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Mapping of Adrenal Gland Diseases Research in Middle East Countries: A Scientometric Analysis, 2007-2013

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***Abstract*—**The aim of the study was to map scientific research on adrenal gland diseases in the Middle East countries through the Web of Science database using scientometric analysis. Data were analyzed with Excel software; and HistCite was used for mapping of the scientific texts. In this study, from a total of 268 retrieved records, 1125 authors from 328 institutions published their texts in 138 journals. Among 17 Middle East countries, Turkey ranked first with 164 documents (61.19%), Israel ranked second with 47 documents (15.53%) and Iran came in the third place with 26 documents. Most of the publications (185 documents, 69.2%) were articles. Among the universities of the Middle East, Istanbul University had the highest science production rate (9.7%). The Journal of Clinical Endocrinology & Metabolism had the highest TGCS (243 citations). In the scientific mapping, 7 clusters were formed based on TLCS (Total Local Citation Score) & TGCS (Total Global Citation Score). considering the study results, establishment of scientific connections and collaboration with other countries and use of publications on adrenal gland diseases from high ranking universities can help in the development of this field and promote the medical practice in this regard. Moreover, investigation of the formed clusters in relation to Congenital Hyperplasia and puberty related disorders can be research priorities for investigators.

***Keywords*—**Mapping, scientific research, adrenal gland diseases, scientometric

I. Introduction

SCIENTOMETRICS is a quantitative method which evaluates and compares scientific publications of countries, universities, scientific institutions, special subjects and authors [1]. Mapping the scientific structure and following their latest changes has been the focus of interest for scientists, librarians, philosophers, government officials and publishers. Scientific texts are considered as the main material for this mapping. While mapping the scientific structure, three parts should be considered: individual elements, related elements forming a network and the interpretation of inter-element relations [2].

The depiction of scientific structure is conducted via different software. One of them is HistCite which uses Web of Science database to present valuable results to researchers in the form of different tables and charts with various indices. HistCite is a software package which has been developed as a result of long-term evaluation of needs of users of citation databases. Librarians and users need to know important publications in a particular field or topic. Researchers will be interested in reviewing the science history and emerging new topics as well. HistCite is, therefore, developed to fulfill the needs of both groups. The software uses a data mining method based on analyzing the citation links between different evidences. The software can be used by reference librarians who prepare Bibliographic tools on an unknown topic, map citation databases in a two-dimensional manner, determine important works and know core and important journals [3].

Numerous studies on scientometrics and scientific publications have been conducted. Gomez et al. have surveyed scientific publications on rare diseases in Spain between 1990-2000. Findings indicated that out of 2978 studied sources, seven organizations affiliated with hospitals had the most scientific publications, among which 82.5% were research-based and 17.3% review-based. There were 14725 authors and the average number of authors per paper was 4.9 [4].

Patra et al. reviewed the scientific publications in India between 1982-2005 using Web of Science and PubMed. Findings suggested that 2178 papers had been written about AIDS. Indian researchers published 118 papers in Indian Journal of Medical Research. The most prolific author was Solomon from Madras Medical College. The University of Delhi with 528 papers, or 24.2% of all papers, had the most scientific publications in this field [5]. Vitzthum et al. have surveyed scientific publications on curvature of the spine which were published between 1907 and 2007. Findings showed that in sum, 8186 papers have been published by 76 countries in this field. The USA, England and Canada had the most papers and Bradford was the most prolific author in this regard [6]. Yang et al. [7], Ramos et al. [8], Signore et al. [9], Stegmann and Grohmann [10], Patra et al. [11] have reviewed papers on Pediatric Dental, microbiology in Spain, Nuclear medicine, bird flu and cancer in India, respectively. In addition, Mirjalili and Osareh [12], Hamdipour and Osareh [13], Rahimi Movaghar et al. [14], Shirshahi et al. [15], Hodhodinezhad et al. [16], Namdar et al. [17], and Mohamadi and Yazdizadeh [18] have conducted studies on genetics and heredity, Multiple sclerosis-related, addiction, surgery, traditional medicine, Parasitology and nursing, respectively.

Evaluation of the scientometric researches in the Middle East showed that so many researches have been carried out, in

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the world and Middle East, on the field of scientometric and mapping. So regarding the significance of adrenal gland disease as an important endocrine disease, conducting this research seems to be more necessary than ever in order to evaluate the scientific products of this disease and compare the Middle East countries. Comparison of the existing condition in the Middle East countries in terms of scientific productions can provide a wide prospective for policy makers to remove the obstacles in order to reach the desired point. The aim of this study is to map scientific productions on adrenal disease in the Middle East through WOS in 2007-2013.

II. Material and Methods

The present study is an analytical with scientometric approach. The studied population included all indexed scientific external data on adrenal gland diseases in the Web of Science database for the period 2007-2013. Data collection was done through the advanced search section of the database. In order to identify and extract external data in this field, the following search strategy was used in the advanced search section.

TI (Title)=(Descriptor or Entry Term) AND CU (Country)=(Country Name) AND Publication Year=(2007-2013)

Adrenal gland disease describers and entry terms were chosen from MeSH (Medical Subject Heading) to search in the Web of Science database. Every describer was searched based on Title. Then, search results were limited to the Middle East countries (17 countries) and to the period 2007-2013.

17 countries from the Middle East were considered for the study (Iran, Turkey, Israel, Iraq, Egypt, Yemen, Bahrain, Jorden, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, UAE, Cyprus, Palestine). Data were saved as plain text and the data analysis was performed using HistCite software. In order to examine the publications in terms of citation, the TLCS and TGCS indices were used. The TGCS index indicates the total number of citations that belongs to retrieved papers separately in Web of Science database for each year. The TLCS index indicates the total citations belonging to the retrieved papers in the set (The Middle East region) for each year, and finally the scientific map is drawn.

III. Results

Following a search in Web of Science database, a total of 268 records were retrieved with regard to adrenal gland diseases in the period 2007-2013. The trend of publications by year is shown in Table I based on TLCS and TGCS indices.

Among Middle East countries, Turkey is ranked first in terms of scientific publications on adrenal gland diseases with 164 scientific publications (61.19%). Israel (47 scientific publications or 17.53%) and Iran (27 scientific publications or 10.07%) are ranked second and third respectively. Iraq has the lowest scientific publications in this field with only 1 scientific publications. No scientific publication was found for Qatar, Bahrain, Oman, UAE, Syria, Yemen, Jordan and Palestine. According to TLCS index, Turkey, Israel and Iran are the top three countries in terms of local citations with 16, 5 and 4 citations respectively. According to TGCS index, Turkey, Israel, Egypt and Iran are the top 4 countries in terms of global citations with 569, 360, 95 and 76 citations, respectively. (Table I)

TABLE I
Top Countries in the Middle East by Scientific Publications on Adrenal Gland Diseases in the Period 2007-2013

Country	Document	TLCS	TGCS	Total %
Turkey	164	16	569	61/19
Israel	47	5	360	17/53
Iran	26	4	76	9/7
Saudi Arabia	10	0	8	3/73
Egypt	6	0	95	2/23
Kuwait	6	0	3	2/23
Cyprus	4	4	21	1/49
Lebanon	3	1	49	1/11
Iraq	2	0	1	0/74
Qatar, Bahrain, Oman, UAE, Syria, Yemen, Jorden, Palestine	0	0	0	0
Total	268	30	1182	100

Fig. 1 shows the trend of scientific publications on adrenal gland diseases for Middle East countries in the period 2007-2013. Findings indicate that most retrieved records are from 2009 (50 publications) and the fewest records were found in 2007 (24 publications).

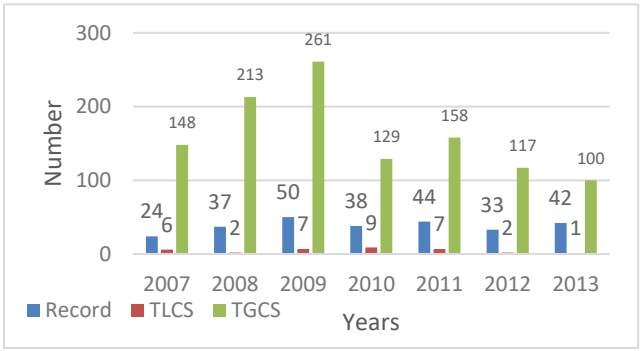

Fig. 1 The trend of scientific publications in Web of Science database in the period 2007-2013

According to TLCS and TGCS indices, the highest TLCS is for 2010 (9 citations) and the lowest is for 2013 (1 citation). In terms of TGCS, the highest number of citations is for 2009 (261 citation) and the lowest is for 2013 (100 citations).

With regard to the document types, article was ranked first with 185 records followed by Meeting Abstract with 49 records, Letter with 12 records, Review with 10 records, Editorial Material with 5 records and other forms with 7 records.

With regard to the authors in Iran and the Middle East defined that a total of 1125 authors worked in the field. Examining the whole results based on TGCS from high to low indicted that Gone EN from Turkey with 3 papers (TGCS=108) and the authors of a paper titled “Corticotropin

tests for hypothalamic-pituitary-adrenal insufficiency: A metaanalysis" had the highest TGCS.

In terms of TLCS index, Neocleous V and Phylactou LA from Cyprus with 4 records (TLCS=4) were ranked first, followed by Ioannou YS from Cyprus with 3 records (TLCS=4), Najmabadi from Iran with 2 records (TLCS=4) who were ranked second and third, respectively. Then, Saffari F from Iran, Azar M from Lebanon and Skordis N from Cyprus had jointly the fourth ranking.

It is really important to determine core journals in each field. When assessing journals, an important criterion is the number of published papers in journals and citing papers in those journals. When reviewing retrieved records on adrenal gland disease publications, it was found out that papers were published in 138 journals. Hormone Research with 25 papers is ranked first followed by Journal of Pediatric Endocrinology and Metabolism with 23 papers, Pediatric Nephrology with 10 papers, Hormone Research in Pediatrics with 8 papers, and Journal of Clinical Endocrinology and Metabolism (JCEM) with 8 papers. According to TGCS index, JCEM is the most cited journal with 243 citations. On the other hand, according to TLCS index, JCEM and Hormone Research in Pediatrics are the most-cited journals with 5 citations.

With regard to universities and scientific institutions, 328 institutes have conducted research on adrenal diseases. Istanbul University has the most retrieved records (26 records) followed by Tel Aviv University with 19 records, Hacettepe University with 13 records and Tehran University of Medical Sciences (TUMS) with 11 records. Based on TGCS index, Tel Aviv University is the most cited university with 157 citations. On the other hand, based on TLCS index, Iran University of Medical Sciences (IUMS) has been the most cited university with 5 citations.

With regard to the language of retrieved external data, English was the most used language for publications on adrenal diseases (263 records) followed by Turkish.

In this study, HistCite was used to draw the scientific map. In order to map, of 268 retrieved records, 150 records were chosen according to GCS and LCS. The resulting clusters were then examined. In GCS, the records for this disease were cited 103 times at most. In LCS, they were cited 4 times at most. In Fig. 2, scientific map for adrenal diseases have been drawn according to LCS and GCS indices. In this figure, circles with bigger diameters indicate higher citations, and based on both LCS and GCS indices, 2 common clusters are formed.

The first cluster consists of 4 papers in the years 2010-2013 with the most global and local citations being 6 and 1, respectively. This cluster belongs to a number of co-authors from Turkey with a paper titled "Prevalence and long-term follow-up outcomes of testicular adrenal rest tumours in children and adolescent males with congenital adrenal hyperplasia" being the most cited publication (242 citations). The main topic of the cluster, which has 4 papers, is about CAH (Congenital Adrenal Hyperplasia).

The second cluster consists of 9 papers, and it is for the period 2007-2013. The most important paper of the cluster is titled "Ethnic-specific distribution of mutations in 716 patients with congenital adrenal hyperplasia owing to 21-hydroxylase deficiency" (GCS=44, LCS=4). This paper was published in Molecular Genetics and Metabolism. Another paper in the cluster was written by authors from Cyprus. The paper is titled "Molecular Defects of the CYP27A2 Gene in Greek-Cypriot Patients with Congenital Adrenal Hyperplasia" and was published in Hormone Research in Pediatrics in 2011 (GCS=8, LCS=2). An important paper of this cluster, titled "Molecular Diagnosis of Congenital Adrenal Hyperplasia in Iran: Focusing on CYP21A2 Gene" has been written by Iranian authors and was published in Iranian Journal of Pediatrics. The papers of this cluster have been published by authors from Iran and Cyprus.

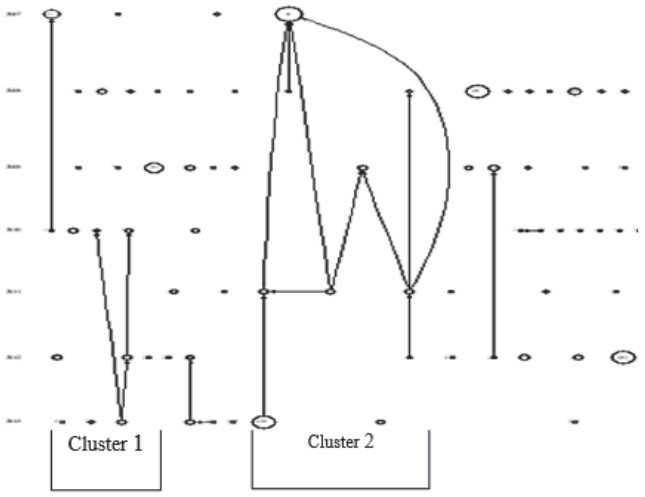

Fig. 2 LCS and GCS map for adrenal diseases in the period 2007-2013

IV. Discussion

The findings of this study showed that in overall, production and publication of papers on adrenal diseases had a moderate growth in the Middle East. Based on this research, Turkey is ranked first with 164 papers followed by Israel with 47 papers, Iran with 26 papers, Saudi Arabia with 10 papers, Egypt and Kuwait with 6 papers. Peykari et al. examine studies on diabetes in the Middle East through scientometrics. They found out turkey is ranked first among 17 Middle Eastern countries followed by Iran and Israel, which is in line with our findings that turkey is ranked first [19]. Osareh et al. draw scientific map of surgery for the period 2000-2010. They concluded turkey is ranked first in the Middle East in terms of surgery followed by Iran which confirms our results [15].

Findings indicated most scientific publications were in the form of article. Our findings with regard to document types are in line with those of [17], [20]. Given the growth of scientific publications in the world, scientific publications growth in the Middle East does not seem to be at a desired level. In addition, most papers are published in a language other than English in the Middle East. In the present study, the papers published in major international scientific journals and indexed in Web of Science database are examined.

Researchers and experts must pay special attention to writing papers in international languages and publishing them in indexed journals in major databases such as Web of Science, Scopus and PubMed. Meanwhile, drawing of scientific map can be used by researchers and policymakers as a guideline based on which one can identify strengths and weaknesses and solve shortcomings.

According to present study findings, for the period 2007-2013, adrenal gland diseases in the Middle East consist of 2 significant clusters based on LCS and GCS indices. The overall subject of these 2 clusters is CAH which is the result of efforts by researchers of this field. Considering the importance of CAH (an enzyme disorder which obstructs hormone production in the adrenal glands, is transferred as autosomal recessive, and depending on the Enzyme scarcity type, has different shapes.), researchers can take advantage of present study findings.

Given the formed clusters, especially in Adrenal Gland Disease and CAH, puberty and related disorders, more precise and thorough studies must be conducted in this field.

According to findings, Iran share of scientific publications on adrenal gland diseases in Web of Science database in the Middle East was 9.7% in the period 2007-2013 which is considered low taking into account the importance of the disease. Considering the high number of experts and researchers in Iran, its ranking of scientific publications is expected to rise as more papers are published in international journals. It is hoped that Iran will become number one country in the field of adrenal diseases in the Middle East.

Policymakers need to provide research and development in the field of adrenal gland diseases across the Middle East by better planning and using necessary platforms, as well. Thus, it seems necessary to support young researchers and experts and employ competent persons in this field.

It is also recommended that Middle Eastern authors collaborate with each other and form a regional adrenal network in order to increase scientific publications on this disease.

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