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Review Article

Iran Diabetes Research Roadmap (IDRR) Study; Trends of Basic Sciences Publication: A Review Article

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Abstract

Background: Basic science studies evaluation is important feature for an effective implementation of diabetes research and funding policy. This study aimed to provide an evaluation of diabetes basic research output up to 2015 in Iran.

Methods: Data were retrieved from scientific search engine including PubMed, Web of science, SCOPUS as well as Iranian science databases including SID, IranMedex, and Magiran using "Diabetes mellitus" and 'Iran" keywords. After classification of total collected publications, basic sciences category was considered as one of the main groups. Specific areas of research activity in the main basic sciences disciplines, methodology of publications as well as proportionality of publications to WHO and Australian classification were identified.

Results: Overall, 1249 basic science items were published up to 2015 in Iran. The greatest number of outputs were published in 2013 (n=201). The annual average growth rate was 38.45%. The Biochemistry contributed 63.7% to the overall output, followed by the Physiology (15.9%) and Histopathology & Anatomy (14.5%). The least participation was attributed to basic microbiology (1%). Animal study was the most common method (64%) followed by the Case-Control method (10.6%).

Conclusion: The present study is the first large-scale analysis of Iranian basic researches in the field of diabetes. It identified single areas of research heavily focused or have been neglected. These areas should be reconsidered aiming to close the knowledge gaps and good policymaking. Basic researches and clinical relevance are approached based on old theories with slight originality in our country.

Keywords: Biochemistry, Physiology, Immunology, Basic sciences, Roadmap, Iran

Introduction

The world of science in recent decades has witnessed dramatic increase in diabetes prevalence and consequently the numerous studies and researches into this disease (1, 2). Diabetes mellitus is a common chronic, life-threatening condition that has a lifelong impact on those suffering from it, and their families (3).

Diabetes lies in the notable global challenges affecting 6.4%-11.1% of the population worldwide (4). All aspects of human society are threatened

by the awfully uprise of diabetes and it is more common in developing countries (4, 5).
Over the past few decades, speedy economic growth, modern urbanity, and lifestyle changes have contributed to increasing of diabetes prevalence in the MENA region and unfortunately, the Middle East region residence five of the top ten countries with the highest diabetes prevalence among adults aged 20-79 in the world (6).
According to the International Diabetes Federation, there were over 4.6 million cases of diabetes in Iran in 2015 and we have more affected people under the age of 60 compared to the world average that is causing more disability, lack of human resources and early death (7-9). Diabetes totally imposes about US $590.676 million on health care system in Iran each year (10).
Diabetes is caused by a problem with the immune system that triggers the body to destroy the beta cells of the pancreas resulting in type 1 diabetes, or by a problem with the insulin's target cells and insulin receptors, resulting in insulin resistance and eventually type 2 diabetes (11, 12).
Since diabetes is a set of complex endocrine and autoimmune disorders, which affects a large of population with a shift in the age of onset to younger age in the recent years, many efforts have been made aiming to understand pathophysiology and basic mechanisms involved in the various facets of this disease and its management (11, 13).
Despite high prevalence of diabetes and putting many funds and energy on researches understanding its basic mechanisms, no previous study has fully compiled or evaluated the route of basic sciences studies on diabetes in Iran.
The aim of this study was to attain a representative map of diabetic basic sciences studies and to identify research gaps of diabetes studies in Iran.

Methods

This study is a part of Iranian Diabetes Research Roadmap (IDRR), which organized to analyze basic publications on the subject of diabetes in Iran.

According to the first article of this roadmap, all published articles into diabetes filed in Iran until 2015 were collected and totally divided into assorted items and each string was assigned to the respective task team. Our team was responsible for justifying total number of literature into basic sciences (except Genetics and Nutrition) authorized in the IDRR protocol, to exclude duplicated and unrelated studies, letter to the editors, meeting abstracts and guidelines and also for entering the relevant information into the basic sciences database (14, 15).
After completion of the above steps, articles in basic sciences category were classified into six main disciplines including Biochemistry, Physiology, Anatomy and Histopathology, Immunology, Hematology, and Microbiology.
Basic sciences have a lot in common, therefore, it was difficult to define outlined borders for each discipline, but we tried to review and consider the main approach of each study and then put them into appropriate overlapping groups.
On the other hand, all articles have also classified within three approaches. First, based on the type of study, appointed by WHO classification (which has five sub-classes resulting from the efficiency of studies for WHO) (16). The second, based on Australian classification system (which has five sub-classes resulting from the field and type of studies and is published as the Australian and New Zealand Standard Research Classification) (17) and the third one, based on the methodology of study, appointed by Evidence Pyramid hierarchy (which has 17 sub-classes resulting from the studies methods and designs).
At the end, assembled database was analyzed using descriptive statistics such as frequency and percentage. Furthermore, appropriate graphs and tables were considered.

Results

A total number of 1843 basic sciences articles were assigned to our team and after achievement of above-mentioned procedure; the final excluded articles were 594. After that, 1249 appro-

priate articles have been taking into account for more assessment classified as explained below.

Classification based on type of study

In WHO Classification system, 94% of publications are out of classification. The remaining 6% are distributed in the following groups:

- Cause and determinants of health-related outcomes
- The prevalence and incidence of health-related outcomes
- Strategies and interventions of health-related outcomes

In Australian Classification system, 96% of total publications are dedicated to the Basic study group. The remaining 4% are distributed in the following groups:

- Clinical research
- Public health

Classification based on methodology (evidence pyramid)

Animal study with more than half of all publication has been at the leading edge of research methods in the field of basic sciences in Iran and by a wide margin, case-control method has followed it. The exact number and percentages of studies assigned to each method are shown in Fig. 1.In terms of time, animal study has been at the top of all using methods over the years except in 2000 that case-control method jumped ahead of it. Time trend of the most prevalent evidence pyramid's subgroups (methods) using in the field of basic sciences researches is in accordance with the Fig. 2.

Classification based on basic sciences Subject area

Main field of basic researches on the topic of diabetes is biochemistry consisting 63.72 % of total publication in Iran (Fig. 3).

Afterward, physiology and anatomy-histology with 16% and 14.5% of published articles are narrowly focused endeavors. Immunology studies have got 4% of total publication and basic hematology and microbiology with an equal volume include 2% of total studies. Fig. 4 shows the time trend of three most frequent basic major publications into diabetes in Iran.

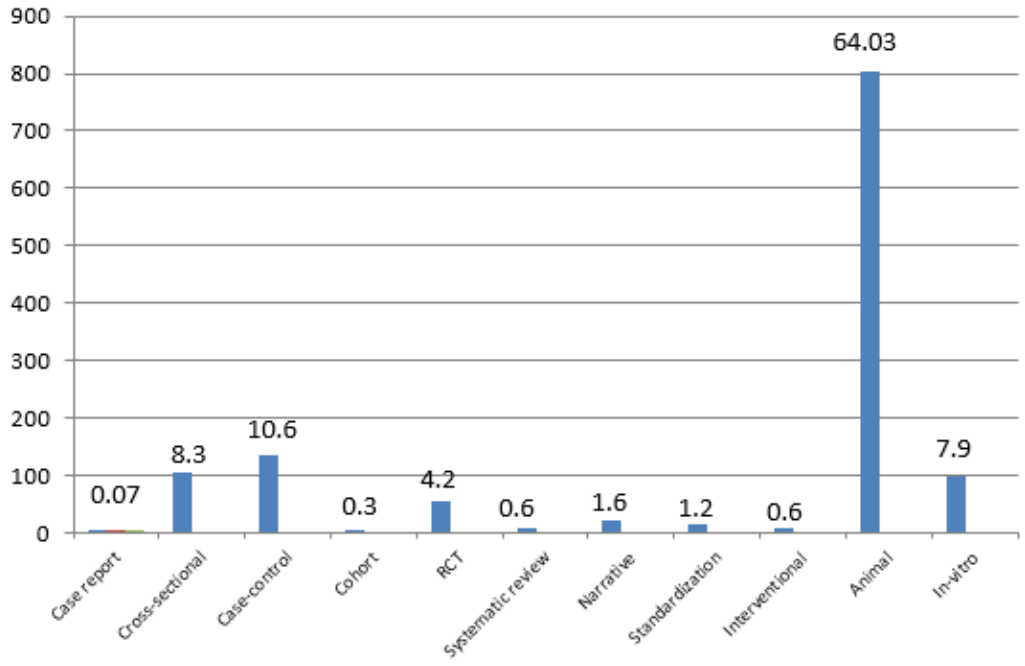

Fig. 1: Number and percentages of studies assigned to each method

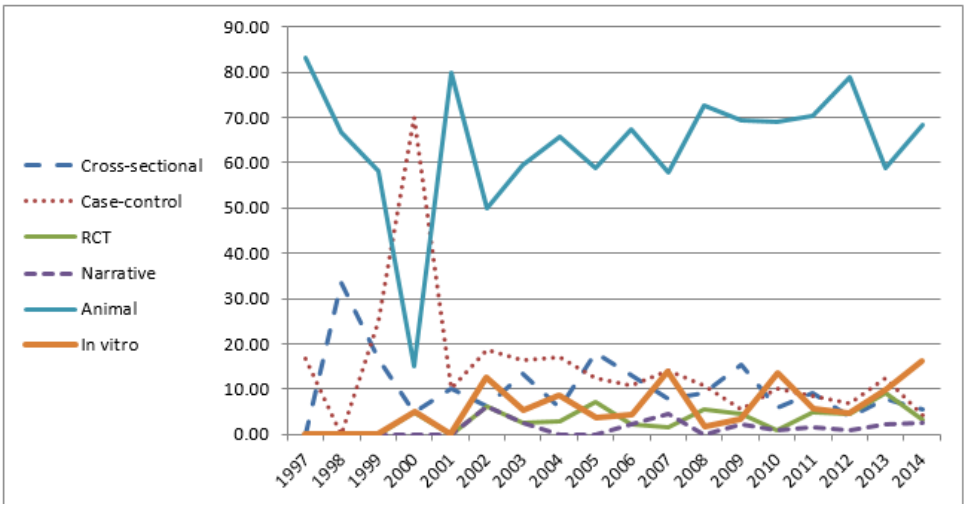

Fig. 2: Time trend of most using research methods in basic sciences articles

In a comprehensive view, Iranian basic publication in the field of diabetes increased from 1 article in the year 1986 to 201 in 2013 and then decreased to 163 in the year 2014. The annual average growth rate of basic research publication is 38.45%, thought the growth rate's curve represents periodic oscillations mode over the years with a negative rate of 18.9% in the years 2013-2014. Fig. 5 demonstrates the growth rate of basic research publication during the time in Iran.

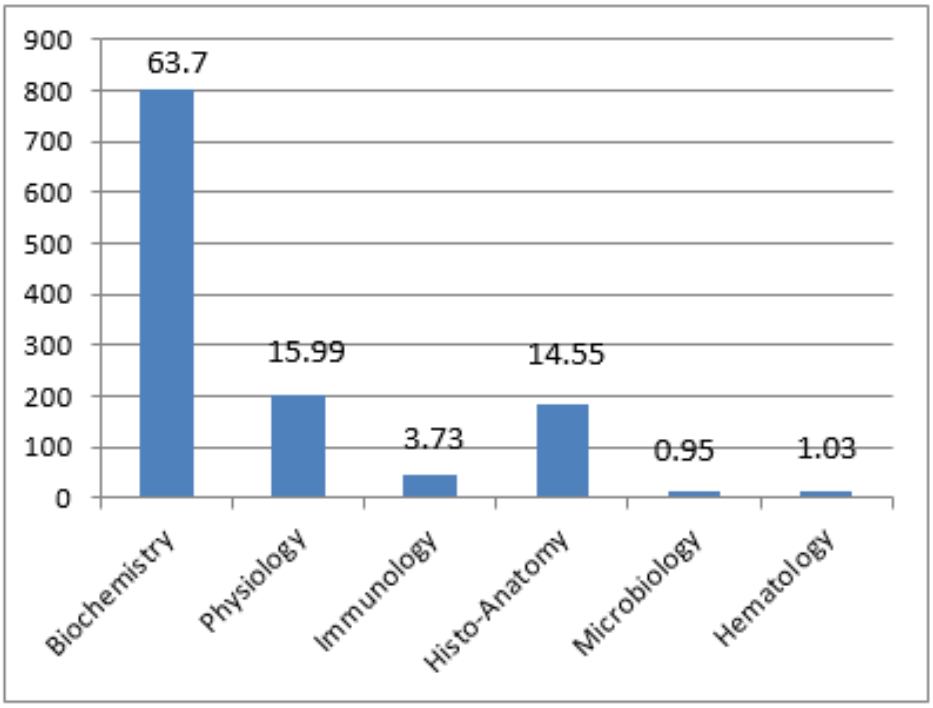

Fig. 3: Classification based on basic sciences subject

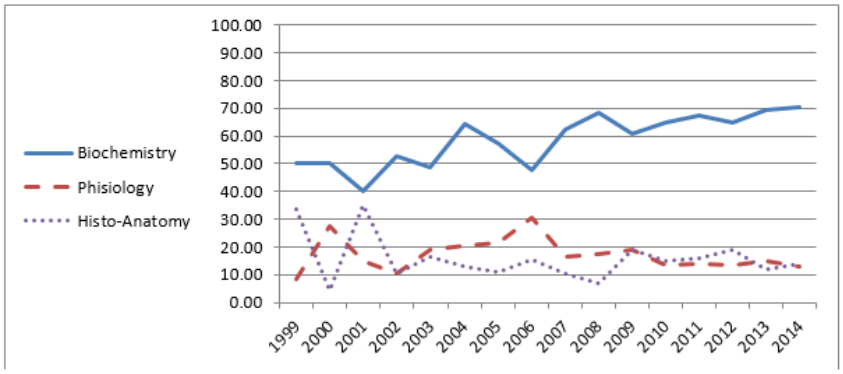

Fig. 4: Time trend of subject approach in the basic sciences articles

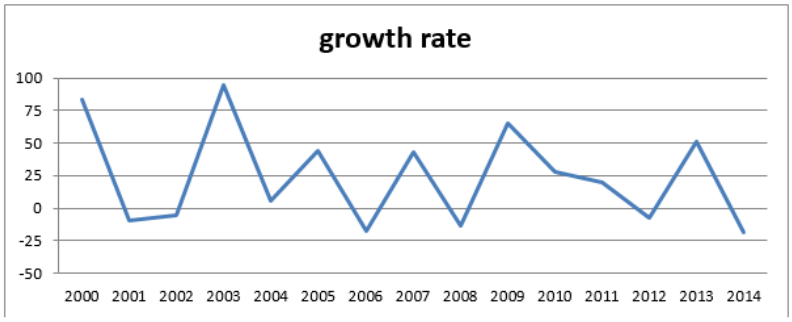

Fig. 5: Growth rate of basic research publication during the time

Discussion

The present study has reviewed the road of basic sciences research in the field of diabetes in Iran. Overall, we evaluated 1249 articles and our findings have shown increasing trend in the basic publications up to 2015 except 2013-2014. The majority of basic studies were performed in the biochemistry field whilst animal study was the most common method employed.

There is no nationwide comprehensive study about characteristics of basic researches on diabetes in Iran and the global studies in this area are also extremely rare, therefore, our study is the first one. However, some scientometric studies have been done about diabetes research in Iran.

Iran ranked 25th among the top 25 countries with the most number of papers in diabetes research and had achieved a global share of 0.72% up to 2015 (18). Iran's contribution to the production of diabetes science has been about 12.7% in Middle East between 1990 and 2012 (1).

The annual average growth rate of basic research publication was 38.45% up to 2015 when the annual average growth rate of total diabetes publication in Iran was 25.5% during the same period (18) and 23.4% between 2008-2012 (15).

Nevertheless, Iran annual growth rate of diabetes publication has decreased 14.6% between 2013 and 2014 that is in accordance with our finding that showed a negative 18.9 % growth rate of basic research in Iran at that time (18). Hence, despite the rapid increase of diabetic population in Iran (7, 19) the growth rate of diabetes studies neither at holistic view nor at the basic research view is sufficient. This situation has also observed in some Asian countries like India and China (20). Basic research moves with another field of diabetes studies as one, but unlike the leading countries in diabetes research such as Eu-

ropean countries and India publishing a greater share in basic sciences-oriented papers (20, 21), less attention is gone to basic science in our country. This may imply an inconsequential addressing of basic science in the eyes of decision makers in Iran.

In terms of methodology, while Iran is in the three leading countries with the highest proportion of RCTs to the total diabetes publications (15), the majority in the field of diabetes is animal studies, that do not fit neatly into the established WHO classification (16) and reasonably, utmost of them are in the Basic study group in Australia classification (17). Nevertheless, further studies are conducted with a view to WHO interests and demands.

Approach of article types also showed attention to animal and in vitro studies increasing during the time. Like other basic researchers (21, 22), Iranian have to use in vitro or animal experiments to mimic human diabetes, its complication or treatment and to describe the determinants and the metabolic conditions that promote diabetes and related disturbances. In spite, animal and in vitro studies do not have prominent role in the production of knowledge and scientific evidence (23). Therefore, our scholars should take steps higher-ranking evidence pyramid stairs in order to reach out in new understanding of diabetes. Biochemistry was dedicated greatest tendency amongst basic science disciplines in the field of diabetes research in Iran similar to India (24), which is probably due to the diabetes property as a complex metabolic disorder that is directly related to biochemistry science (25). It could also somehow be tied to development of the post-graduate programs in our country besides the fact that biochemistry is the most fundamental of the basic biomedical sciences (26).

Concerning other disciplines of basic sciences, in the case of immunology, it is slightly frustrating. There are many interactions between immune system and diabetes pathophysiology (27) and many immunologic components in the diabetes research in the most knowledge productive countries (21). However, there are not profound basic immunological considerations when it comes to Iranian diabetes research. We have found little evidence for reliable and useful immunology studies into diabetes in Iran until present time. This theorem is somewhat true for microbiology studies in Iran. The same results were reported evaluating Indian diabetes papers during 1999-2008. On the subfields analysis, they announced minimum contribution came from immunology and microbiology (2.59%) (24). It is required that apportion duties and the way of allocating funds to various domains of basic science in diabetes researches to be criticized and revised.

An increasing knowledge gap has been created between basic research and clinics during the time (28), therefore we need to train some translational investigators opening a window to promote clinically oriented basic researches and translate fundamental findings to the clinical approaches.

Countrywide integration of diabetes basic and clinical researches toward harmonizing scientific and clinical career structures across our country felt necessary. This will ensure a targeted planning and beneficial sources allocation for diabetes researchers from the start. Such a large-scale study has been carried worldwide out (29) and the using procedure and software could be employed in Iran.

Conclusion

We suggest research projects about "percentage spent on each diabetes type studies" to be implemented, as well as the scientometric analysis about in-vitro and in vivo studies including techniques, methods, and type of animal models. Interventional studies with high quality, non-randomized clinical trials and meta-analysis are also recommended.

Implications of basic researches and the "omics" should be another effort to develop personalized medicine for diabetics as its application become increasingly wide-reaching.

We need to improve our attitude in the basic studies and try to keep pace with the global science wave.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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