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Review Article

Iran Diabetes Research Roadmap (IDRR) Study; Nutrition in Diabetes: A Review Article

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Abstract

Background: The study aim was to reports detailed characteristics of nutrition research in field of diabetes, and recognize knowledge gap in nutrition science in diabetes in Iran.

Methods: Online databases of PubMed, Web of Science and Scopus as well as national databases including SID, IranMedex, and Magiran were searched up to 2015 to identify eligible articles. Finally, 378 articles were included.

Results: Final articles were categorized based on WHO and Australian classifications, study design and subject area. The most number of studies (80%) was related in strategies and interventions of health-related outcome group the WHO classification. The most percentage of publications in Australian classification system was allocated to clinical researches (78%) and the least studies were health service studies (0.08%). The most common designs used in the obtained documents (41%) were Randomized Clinical Trials (RCT) and about 17% of publications were animal studies. Cohort studies were the least studies among the obtained documents. The most common subject was type 2 Diabetes Mellitus and its complications followed by DM management (64%, n=241). The least numbers of publications were dedicated to GDM (Gestational Diabetes Mellitus). There was a large ascent in studies during 2010-2011 and 2012-2013.

Conclusion: Available evidence provides very good support for the role of nutrition diets in the prevention and management of all types of diabetes. This systematic review indicates trend of nutrition researches in diabetes was noticeable flourished, while the important subjects in diabetes studies are forgotten or unimportance.

Keywords: Diabetes mellitus, Roadmap, Nutrition**,** Randomized clinical trials, Iran

Introduction

Nowadays, the prevalence of diabetes mellitus (DM) has rapidly increased worldwide. Middle East and North Africa Region (MENA) has the highest rate of diabetes (age adjusted) in the world, that Iran is in the third place after Egypt and Pakistan in the (MENA) region (1). The first

goal in the management of diabetic patients is the achievement of optimal glycemic control because chronic elevation of blood glucose is linked to organ and nerve damage and to increased risk factors for cardiovascular disease (CVD) (2).

Diet can favorably affect the health of diabetic patients (3). Nutritional studies in the field of diabetes are comprehensive and involve studies in the prevention and treatment of diabetes.

Lifestyle intervention including dietary management is recommended as the fundamental approach for all patients with DM. The aim of diabetes management in patients was to slow progression of the disease, prevent the development of complications and improve quality of life through a combination of adequate nutrition, exercise, and medications. Good nutritional status and good functional capacity have been shown to be associated with good quality of life in patients with type2 DM particularly oldest (4). Specific nutrition guidelines for individuals who suffer from chronic health conditions, such as diabetes, are also available to manage these conditions effectively and to reduce the risk for comorbidities and complications (5).

Patients with diabetes, as well as their health care providers, are reluctant to initiate the use of medication for fear of weight gain. Referral to a registered dietitian for nutrition therapy has been shown to help mitigate this unwanted side effect of treatment. In addition, successful lifestyle intervention typically reduces the confidence on pharmacologic agents to achieve glycemic targets. Therefore, aside of duration of diabetes in years, nutrition therapy remains a key treatment strategy (6). Dietary patterns investigation, which reflects the complexity of dietary intake, has emerged as an alternative and complementary approach to examining the association between diet and chronic diseases (7). Dietary patterns are influenced by individual preferences, cultural practices, environmental and seasonal variability and socioeconomic factors.

In some studies the Mediterranean Diet and DASH diet, (Dietary Approaches to Stop Hypertension) patterns show ample evidence to recommend their use for people with diabetes and others with risk for CVD. However, a spectrum of dietary practices is available based on the macronutrient composition of the foods, such as a low-carbohydrate diet, low-fat diet, high-protein diet, high-fat diet and many more combinations (5). The Mediterranean diet is able to reduce the incidence of future diabetes by 19%–23%. A significant reduction of type 2 diabetes has been found to be associated with greater consumption of healthy dietary patterns, including the Mediterranean diet and the DASH diet (8).

A correlation between diminution of food intake and extension of longevity has been indicated in a wide range of organisms and it is accepted that excessive food intake, when linked with sedentary behavior, may eventuate in obesity, T2DM and other no communicable diseases (9).

Medical nutrition therapy, as an integral part of diabetes education, is a cornerstone in the comprehensive approach to diabetes. These therapies include individual and group interventions focused on various aspects of dietary modification (10), multiple encounters to provide education and counseling initially and on a continued basis are essential. Patients with DM gain from nutrition education designed to improve knowledge and skills to make healthy choices about their diet. Therefore, the role of nutrition education in diabetes is notable.

Some dietary factors developed type 1 diabetes mellitus (T1DM) in childhood, adolescence and young people, so dietary factors during the fetal period lactation, infancy and childhood. For example, Breast milk may be protective, processed foods may be related to a greater risk of T1DM because they contain higher amounts of advanced glycation products. Among nutrients, n-3 fatty acids, vitamins D, and E, and zinc may protect from preclinical and/or clinical T1DM (11).

Dietary recommendations for children with diabetes are based on healthy eating recommendations suitable for all children and thus the entire family. Nutrition education should be individualized and adapted to cultural, ethnic, religious and family traditions. Regular dietetic assessment is necessary to adapt nutritional suggestion to growth, diabetes management, and lifestyle

changes as well as to allow the identification and treatment of disordered eating patterns. Growth monitoring is an important part of diabetes management (12).

The incidence of diabetes was about 50% lower in individuals treated with intensive diet and exercise intervention compared with placebo or metformin respectively in the diabetes prevention program (13).

In the last decade, many Diabetes Clinical Practice Guidelines have been published and the consensus on the delivery of nutrition therapy is restricted. Most guidelines recommend nutrition therapy is delivered: at high severity; by nutrition experts; including individualized and structured approaches. Other recommendations later and inconsistencies may be due to differences in the methodological quality of guideline progression (14).

Literature of the world has largely focused on individual nutrients with conflicting outcomes to identify new risk factors for diabetes and its complications and new aspects of diabetes management and control.

The present study was a part of Iran Diabetes Roadmap study to reports detailed characteristics of nutrition research in field of diabetes in Iran. The main objective of this study was to relate characteristics of nutrition research performance of Iran in diabetes research in national and global context, as reflected in its publication output up to 2015, and to recognize knowledge gap in nutrition science in diabetes in Iran.

Methods

This systematic search was performed in each database and the number of published articles relevant to nutrition and diabetes up to 2015 in national and international journals by Iranian authors. For this study, international databases including PubMed, Web of Science and Scopus as well as national databases including SID, IranMedex, and Magiran were used as the source of information. The study method has been described in details elsewhere (15).

This comprehensive search strategy without any limitation obtained 20695 documents in National and International journals by Iranian authors.

In the next step, all obtained articles from all databases were merged and categorized according to the study topic to eleven groups of complications, comorbidity, prevention, management, psychology, nutrition, physical activity, genetics, basic sciences, education and gestational diabetes mellitus (GDM). Each category was assigned to a study team member. To review the nutrition articles, eligible all studies about nutrition that published in national and international journals by Iranian authors up to 2015 were evaluated. Duplications were removed, and then we categorized assigned publication based on the WHO classification, study design, Australian National Health and Medical Research Council criteria, diabetes type, nutrition group.

According to the indicated procedure, 378 nutrition articles after eliminated duplication were acquired.

The data was analyzed by descriptive statistic and results were depicted by appropriate graphs. SPSS software version 17 (Chicago, IL, USA) was used for data analysis.

Results

After searching the databases, screening and eliminating duplications we reached to 378 studies. These final articles were categorized to the WHO and Australian classifications, study design, diabetic type, nutrition groups, and subgroups.

Most numbers of studies (80%) was related to strategies and interventions of health-related outcome group the WHO classification. In WHO classification, Evaluation interventions studies were scanty and included 9% of whole nutrition studies in diabetes. Also, in this classification 1% of nutrition publication that evaluated in this research was attached to pilot intervention.

Studies in the field of prevalence and incidence were included only 1% of total studies that evaluated in this research. In addition, 9% of totality publications were shared causes and determinants

of health-related outcomes that these two groups were stymied in one group.

The most percentage of publications in the classification studies based on Australian national health and medical research system are allocated to clinical researches (78%) and the least of studies are included health service studies (0.08%) and also, 18.5% and 2.6% of this researches belonged to basic study and public health, respectively.

Fig. 1 demonstrates the frequency of different types of the nutritional studies with different designs in the field of diabetes up to 2015 in Iran. The most common type of study designs used in the obtained documents (41%) were Randomized Clinical Trials and about 17% of publications were animal studies (Fig. 1). Cohort studies were the least studies among the obtained documents in this research.

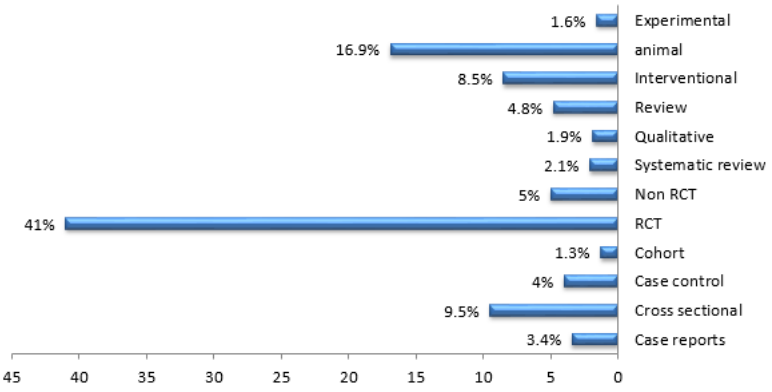

Fig. 1: The frequency percent of different types of the study designs of nutrient science publications in the field of diabetes up to 2015 in Iran

The most common subject investigated in Iranian studies was patients with type 2 Diabetes Mellitus and its complications followed by DM management (64%, n=241). The lowest numbers of these publications were dedicated to GDM (Gestational Diabetes Mellitus) studies among the obtained documents. As well as, 20% of these publication were reserved to type 1 diabetes mellitus and other publication were allocated to type 1&2 (9%), none-diabetic (4%) and pre-diabetic (2%).

Nutrient studies were divided into 4 major groups. The major groups of nutrition science to be involved Macronutrients (12%), Micronutrients (19%), Functional food (64%) and Education (5%).

Macronutrient groups were included Carbohydrates, Proteins, and Lipids. Micronutrient groups were included Vitamins and Minerals and so functional foods were involved Fibers, Probiotics, Prebiotics, vegetables, Special foods and Diets (DASH Diet for example), Seeds, Fruits, Supplementations and other (Fig. 2).

The frequency percent of nutrition subgroups showed (macro & micronutrients and functional food) of nutrition science publications in the field of diabetes in our study (Fig. 2).

Trend of publication was increasing during the study period. However, there was a large ascent in studies during 2010-2011 and 2012-2013. On the other hand, there was severe drop in the nutrition studies between 2011and 2012 so 2013 and 2014 (Fig. 3).

Discussion

Publications in the field of nutritional sciences among diabetes were comparatively limited in Iran and the most common nutritional studies were performed on functional foods.

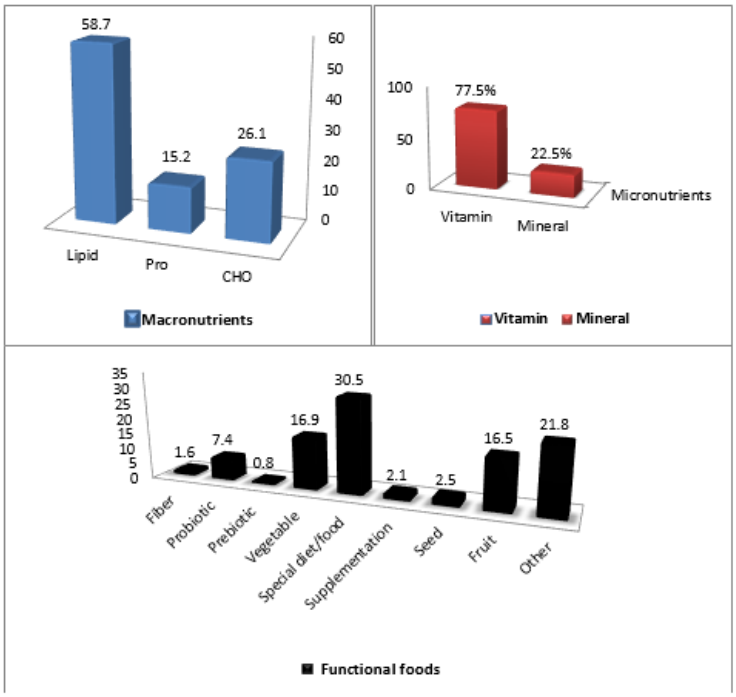

Fig. 2: Classification of studies based on nutrition sub groups of publication in the field of diabetes up to 2015 in Iran

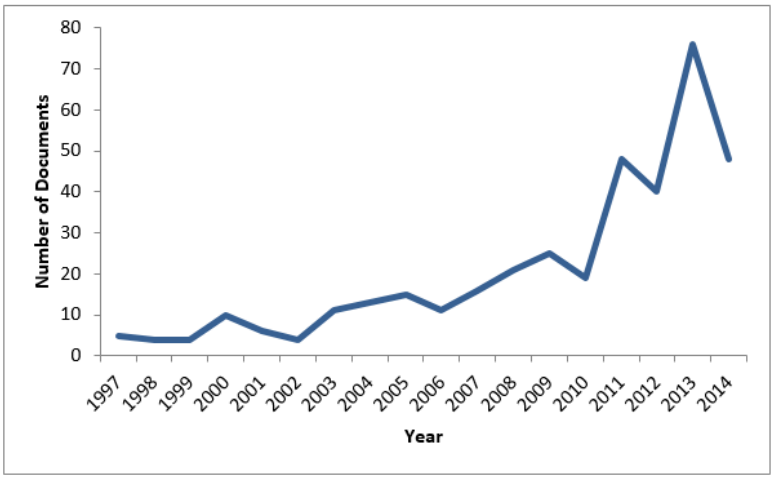

Fig. 3: Trend of publications during the study period

Of the 378 nutrition-related articles surveyed in our study, a large number has allocated in randomized clinical trial (RCT) studies.

This is a review of studies investigated the effects of nutritional intervention on health outcomes, integral to the management of diabetes and prevention of diabetic complication in Iranian articles and discovered strength and weakness points and lacks these publications.

Nutritional intervention had an important role in functional rehabilitation for people particularly older one. Nonetheless, a greater understanding of the functional benefit of nutritional interventions is needed (16).

Higher consumption of dairy products could reduce the risk of T2DM. In addition, they were expressed there have only been a few long-term clinical studies on dairy intake and T2DM. These studies primarily have focused on a type of yogurt drink called Doogh. Daily fortified yogurt supplementation could improve glycemic status in adults with T2DM, and that many of the beneficial effects on glycemic control appeared to be dependent on factors such as vitamin D fortification and the addition of certain probiotic strains (17). In our publications were presented a few clinical studies on dairy products like Doogh and management of diabetes, too. Hence, more researches on dairy food like Doogh are needed to do in future studies.

Nutrition therapy in diabetes has been found to be an effective component of comprehensive group education program or an individualized session. Individualized education sessions or group education programs including nutrition therapy have shown HbA1c reductions of 0.5% to 2% for type 2 diabetes (6). Nutrition education programs improve metabolic outcomes such as blood glucose, HbA1c, lipids, and blood pressure in people with diabetes.

Our findings are compatible with the recent study that evaluates the impact of dietary habits and metabolic risk factors on cardiovascular and diabetes mortality in 20 countries of the Middle East and North Africa. They have received an unhealthy lifestyle (poor diet and physical inactivity), poor detection and inadequate treatment are the key contributors to the none-optimal level of metabolic risk factors in this region. Besides, the nutrition intervention to improve the accessibility and acceptability of functional food has increased in most countries of the Middle East and North Africa recently, but they have expressed the amount available per person is still low (18).

In evaluation WHO classification (19) of articles in our study, we discovered which most of these studies are centered on "Strategies and Intervention of Health-related Outcomes". The effective points that need to be considered are evaluation of prevalence and incidence studies done under 1%, whereas these studies are performed inexpensive and easy.

The investigation about Mediterranean (Med) dietary pattern has been done in Canada which indicates that dietary practices based on a balanced approach, such as Med and DASH (Dietary Approaches to Stop Hypertension) diet, are associated with significant improvements in weight loss and risk factors for CVD, including people with type 2 diabetes and CVD. Among Iranian publications, there are a few articles about Med and DASH diet (5).

The multi-professional approach means that the focuses is not entirely on high-cost investigation, but also on alternative methods to translate research outcomes for the benefit of people with diabetes are needed. All aspects of diabetes research, from molecules to clinical science and care, were embraced where possible within the overall road mapping strategy. Not every aspect can be concealed in such a report; however, the maps are flexible and open to further input at a future date. Therefore, we need to emprise more aim studies to prevent unnecessary duplication of publication and show the lack of publication for researchers (7).

Nutritional interventions need to be delivered by multidisciplinary teams, using a combination of individualized and group strategies tailored to meet the patient's needs. They need to incorporate theories of education and behavior change and focus primarily on self-management. Some broad Clinical Practice Guidelines recommend multifarious uses of technology including communication with specialist teams, self-monitoring, computer assisted education packages, electronic medical records, and the delivery of education and recommended interventions support self-care or self-management too (14). Nowadays, majority of population have access to internet and new technology in our country, it can the way of accessibility nutrition educations and self-monitoring in diabetes for commonality. At this time, a few studies available about nutritional education in diabetes in our researches entirely included 5% of nutritional publications in our country up to 2015. Thus, it is necessary to enhance the nutrient education articles in diabetic fields in future years.

The acceptability of dietary fiber incorporation in foods especially meat products is increasing because of its numerous functional properties like water retention, emulsion stability, lubrication, texture modification and neutral flavor. Fiber is also being used as a fat replacer in manufacturing of various meat products. The dietary fiber rich meat products are considered clinically better than traditional meat products (20).

Unfortunately, we found a few articles (1.6%) about fiber among the obtained results. The main cause of this finding may be inattention researchers about this subject matter in our country, or this object is absence in precedence. It should better survey about fiber by researchers in next studies more than forepast.

There was lack of nutritional studies about Gestational Diabetes Mellitus (GDM) that its reason is still unknown. Most of nutritional studies in Iran were similar to the published studies in other countries. While the nutrient studies confirmed statistical associations between diet variations and activity with disease states, so identify risk factors studied by more methods that are comprehensive are considerable. This nutrition research type technique is normally accessible, inexpensive and a simple pattern to do.

Recently, the absence of studies to be occurred specifically investigating the treatment of Type 3c DM (also known as pancreatogenic diabetes refers to diabetes caused by disease of the exocrine pancreas and patients may be misclassified, usually as T2DM). The current guidelines for management are inferred from best practice as applied to T1DM and T2DM. In fact, there is a severe lack of studies focusing specifically on the management of those with T3cDM, and indeed, subjects with pancreatogenic diabetes tended to be specifically excluded from many diabetes studies (21). Likewise, this absence existed in publications in our study. For better results of next studies in diabetes field assessment and follow-up of patients with pancreatitis separately is suggested to facilitate the timely diagnosis and treatment of T3cDM in after time.

Nutritional management of diabetes in childhood was investigated. They were declaring nutritional interventions should purpose to maintain an ideal body weight, optimal growth as well as health and development. Growth monitoring is an important part of diabetes management in children. The optimal macronutrient distribution varies depending on the individualized assessment of a child or young person. They have expressed the prevention of overweight and obesity in pediatric Type1DM is a key strategy of care and should involve a family-based approach (12). In our publication, we have found small number of articles about children and T1DM that emphasized in preserve optimal body weight and prevention of overweight, education, and self-care by parent.

There were ascents and drops in the trends of publications in some years of our study. There is an extreme drop in the trend of nutrient articles about diabetes between 2013 and 2014. Citation of Iran diabetes publications rose in 2014 and stood in highest rank (2). Similar drops also were seen in the publication trend in our country as well as in all fields of sciences in the same years (7). This probably explained by changes in budget priorities due to changes in the strategy in same time. There is a severe ascent in this trend between 2012 and 2013 that has explained by progression of science and technology.

Our study is the one of initial analyzing characteristics of nutritional science research in diabetes in Iran as well as the world. This study showed growing trend of nutrition research in diabetes in Iran during the study period (Up to 2015).

A limitation of this study was limited in publication year (up to 2015). For this reason, these findings cannot be generalized to the broader community based on this study alone completely. This research should fare about studies that published in 2015 and next years in future.

Nutrition interventions are growing in the world in recent years and they are of great interest in the management of diabetes and prevention of diabetes complication. These issues are important knowledge gap in nutrition of diabetes and future diabetes research should be focused more on these issues.

Research in Iran is to somewhat in line of world diabetes research and the proportion of clinical

trials among all diabetes research is among the highest in the world (22).

Conclusion

A nutritional pattern which mostly characterized by a functional food could be practical for prevention of prevalence of diabetes. Collectively, available evidence provides very good support for a role of nutrition diets in the prevention and management of all types of diabetes. This systematic review indicates trend of nutrition researches in diabetes was noticeable flourished, while the important subjects in diabetes studies are forgotten or unimportance. Therefore, these forgotten studies should better stand in priorities in future.

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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