختلف دیگر در نقش‌های علمی است. استفاده از نشاندهندگی گره‌های مختلف دیگر در نقش‌های علمی

1. در هر یک از مطالعات، حوزه پژوهشی ممکن است با انتخاب کمتری دارند.
2. هر یک از مطالعات، حوزه پژوهشی ممکن است با انتخاب کمتری دارند.
3. هر یک از مطالعات، حوزه پژوهشی ممکن است با انتخاب کمتری دارند.
4. هر یک از مطالعات، حوزه پژوهشی ممکن است با انتخاب کمتری دارند.

RA تهیه شده و همکاری به عنوان یکی از مهم‌ترین جوهر مطالعات سنجشی علم، اهمیت بسایری در حوزه‌های مختلف کسب کرده است. مطالعه زانوی حاضر نشان می‌دهد که کلیدهای علمی گرد و بزرگ در حوزه کرونا و ایران در مطالعات واکسن SARS-CoV-2 فیش Web هم‌خورا و بازیگر ابتکار و نمایش هرکی می‌باشد در این سال، و ارتقای و عقلانیت، از اوزه‌های مرتبه با و اکسن در SARS-CoV-2 در جهان و ایران از نظر قابل اثر، زبان، کشور، مؤسسات و پژوهشگران مشترک کننده حوزه پژوهش و نشریات دارای جه ویژه‌ای هستند.

SARS-CoV-2 در جهان و ایران براساس تحلیل همبستگی و خوشنویسی
جدول ۱ وضیعت پژوهش‌های مرتبط با واکسن کووید ۱۹ در جهان

| نوع پژوهش | جایگاه چهارم | جایگاه سوم | جایگاه دوم | جایگاه اول |
|------------|-------------|-------------|-------------|-------------|
| Letter     | (تعداد، درصد) | (تعداد، درصد) | (تعداد، درصد) | (تعداد، درصد) |
| ترکی     | ۳/۱۱     | ۳/۱۸     | ۳/۲۱     | ۳/۳۴     |
| ایتالیا   | ۳/۵۴     | ۳/۶۸     | ۵/۹۱     | ۵/۹۱     |
| اکلیس   | ۳/۶۴     | ۱۱/۶۴     | ۱۱/۶۴     | ۱۱/۶۴     |
| چین     | ۱۱/۶۴     | ۱۱/۶۴     | ۱۱/۶۴     | ۱۱/۶۴     |
| کشور     | ۹/۶۳     | ۹/۶۳     | ۹/۶۳     | ۹/۶۳     |
| پژوهشگر   | ۸/۶۳     | ۸/۶۳     | ۸/۶۳     | ۸/۶۳     |
| Dharma K, Mahase   | ۸/۶۳     | ۸/۶۳     | ۸/۶۳     | ۸/۶۳     |

| مؤسسه     | جایگاه چهارم | جایگاه سوم | جایگاه دوم | جایگاه اول |
|------------|-------------|-------------|-------------|-------------|
| NIH NATIONAL INSTITUTE OF ALLERGY INFECTION DISEASES NIAD (NIAID) | (۷/۳۱۷, ۱۴۰) | (۷/۳۱۷, ۱۴۰) | (۷/۳۱۷, ۱۴۰) | (۷/۳۱۷, ۱۴۰) |
| EUROPEAN COMMISSION | (۷/۳۱۷, ۱۴۰) | (۷/۳۱۷, ۱۴۰) | (۷/۳۱۷, ۱۴۰) | (۷/۳۱۷, ۱۴۰) |
| NATIONAL NATURAL SCIENCE FOUNDATION OF CHINA NSFC | (۷/۴۳۴, ۲۱۰) | (۷/۴۳۴, ۲۱۰) | (۷/۴۳۴, ۲۱۰) | (۷/۴۳۴, ۲۱۰) |
| NATIONAL INSTITUTES OF HEALTH NIH USA | (۷/۴۳۴, ۲۱۰) | (۷/۴۳۴, ۲۱۰) | (۷/۴۳۴, ۲۱۰) | (۷/۴۳۴, ۲۱۰) |
| UNITED STATES DEPARTMENT OF HEALTH HUMAN SERVICES | (۷/۴۳۴, ۲۱۰) | (۷/۴۳۴, ۲۱۰) | (۷/۴۳۴, ۲۱۰) | (۷/۴۳۴, ۲۱۰) |
| BMJ-BRITISH MEDICAL JOURNAL | (۷/۴۳۴, ۲۱۰) | (۷/۴۳۴, ۲۱۰) | (۷/۴۳۴, ۲۱۰) | (۷/۴۳۴, ۲۱۰) |

سیم جغرافیایی آبادی و راهی، شرکت | مطالعه پژوهش‌های مرتبط با واکسن کووید ۱۹ در ایران و جهان

کلیدوژه‌های هریک از خوشه‌های دیده امده از طریق نمونه‌برداری UCINET مربوط و چگالی خوشه‌ها با استفاده از طرح‌های تعداد و نمونه‌برداری راهبردی توصیف ارتباط درونی و همبستگی بین خوشه‌های موضوعی متفاوت است. در این نمونه‌برداری از محور لفیجه ارائه مرکزی (میزان همبستگی خوشه‌ها) از محور عمومی جهت ارائه تراکم (میزان توان ارتباط درونی هر خوشه) استفاده می‌شود.

یافته‌ها

با استفاده از WOS و اسناد واکنش از تعداد HistCite تعداد ۵۰ پژوهشی مرتب طی سال‌های ۲۰۰۰ تا ۲۰۰۵ و نویسندگان وابسته به تعداد و ابزار تعداد و سال از ۱۴۰ کنش در این مطالعات مشارکت مشترک می‌باشد از لحاظ پایگاه‌های انجام یافته شده در این مطالعات ویژه‌گری و پژوهشگران مشترک‌کننده، حوزه - دایر پژوهشی و نشریات در جدول ۱ امده است. به‌طور متقابل هر یک اثر مربوط به ۵۰۶۸ Citation دریافت کرده است همچنین این جدول از درصد H index
نکته قبل توجه جایگاه ایران در میان کشورهای مشارکت کننده است که با ۱۹۶ مطالعه، رتبه ۱۰ را از آن خود کرده است. پس از محدودسازی نتایج بازبینی شده به کشور ایران، نتایج که پژوهش مرتب طی سال‌های ۲۰۱۷ و ۲۰۱۹ که با وابسته به ۱۵۸۳ نویسنده و با استفاده از ۳۲۵ دانشگاه و مؤسسه علمی با همکاری ۷۶ کشور همکار در این مطالعات مشارکت داشته‌اند برای این سال‌ها با بیش از ۱۱۱۰۰ شناسایی و تحلیل مورد بررسی قرار گرفته‌اند. تحقیقات مشترک ترکیبی از سطح‌های مختلف به‌طوری که شامل از شاخص‌های بازیابی و نتایج به‌کارگیری در دستگاه‌های مختلفی می‌باشد. این نتایج باعث شده که در این سال‌ها به‌طور میلیون‌ها مطالعه در ایران شناخته شده و همکاری دانشگاه‌های مختلف از مطالعات ایران در WOS. WOS در این سال‌ها به‌طور میلیون‌ها مطالعه در ایران شناخته شده و همکاری دانشگاه‌های مختلف از مطالعات ایران در WOS.

| جایگاه نجمه | جایگاه چهارم | جایگاه سوم (تعداد، درصد) | جایگاه دوم (تعداد، درصد) | جایگاه اول (تعداد، درصد) |
|-------------|-------------|----------------|----------------|----------------|
| - | - | Letter | Editorial Material | Article |
| Akbari A, Hemmat N, Iravani S, Khodaviridipour A, Lotfi M, Neghadaripour M, Nosrati H, Pormohammad A, Rahimi F, Ranbar R, Sadeghi S, Sahebkar A, Soltani S, Soufi GJ, Zandi M | Abadi ATB | Rezaei N | | |
| دانشگاه علوم پزشکی ایران | دانشگاه علوم پزشکی شهید بهشتی | دانشگاه علوم پزشکی تبریز | | |
| HAMADAN UNIVERSITY OF MEDICAL SCIENCES | CIAR, NATIONAL INSTITUTE OF GENETIC ENGINEERING AND BIOTECHNOLOGY NIGEB OF THE ISLAMIC REPUBLIC OF IRAN, PASTEUR INSTITUTE OF IRAN, SHIRAZ UNIVERSITY OF MEDICAL SCIENCES | TEHRAN UNIVERSITY OF MEDICAL SCIENCES | | |
| IRAN'S NATIONAL ELITES FOUNDATION | | | | |
| MELAN; TUBITAK, | | | | |
| INFLUENCE OF BONE AND JOINT SURGERY-ABJS, | EXPERT REVIEW OF ANTI-INFECTIVE THERAPY, | JOURNAL OF CELLULAR PHYSIOLOGY, | | |
| REVIEWS OF INFECTIONOUS DISEASES | | | | |
| BIOCHEMISTRY MOLULAR BIOLOGY | | | | |
| RESEARCH EXPERIMENTAL MEDICINE | | | | |
| IMMUNOLOGY | | | | |

| نوع | نویسنده | پژوهشگر | مؤسسه |
|------|---------|------------|---------|
| جلد ۲ | وضعيت پژوهشگر مرتب با واکسن کووید ۱۹ در ایران | | |
سری جغرافی باقی آبادی و راهبه فرشید | مطالعه پژوهش‌های مرتبط با واکسن کووید ۱۹ در ایران و چهار

فراخوانی از نوبندگان و با استفاده از نرم‌افزار SPSS فراخوانی از نوبندگان و با استفاده از نرم‌افزار SPSS فراخوانی از نوبندگان و با استفاده از نرم‌افزار SPSS فراخوانی از نوبندگان و با استفاده از نرم‌افزار SPSS فراخوانی از نوبندگان و با استفاده از نرم‌افزار SPSS فراخوانی از نوبندگان و با استفاده از نرم‌افزار SPSS

چهار و ایران وارد نرم‌افزار VOSviewer در ادامه نقش دانش پژوهش‌های چهار و ایران و کلیدوژوه‌های برتر آن بر اساس سن‌به‌سنگهای مرکزی آمده است.

الف. مطالعات چهار و ایران

به دنبال تحلیل همبستگی مطالعات اندک حوزه از واژگان و مفاهیم شناسایی شد. براساسدیرین پژوهش با عنوان «Cryo-EM structure of the 2019-nCoV spike in the» Goldsmith, JA, Abiona, O Jsieh, CL, Corbett, KS, Wang, NS, Wrapp, D از مجله «SCIENCE» در سال ۲۰۲۰ به چاپ رسیده است. تصویر ۱ نقشه مفاهیم مطالعات چهار و ایران در حوزه پژوهش واکسن کووید را نشان می‌دهد. لازم به ذکر است نظری درباره نشان‌دهنده کاربرد بیشتر آن مفاهیم در توصیف آثار و رنگ‌دانش تخلف شده مفاهیمی است. ضمن اینکه در این نقشه دوری و نزدیکی کلیدهای نشان می‌دهد که مفاهیم چه‌ مقدار به هم‌دیگر مرتبط هستند.

تصویر ۱. مفاهیم و خوشه‌های موضوعی مطالعات چهار در حوزه واکسن کووید ۱۹

نقشه شش‌اند. در این نمودار ارتقاء هر یک از خوشه‌ها بیانگر آن است که دو خوشه موردنظر در چه نقطه‌ای با یکدیگر ترکیب شدند. همچنین خطوط عمودی قرمز رنگ خط شاخه تفسیر است که با نظر متخصص موضوعی ترسیم می‌گردد (۶۴).
ACE2
angiotensin-converting antiviral antiviral drug
BCG
Cancer
child
clinical trial
covalescent plasma
Cytokine storm
Diagnosis drug
Drug repositioning
Immunity
immunotherapies
Infection
Inflammation
Influenza
innate immunity
knowledge
Mortality
neutralizing antibodies
pandemic
Pathogenesis
pneumonia
SARS
Serology
social distance
spike (S) protein
Spikeglycoprotein
T cell
Transmission
Treatment
vaccination
vaccine
Vaccin development
adjuvant Corona
Coronavirus infection
COVID-19 vaccine epidemic
Epitope Hydroxychloroguine
Immunization
immunoinformatic
Immunology
Infectious disease
Molecular docking
Mutation
Outbreak prevention
Public health
receptor binding
domain
Remdesivir
Safety
Therapeutics
vaccine hesistancy

خوش‌های اول: راهبرد ساخت واکسن

خوش‌های دوم: ایمونوتراپی
خوشه سوم: پیشگیری پزشکی.

با توجه به شناسایی، مطالعه، و بررسی موضوعات موجود در COVID-19 pandemic، انتخاب نام پیشگیری پزشکی مناسب بنا به نظر می‌رسد.

پس از تشکیل ماتریس برای هر کدام از خوشه‌ها و فراوانی این تکنیک UCINET نمره مرکزی و تراکم خوشه‌ها مشخص گردید و نمونه‌گیری را به‌سادگی انجام دادند. نمرات مربوط به تراکم و مرکزیت خوشه‌ها در جدول ۱ آمیخته داده‌شد است. لازم به ذکر است که یکی از نمونه‌های خوشه‌های برای نظامیت گردید. تنظیم گردید.

خوشه اول: راهبرد ساخت واکسن.

نتایج مربوط به تحلیل هم‌اوازی‌گانی نشان داد که خوشه ۱ بزرگترین خوشه تشکیل شده بوده. کلید‌واژه‌های: ACE2، Antibodies، BCG، Cancer، Immune response، Infection، clinical trial، convalescent plasma، واکسن.

خوشه دوم: ایمونوتراپی.

کلید‌واژه‌های: Epitope adjuvant، Epitope، Vaccine، Safety، Remdesivir، prevention، Immunosuppression، واکسن.

خوشه را ایمونوتراپی نام گذاری نمود.

جدول ۱. تراکم و مرکزیت خوشه‌های حاصل از تحلیل هم‌اوازی‌گانی پژوهش‌های جهان

| شماره خوشه | عنوان خوشه | مرکزیت | تراکم |
|------------|------------|---------|-------|
| ۱           | خوشه ۱: راهبرد ساخت واکسن | ۲۲/۴۷ | ۰/۵۷ |
| ۲           | خوشه ۲: ایمونوتراپی | ۰/۴۲ | ۰/۲۴ |
| ۳           | خوشه ۳: پیشگیری پزشکی | ۲۰/۵۸ | ۱/۷۵ |

خوشه اول خوشه ۱ راهبرد ساخت واکسن با مقدار ۲۲/۴۷ بیشترین مرکزیت و خوشه ۳ پیشگیری پزشکی با مقدار ۱/۷۵ بالاترین تراکم را دارا هستند. این بدان معنایست که خوشه
ب. مطالعات ایران

به دنبال تحلیل هیپوژنی مطالعات ایران در حوزه پزوهشی واکسن کووید ۱۹، خوشش از واکنش و مفاهیم شناسایی شد. براساس ترین پژوهش با عنوان «COVID-19, an emerging coronavirus infection: advances and prospects in and developing vaccines, immunotherapeutics, designing Sharun, K; Dhama, K; Malik, YS; Singh, KP; Chaicumpa, Tiwari, R; Dadar, M HUMAN VACCINES & IMMUNOTHERAPEUTICS» از نویسنده‌گان «W» در سال ۲۰۲۰ به‌جای رسیده است. تصویر ۳ نشان دهنده مفاهیم موجود در حوزه پزوهشی واکسن کووید را نشان می‌دهد.

تصویر ۳. نمودار راهبردی حوزه پزوهشی جهان مرتبط با واکسن کووید

با توجه به تنوع موضوعی در این حوزه و نمودار راهبردی تریسته شده (تصویر ۳)، خوشش‌ها در سه منطقه اول، دوم و سوم حضور دارند. همانطور که نمودار راهبردی نشان می‌دهد، خوشش
مجله میکروبشناسی پزشکی ایران، سال 15، شماره 15، مرداد و شهریور 1400

تصویر 5. خوش‌های سلسله مردانه پزشکی ایران مرتب‌با وایکس کووید 19

SARS، prevention، pandemic، Outbreak، MERS، SARS-CoV-2

در مرحله بعدی نمودار دندوگرام (خوش‌های سلسله مردانه) موضوعات پژوهش‌های ایران ترسیم شد. همان‌طور که در تصویر 5 مشاهده می‌شود، کلیدی‌های پژوهش‌های پژوهش‌های مردانه‌ی سلسله چهار خوش‌های تشکیل داده‌اند که در ادامه خوشه‌های مذکور بررسی می‌شوند.

خوش‌های اول: ایمونوتراپی

نتایج مربوط به تحلیل هم‌ارزانی نشان داد که در،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،،，
جدول ۴. تراکم و مرکزیت خوشه‌های حاصل از تحلیل همبستگی پژوهش‌های ایران

| شماره خوشه | مرکزیت | تراکم | عنوان خوشه |
|-------------|---------|--------|-------------|
| ۱ | ۱۳/۳ | ۰/۶۶ | خوشه ۱: ایمونوتراپی |
| ۲ | ۱ | ۰/۱ | خوشه ۲: چرخه تشخیص و درمان |
| ۳ | ۱/۵ | ۰/۴ | بیشگیری پژشکی |
| ۴ | ۱ | ۰/۱ | خوشه ۴: ایمونوتراپی |

همچنین پیوندهایی در بین سایر کلیدواژه‌ها داراست. در نمونه راهبردی محور افقی نشان دهنده مرکزیت (میزان همبستگی خوشه) و محور عمودی نشان دهنده تراکم (میزان توان ارتباط درونی هر خوشه) است. در ادامه نمونه راهبردی بر اساس نمودار فوک ترسیم شده است.

**تصویر ۶. نمودار راهبردی جهت پژوهش‌های ایران مرتبط با واکسن کووید ۱۹**

به‌صورت آماری، به منظور تررسیم تقاطع‌های همکاری علمی در جهت پژوهش‌های واکسن کووید ۱۹ در سطح کشور به‌وسیله ویژه‌گری تمامی مطالعات استخراج شده از WOS و VOSviewer تاکید می‌شود. در ادامه نماده‌های همکاری علمی کشورها در پژوهش‌های جهان و ایران آمده است.

**الف. مطالعات جهان**

به‌دلیل تحلیل همبستگی مطالعات این جهان در سطح همکاری کشورها، ۵ خوشه از کشورهای آمریکا، چین، آلمان و انگلیس که به نظر می‌رسد که در ناحیه خاص قرار دارند.
تصویر 7. نقشه همکاری علمی کشورها در مطالعات جهان در خوزه واکسن کووید ۱۹.

تصویر 8. نقشه همکاری علمی کشورها در مطالعات ایران در خوزه واکسن کووید ۱۹.
الف. مطالعات جهان

به دنبال تحلیل همبستگی مطالعات این حوزه در جهان
در سطح همکاری سازمان ها، 17 خوشه شامل مراکز و موسسات
علمی شناسایی شد (تصویر ۹).

ب. مطالعات ایران

در تحلیل همبستگی مطالعات این حوزه در ایران در
سطح همکاری سازمان ها، 10 خوشه از مراکز و موسسات
مشارکت کننده شناسایی شد (تصویر ۱۰).
ب. مطالعات ایران
در تحلیل همبستگی مطالعات این جهان در ایران در سطح همکاری پژوهشگران، 16 خوشه شامل پژوهشگران مشارکت کننده شناسایی شد (تصویر 11). در ادامه نقشه همکاری علمی پژوهشگران در پژوهش‌های جهان و ایران آمده است.
الف. مطالعات جهان
به دنبال تحلیل همبستگی مطالعات این جهان در سطح همکاری پژوهشگران، 10 خوشه از پژوهشگران شناسایی شد (تصویر 12).

تصویر 11. نقشه همکاری علمی پژوهشگران در مطالعات جهان در حوزه واکسن کووید-19

تصویر 12. نقشه همکاری علمی پژوهشگران در مطالعات ایران در حوزه واکسن کووید-19
یک شاخص قدرت کنترل‌کننده مستقیم و غیرمستقیم جریان اطلاعات در شبکه شمرده می‌شوند. همچنین مقدار مرکزیت بین‌این‌الات بین صفر و یک است. در حالی که یک گره هنگامی از ورود در جریان اطلاعات در شبکه بین‌این‌الات، این صورت این گره خود می‌تواند کانال‌دهای نقله عطف بوده و از موقعیت منحصربهفرد برخوردار باشد (32). در ادامه پنج پژوهشگر برتر جهان در این جریان بر اساس هر یک از شاخص‌های مرکزیت در جدول 5 آن‌ها است. در ادامه برخی از شاخص‌های مهم در شبکه همکاری علمی پژوهشگران جهان گزارش شده است. در ادامه پنج پژوهشگر برتر ایران در این جریان به ترتیب شاخص‌های مرکزیت آن‌ها است. در ادامه برخی از شاخص‌های مهم در شبکه همکاری علمی پژوهشگران ایران گزارش شده است.

جدول 5. پنج پژوهشگر برتر مطالعات جهانی برای افراد و اکستروفیک 19 بر اساس سنجه‌های مرکزیت

| پژوهشگر | مرکزیت درجه | شاخص‌های مرکزیت | شاخص‌های مرکزیت
|----------|---------------|---------------------|---------------------|
| Dhama K  | 30            | Iacobucci G        | Liu Y              |
| Tiwari R | 22            | Mahase E           | Khan S             |
| Kumar P  | 20            | Liu Y              | Atyeo C            |
| Malik YS | 20            | Shi PY             | Baric RS           |
| Patel SK | 18            | Wang L             | Shi PY             |

جدول 6. شاخص‌های مهم در شبکه همکاری علمی پژوهشگران جهان

| شاخص‌های مهم | درجه |
|---------------|------|
| بانک امور | 8    |
| سیستم بانک | 187  |
| سیستم هزینه | 56  |
| سیستم مالی | 565  |
| نظام حسابدار | 5   |
| نظام اقتصادی | 067  |
| نظام ثروتی | 153  |
| نظام اقتصادی | 132  |
جدول 7. نشان‌های مهم در شبکه همکاری علمی پژوهشگران ایران

| میانگین درجه | 4/274 | مانندگی درجه |
|---------------|-------|---------------|
| فاصله انحراف معیار | 0/184 |
| قطر شبکه | 11 |
| میانگین طول مسیر در شبکه | 3/295 |
| فشردگی شبکه | 0/277 |
| وسعت شبکه | 0/277 |

جدول 8. نشان‌های مهم در شبکه همکاری علمی پژوهشگران ایران

| میانگین درجه | 6/128 |
|---------------|-------|
| اج ایندکس | 30 |
| تراکم شبکه | 0/65 |
| نسبت مولفه‌ها | 0/383 |
| اجرا | 28 |
| اتصال شبکه | 0/224 |
| مرکز شبکه | 1/189 |
| افتکار شبکه | 7/766 |
| افتکارگر شبکه | 2/737 |
| فاصله انحراف معیار | 0/154 |
| قطر شبکه | 8 |
| میانگین طول مسیر در شبکه | 2/555 |
| فشردگی شبکه | 0/224 |
| وسعت شبکه | 1/223 |

بحث
نتایج نشان داد در باره زمانی ۲۰۲۱ تا ۲۰۱۹ در پایگاه WOS تعداد ۶۰۰ پژوهش مربوط از ۲۹۴۷۳ نویسنده وابسته به ایران شناسایی شد.
به شکل ۵ خوش‌شته در مطالعات جهانی و ایران در مجموع نیوتروژنیک و آنتی‌بیوتیک مطرح شده است. همچنین در ارائه این آنتی‌بیوتیک‌ها در جیره‌ها و بهبود این درمانات درمانی استفاده شده است. با این حال باید به‌نظر گرفته شود که این مطالعات در حال انجام است و نتایج نهایی آن‌ها به‌طور کامل نشان‌دهنده مواردی است که باید دوام یابد و به روزرسانی شود.
خوش‌های مهم و مرکزی در همکاری پژوهشگران چهار نام بر، بر اساس نتایج دست‌امده در میان پژوهشگران برتر جهان به کامپار و Tiwari R. و Dharma K. و Iacobucci G. و Karian Y. و Mahase E و مرکزیت بین‌بانی نیز به ترتیب در Ayteo که Y. و Khan S. و Liu Y. و مطابق با برترین رتبه‌ها و از نظر برخی از شیخه‌های پژوهشگران ایران نیما رضایی حائز بیشترین استعدادهای دریافتی است؛ از طرف دیگر امین طالبی و فردی رحمی، نیز پژوهش‌های دیگر ارتباطات بیشتری را برقرار نموده‌اند و تشکیل یک خوش‌بازی در داده‌ها در صورتی که سایر خوش‌ها نک و فناوری‌های گوناگون و … در جهت تفکر این جهان افرادهای تا بازرسی پژوهش‌ها و تحقیقات شناسایی شده و سپس انجام برنامه‌ریزی، ادامه و بازگشت و مفاهم‌شناسی شده و سپس استفاده از آنها در پژوهش‌های اجرایی و پژوهش مرتبی اقدامات جدی به عمل آورد. این است که با اساس پژوهش حاضر، پیشنهادات برای انجام پژوهش‌های آن را می‌شود:

- تحلیل موضوع‌های مطالعاتی این جهت در دگر یک‌دیگر داده‌ها استنداد تعریف اسکوپوس و گوگل اسکوپوس به منظور ارزیابی جامعتری از وضعیت پژوهش‌های این جهات در جهان و ایران.

- تحلیل محترم و ساختار مفاهیم و وژگون کردن مدل منبعی مرتبط با واقعیت کوانتی در یک‌دیگر اطلاعات علمی به زبان فارسی در داخل کشور و مقایسه ساختار مطالعات داخل و خارج از کشور در این جهت.

- تحلیل محترم و ساختار مفاهیم و وژگون کردن مدل منبعی زیر حوزه‌ها و خوش‌های حاصل در مطالعات ایران و جهان به منظور شناسایی شکاف‌های موردی. سپس‌گزاری

- با تقدیر و تشکر شایسته از استاد فرهیخته، جناب آقای دکتر علیرضا نوروزی که باید از دیگر دانشجویان و راهنما و راهنماشای نگارندهای در مری رابطه پژوهش بوده‌اند.

نتیجه‌گیری

تأثیر در منابع

نیوپنگ گردن همی چهگونه تعریف در منابع را گزارش نکرده‌اند.

مباحث مالی

نیوپنگ گردن تامین شده است.
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