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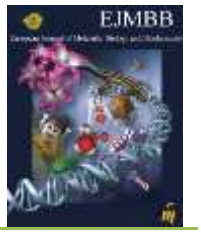

ASSESSING THE EXISTING KNOWLEDGE ON DIABETES IN RELEVANT TO ESSENTIAL FATTY ACIDS RICH FOOD: A PREVENTIVE STUDY

E.Prabhakar Reddy[1], R.Srikumar[2*], R.Vijayakumar[3], C. Naveen Kumar[2], N. Kanagathara[4]

[1]Department of Biochemistry, Bhaarath Medical College & Hospital, Affiliated to Bharath University, Chennai, India.
[2]Department of Microbiology, Sri Lakshmi Narayana Institute of Medical Sciences, Affiliated to Bharath University, Pondicherry-605 502, India.
[3]Department of Physiology, Sri Lakshmi Narayana Institute of Medical Sciences, Affiliated to Bharath University, Pondicherry-605 502, India
[4]Centre for Research, 0 Sri Lakshmi Narayana Institute of Medical Sciences, Affiliated to Bharath University, Pondicherry-605 502, India.

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ABSTRACT
Diabetes Mellitus is a major clinical and public health problem across globally, accounting 422 million people living with diabetes during 2014 and increasing in the prevalence rate steadily. The present study was aimed to assess the existing knowledge on diabetes to create awareness about the root cause for diabetes among the healthy population completed graduation with biology background in and around Pondicherry. In the present study 642 graduates were voluntarily participated, a structured pre-tested questionnaire relevant to existing knowledge relevant to root cause for diabetes by assessing the cell membrane and fatty acids, mechanism of complication, low glycemic index, glycation, type of diabetes, and symptoms for diabetes. Result showed only 17% of population aware importance of essential fatty acids in the cell membrane, 25% of participant aware about the formation of glycation, 28% of population aware about gluten rich food leads to autoimmune disease. Relevant to low glycemic index food about 45% of studied group aware, about 44% were aware that glycogen stored in the muscle cell can't be released in the blood. Apart 93% aware insulin action, 90% aware types of diabetes, 100% aware about the symptoms of diabetes. Overall, only 15% of the studied population showed existing knowledge on root cause for diabetes on preventive aspect and this may still further decline in general population and graduate from other non-biological background. The present study explored that warrant awareness on preventive aspect on root cause for diabetes in relevant to essential fatty acids rich food and it source, to change in the life style, apart from screening, management and treatment of diabetes.

INTRODUCTION

Glucose is a ubiquitous fuel in biology. High blood sugar levels stimulate the release of insulin, which increases the uptake of glucose by the cells to be used as energy and excess glucose will be converted as glycogen, stored in the liver and muscle cells, or used in the production of fats (insulin + Glucose) in adipose tissue. When the blood glucose level begins to drop several hours after food intake, results in decreased insulin production and rise in glucagon secretion which stimulates breakdown of stored glycogen into glucose which is released in blood stream to maintain the blood glucose level at 80 mg/dl. If the stored glycogen also depleted then liver and muscle cells use fatty acids as fuel by breakdown of fat in the adipose tissue.

Corresponding Author
R. Sri kumar
Email: - rsrikumar_2003@yahoo.co.in

When there is a lack of insulin secretion or cell resist to uptake glucose even in the presence of insulin leads to "Diabetes Mellitus". Diabetes Mellitus arises when insufficient insulin is produced, or when the available insulin does not function correctly, result in abnormally high amount of glucose in the blood stream causing from frequent urination to premature death. During 2012 about 1.5 million deaths due to diabetes making 8th leading cause of death.[1]

Globally 422 million people living with diabetes during 2014 and prevalence rate is 8.5 percentage (%). The prevalence of diabetes has been steadily increasing and most rapidly in low and middle income countries and about 62% of people with diabetes were undiagnosed with the prevalence may still bound to increase several folds. China, India and USA are among the top three countries with a high number of diabetic population [2]. In India numbers climbed from 11.9 million in 1980 to 64.5 million during 2014. Prevalence of diabetes has more than doubled for men (3.7% (1980) to 9.1 % (2014)) and 80% (4.6% to 8.3%) among women population in India. It has been estimated that the globally annual expenditure cost for diabetes is more than USD 827 billion which impose a large economic burden on health care system.[3]

Diabetes prevention and effective management of diabetes should be a public health priority to reduce death and financial burden, warrants new research on preventive efforts rare than treatment. Awareness and education is the key role especially in screening, control and better management for various diseases including diabetes and various research also carried and presently more than 80% of population well aware about diabetes, but still India is second largest, next to China in diabetes population. About 99% of the awareness studies and education based only on treatment aspect like symptoms, screening, management, complications etc but none of the studies highlighted the awareness on preventive aspects by creating knowledge and awareness on root cause for diabetes for which the people must be sensitized.[3] Though awareness and education is key role for better management but everyone atleast graduates should aware about the basic knowledge on root cause for diabetes, by which they can create awareness among their family members, friends and nearby population by which themselves will change their life style, what to have, when to have, how much to have, what to do, what should avoid etc.

The present study was designed to make an attempt on preventive aspect to assess the existing knowledge on diabetes to create awareness about the root cause for diabetes among those who completed their science graduation from in and around Pondicherry, India using a structured, pre-tested questionnaire.

Materials and Methods

The study was carried between January to June 2022 from in and around Pondicherry, India and Institutional Ethics Committee approval was obtained. The study was conducted among 642 graduates includes Medical (MBBS), Paramedical (BDS, Nursing, Physiotherapist) and Arts & Science (Anatomy, Physiology, Biochemistry, Microbiology, Pharmacology, Zoology, Biotechnology) who voluntarily participated. A briefing was given about the objective of the study and confidentiality was assured in collection of personal data. A structured and pre-tested questionnaire relevant to existing knowledge relevant to the root cause for diabetes, complication and its symptoms, were assessed. A scoring mechanism was used for each correct answer by awarding one score. After collecting the filled questionnaires, in detail about the cell membrane, importance about omega-3 essential fatty acids and cis-unsaturatted fatty acids, what food to take and not to take, how diabetic complication developed, symptoms, management and how to prevent were explained for about 15 minutes.

Statistical Analysis

Data's were expressed in percentage.

Result

Totally 642 graduates with biology background were actively participated which includes 384 male and 258 female. Among 642 participants, only 119 (17%) had knowledge about Omega-6 and omega-3 essential fatty acids, 'cis' and 'trans' unsaturated fatty acids role in cell membrane, its function, essential fatty acids available rich food materials. Only 159 (25%) participant aware about the formation of glycation due to excess glucose available in blood and 180 (28%) aware about gluten rich food leads to autoimmune disease. Relevant to low glycemic index food about 292(45%) were aware and about 283(44%) were aware that glycogen stored in the muscle cell can't be released in the blood. Apart 599(93%) aware insulin action, 580(90%) aware types of diabetes, 642(100%) aware about the symptoms of diabetes. Overall, only 15% of the studied population showed existing knowledge on root cause for diabetes on preventive aspect.

Table No. 1: Assessing the Existing Knowledge On Diabetes from 642 biology graduate population.

1	Cell membrane	2
2	Essential fatty acids	2
3	Omega-6:omega-3 essential fatty acids ratio	1
4	Omega-3 essential fatty acids rich in	3
5	Omega-6 essential fatty acids rich in	1
6	Type of fatty acids	3

7	Unsaturated fatty acids forms	1
8	Reason for replacement of cis to trans- unsaturated fatty acids	2
9	Reason for replacement of omega-3 to Omega-6 essential fatty acids	2
10	Insulin function	93
11	Diabetes Mellitus & its type	90
12	Glycogen role	83
13	Why Physical activity / exercise is essential	44
14	Type I diabetes	87
15	Type II diabetes	82
16	Low glycemic index (LGI) food	45
17	Gluten rich food	28
18	Organ cell in which glucose diffuse without insulin	80
19	Glycation formation	25
20	Symptoms for diabetes	100
21	Overall knowledge on prevention aspect	15

DISCUSSION

Almost everyone aware about the diabetes symptoms, management and its complications, those who are diabetic be self-monitored and also monitored by their physicians. Hence it cannot be accept that 422 million world population affected by diabetes is due to lack of awareness and less knowledge on diabetes. Most of the research on awareness studies explored with symptoms and treatment on diabetic patients[4, 5] and none of the awareness study highlighted to explore the root cause for diabetes on preventive aspect in the healthy population. If healthy people aware about the root cause for diabetes, they themselves can change their life style which may result in the prevention of diabetes. Present study was designed to assess the existing knowledge on diabetes and to create awareness on root cause for diabetes on preventive basis among the science graduates.

The cell membrane plays a vital role in the type 2 diabetes. Initially Omega-6 and Omega-3 essential fatty acids ratio on cell members was 1:1 ratio but at present ratio was greater than 20:1.[6] In addition, most of the essential unsaturated fatty acids are artificial 'trans' by replacing the naturally occurring 'cis' form by which cell membrane showed more rigidity by reducing the fluidity and permeability for most of the substances including glucose even in the presence of insulin glucose fails uptake into the cells, results in type 2 diabetes.[7] In cis-unsaturated fatty acids hydrogen atoms are on the same side of the molecule result in bend, creates more open structure between the fatty acids fluidity, but in 'trans' form hydrogen on opposite sides result in a straight hydrocarbon with less membrane fluidity of the cell. This is due to change in the life style by intake of refined oils, less cholesterol and western style foods leads to unavailable of Omega-3 essential fatty acids and natural form of cis-unsaturatted fatty acids on the other hand intake of food rich in omega-6 essential fatty acids in the for 'trans' unsaturated fatty acids. Due to unavailable of omega-3 fatty acids of cis-unsaturated fatty acids are replaced with omega-6 fatty acids of trans-unsaturated fatty acids in the cell membrane is the major root cause for type 2 diabetes by resist to uptake of glucose from the blood into the cell even in the presence of insulin.[8]

In the present study observed least knowledge of 19% on the cell membrane Omega-6 and omega-3 essential fatty acids, 'cis' and 'trans' unsaturated fatty acids and their role on cell membrane among the studied population needs awareness since it is the major root cause for diabetes. As essential fatty acids cannot be synthesized, must be obtained only from external food source for cell membrane, needs awareness on omega-3 rich foods with cis unsaturated fatty acids. Followed by poor knowledge on glycation, only 25% of the studied population aware, as excess glucose in the blood stream result in glycation, glucose cross-link with proteins and DNA, destroys functions of many enzymes leads to insoluble, harder, less elastic by which no new blood vessels in the wounded areas to heal.[9] As glucose freely diffuses in the nerves, kidneys and retina without insulin leads to glycation results in neuropathy, kidney failure and retinopathy.

The knowledge on gluten rich food is only 28% which is also very less, since undigested gluten peptide escape into the blood stream adhere to various organ including pancreas, antibody raised against gluten peptide affects the organ result in various autoimmune disease including Type I diabetes by damaging the beta cells in the pancreas.[10] Only 44% of the studied populations are aware about the mechanism behind the physical activity to utilize glycogen found in muscle cell are utilized only by the muscle cell. Knowledge on low glycemic index food also needs awareness as present study showed only 45% of awareness, since low glycemic index food tend to slowly digested, absorbed by which blood glucose level will not be shoot-up after food intake.[11] Almost everyone aware about the symptoms of diabetes like frequent urination, increased thirst and hunger, weight loss or gain, blurred vision, wounds that heal slowly, 93% aware the function of insulin, 90% aware about types of diabetes, 87% and 82% showed knowledge on Type 1 and Type II diabetes respectively and 80% of studied population aware that without insulin glucose diffuse in RBC, retina, kidney and nerve cells (Table No. 1). Overall, only 15% of the

studied population showed existing knowledge on root cause for diabetes on preventive aspect and this may still further decline in general population and graduate from other non-biological background, which concern a lot. The Government, Non-Government organisation, academic institution includes schools and colleges, private sectors, voluntaries should tie hands together to create awareness about the root cause for diabetes, food habits and life style on preventive aspect to save the healthy population from diabetes.

The present study assessed the existing knowledge on diabetes among the graduates with biology background, present study warrant awareness on root cause for diabetes especially to change the lifestyle and food habits, which needs much attention in order to prevent diabetes among the healthy population. As the study was conducted only with biology background graduates, warrants studies among general population in both rural and urban areas, graduate from other discipline with simple questionnaires to assess their existing knowledge on diabetes with preventive aspect. The present study emphasis that similar study should carry across the State, Nation and also globally in order to create knowledge and awareness about the food habits, life style, physical activity among the healthy population to prevent diabetes on war foot basis.

Conflict of interest:

We declare no conflict of interest

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