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**Assessing The Existing Knowledge on Diabetes to Create
Awareness on Its Root Cause: A Preventive Study**

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ABSTRACT

Diabetes Mellitus is a major clinical and public health problem globally, accounting for 422 million people living with diabetes during 2014 and increasing the prevalence rate steadily. The present study aimed to assess the existing knowledge on diabetes to create awareness about the root cause for diabetes among the healthy population who graduated with biology background in and around Pondicherry. In the present study, 642 graduates 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. Results showed that only 17% of the population is aware of the importance of essential fatty acids in the cell membrane, 25% of participants are aware of the formation of glycation, and 28% of the population is aware that gluten-rich food leads to autoimmune disease. Relevant to low glycemic index food, about 45% of the studied group were aware, about 44% were aware that glycogen stored in the muscle cell could not be released in the blood. Apart 93% aware of insulin action, 90% aware of types of diabetes, 100% aware of the symptoms of diabetes. Overall, only 15% of the studied population showed existing knowledge on the root cause of diabetes on preventive aspect and this may still further decline in the general population and graduate from other non-biological backgrounds. The present study explored that warrant awareness on the preventive aspect on the root cause for diabetes in relevant to essential fatty acids rich food and its source, to change in the lifestyle, apart from screening, management, and treatment of diabetes.

Keywords: Diabetes Mellitus; knowledge; Low Glycemic Index

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. Conversely, 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 the breakdown of stored glycogen into glucose released in the blood stream to maintain the blood glucose level at 80 mg/dl. If the stored glycogen is also depleted, liver and muscle cells use fatty acids as fuel by the breakdown of fat in the adipose tissue (WHO, 2016).

When there is a lack of insulin secretion or cell resistance 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, resulting in an abnormally high amount of glucose in the blood stream, causing frequent urination to premature death. During 2012 about 1.5 million deaths due to diabetes made 8th leading cause of death (Worldwide trends in diabetes since 1980).

Globally 422 million people lived with diabetes during 2014, and the prevalence rate is 8.5 (%). 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 still bound to increase several folds. China, India, and USA are among the top three countries with a high number of diabetic populations (Seuring et al., 2015). In India, numbers climbed from 11.9 million in 1980 to 64.5 million during 2014. The prevalence of diabetes has more than doubled for men (3.7% (1980) to 9.1 % (2014)) and 80% (4.6% to 8.3%) among the women population in India. It has been estimated that the globally annual expenditure cost for diabetes is more than USD 827 billion, which imposes a large economic burden on the health care system (Seuring et al., 2015).

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 are the key role, especially in screening, control, and better management for various diseases, including diabetes. Various research also carried out 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 aspects 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 ((Seuring et al., 2015). Though awareness and education is a key role for better management everyone, at least graduates should be aware of the basic knowledge on the root cause for diabetes, by which they can create awareness among their family members, friends, and nearby population by which themselves will change their lifestyle, what to have, when to have, how much to have, what to do, what should avoid etc.

The present study was designed to attempt preventive aspects 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 (Deepa et al., 2014).

Materials and Methods

The study was carried between January - June 2017 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 study's objective, and confidentiality was assured in collecting personal data. A structured and pre-tested questionnaire was assessed on existing knowledge relevant to the root cause for diabetes, complication and its symptoms. A scoring mechanism was used for each correct answer by awarding one score. After collecting the filled questionnaires, details about the cell membrane, importance of omega-3 essential fatty acids and cis-unsaturated fatty acids, what food to take and not to take, how diabetic complications developed, symptoms, and management and how to prevent were explained for about 15 minutes.

Statistical Analysis

Data were expressed in percentage.

Result

Totally 642 graduates with biology background actively participated, which includes 384 male and 258 female. Among 642 participants, only 119 (17%) knew 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%) participants are aware of the formation of glycation due to excess glucose available in blood, and 180 (28%) are aware that gluten-rich food leads to autoimmune disease. On the other hand, about 292(45%) were aware of low glycemic index food, 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, and 642(100%) aware about the symptoms of diabetes. Overall, only 15% of the studied population showed existing knowledge of the root cause for diabetes on preventive aspects.

Discussion

Almost everyone is aware of diabetes symptoms, management, and its complications; those who have diabetes are self-monitored and monitored by their physicians. Hence, it cannot be accepted that the 422 million world population affected by diabetes is due to lack of awareness and less knowledge of diabetes. Most of the research on awareness studies explored symptoms and treatment on diabetic patients (Deepa et al., 2014), and none of the awareness studies highlighted exploring the root cause for diabetes on the preventive aspect in the healthy population. If healthy people are aware of the root cause for diabetes, they themselves can change their lifestyle, resulting in the prevention of diabetes. The present study was designed to assess the existing knowledge on diabetes and create awareness on the root cause for diabetes on a preventive basis among the science graduates.

The cell membrane plays a vital role in type 2 diabetes. Initially, the Omega-6 and Omega-3 essential fatty acids ratio was a 1:1 ratio on cell members, but the current ratio was < 20:1. 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 (Rameez et al., 2016). In cis-unsaturated fatty acids, hydrogen atoms are on the same side of the molecule result in a bend, creating a more open structure between the fatty acid fluidity, but in 'trans' form, hydrogen on opposite sides results in a straight hydrocarbon with less membrane fluidity of the cell. This is due to change in the lifestyle 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-unsaturated 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 unavailability 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 (Rameez et al., 2016).

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 primary root cause for diabetes. Moreover, as essential fatty acids cannot be synthesized, they must be obtained only from an 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 bloodstream result in glycation, glucose cross-link with proteins and DNA, destroys functions of many enzymes leads to insoluble, more challenging, less elastic by which no new blood vessels in the wounded areas to heal (Artemis et al., 2016). Moreover, 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 significantly less, since undigested gluten peptides escape into the bloodstream adhere to various organs, including the pancreas, antibody raised against gluten peptide affects the organ result in various autoimmune diseases, including Type I diabetes by damaging the beta cells in the pancreas (Artemis et al., 2016). Only 44% of the studied populations are aware of 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 The present study showed only 45% of awareness, since low glycemic index food tends 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 of 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 of the root cause for diabetes on preventive aspect and this may still further decline in the general population and graduate from other non-biological backgrounds, which concern a lot. The Government, Non-Government organisations, 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 lifestyle on the preventive aspect to save the healthy population from diabetes (Artemis et al., 2016).

The present study assessed the existing knowledge on diabetes among graduates with a biology background. The present study warrants awareness on root cause for diabetes, especially to change the lifestyle and food habits, which needs much attention to prevent diabetes among the healthy population. As the study was conducted only with biology background graduates, it warrants studies among the general population in rural and urban areas and graduates from other disciplines with simple questionnaires to assess their knowledge of diabetes with preventive aspects. The present study emphasizes that similar studies should carry across the State, Nation, and globally to create knowledge and awareness about the healthy population's food habits, lifestyle, and physical activity to prevent diabetes on a war foot basis (Artemis et al., 2016).

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Study significance: The present study explored an awareness on the preventive aspect on the root cause for diabetes in relevant to essential fatty acids rich food and its source, to change in the lifestyle, apart from screening, management, and treatment of diabetes.

REFERENCES

Artemis P. (2016). Simopoulos An Increase in the Omega-6/Omega-3 Fatty Acid Ratio Increases the Risk for Obesity. *Nutrients*; 8:128.

<https://doi.org/10.3390/nu8030128>

Deepa M, Bhansali A, Anjana RM, Pradeepa R., Joshi SR, Joshi PP. (2014). Knowledge and awareness of diabetes in urban and rural India: The Indian Council of Medical Research India Diabetes Study (Phase I): Indian Council of Medical Research India Diabetes 4. *Indian J Endocrinol Metab.*; 18: 379-385.

<https://doi.org/10.4103/2230-8210.131191>

Rameez H, Bindu R, Anantharaman G, Mahesh G, Sanjai S, Justin J (2016). Knowledge and awareness about diabetes mellitus and diabetic retinopathy in suburban population of a South Indian state and its practice among the patients with diabetes mellitus: A population-based study. *Indian J Ophthalmol.* 64: 272-276.

<https://doi.org/10.4103/0301-4738.182937>

Seuring T, Archangelidi O, Suhrcke M. (2015). The economic costs of type 2 diabetes: A global systematic review. *Pharmacoeconomics.*; 33: 811-31.

<https://doi.org/10.1007/s40273-015-0268-9>

World Health Organization, 2016. *Global Report on Diabetes*. Geneva,