

PHARMACOECONOMIC STUDIES OF THE EFFECT OF DIABETES TREATMENT

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ABSTRACT

Pharmacoeconomics refers to the segment of the health economics that primarily focuses on benefits of any intervention and cost towards the application of limited resources, aiming to increase the value to various patients through the use of data driven decisions. In the past few years, numerous studies have been done to analyse the suitable treatment procedure for curing diabetes. This study aims to determine the suitable treatment procedure for diabetes through the application of secondary data. Chronic diabetes includes two types, type 1 and type 2-diabetes. Diabetes mellitus (DM) is a critical disorder that can be seen among people in all age groups. The reversible conditions of diabetes include gestational diabetes and prediabetes. Thus, a person who can control the glucose level in blood can avoid complications such as microvascular and macrovascular diseases. However, recent data published in the last 5 years are accessed in this study to provide a detailed view regarding the effects of diabetes treatment among people. Patients' data available in secondary sources are gathered to provide maximum knowledge regarding diabetes treatment and its impact on human health. Findings of this study reveals that in order to prevent diabetes it is essential to get more physical activity, eat healthy foods and lose excess weight. Furthermore, medications for diabetes treatment can cause weight gain, chest infection, water retention, osteoporosis, allergies and many other health issues. Majority of the patients are found to have foot ulcers and hypertension as a result of diabetes.

Keywords: Pharmacoeconomic, Diabetes, Medication, Glucose level, Treatment

INTRODUCTION

Overtime, Diabetes is recognised as a major health issue among the global population. This critical health issue can damage the system of the body including blood vessels and nerves. As a result stroke, lower limb amputation, blindness, kidney failure and heart disease can be observed as a result of Diabetes. Type 1 diabetes symptoms can be observed by checking the blood sugar level. Hence, the American Diabetes Association (ADA) provided some screening guidelines in order to check the prevalence rate. According to ADA, there are some screening tests that are recommended for analysing the prevalence rate of this disease. Hence, people with a higher BMI, HIV and older than 35 years should test their blood sugar level. There are multiple blood tests that can be followed for checking the sugar level in blood. For example, Random test is done by analysing the blood sample at any random time. Hence, a sugar level of 200 mg/dL - 11.1 mmol/L or higher suggested to do a test for diabetes.

Additionally, Glucose tolerance test, A1C test, fasting blood sugar test can also be followed for checking the glucose level in blood. The symptoms of Diabetic ketoacidosis include vomiting, dry mouth, confusion, weakness, shortness of breath, stomach pain and even Coma. On the other hand, the symptoms of Hyperosmolar syndrome include dry mouth, vision loss, hallucination, extreme thirst, fever, drowsiness and so on. A blood sugar level over 600 mg/dL or 33.3 mmol/L is known as Hyperosmolar [1]. Low level of blood sugar among people

is known as Hypoglycemia. In this case, the blood sugar range drops that causes several issues such as Weakness, Shaking, Sweating, Headache, Irritability, Heart palpitations, Hunger, Slurred speech and so on. In case, a patient is taking medications for controlling the blood sugar level including insulin then the blood sugar level can drop at any time. Becoming more physically active or skipping meals can cause several issues for people. Low blood sugar related issues can be observed in case a person is taking too much medications for lowering glucose or taking too much insulin. Type 2 diabetes is generally tested by performing “glycated haemoglobin(A1C) test”. Thus, below the rate 5.7% sugar in blood is normal while 5.7 to 6.4% is considered a prediabetes phrase. Additionally, 6.5% sugar level in blood indicates diabetes [2]. The findings of multiple researchers reported that common diabetes can cause several kinds of health complications such as nerve damage, hearing, vision, oral health, mental health and foot infection.

RESOURCES AND PROCEDURES

In order to collect data in this research, a secondary method is followed. A research can be completed by following more than one method such as observing, case studies, secondary data, survey or interview [3]. In this research, only secondary qualitative types of data have been collected from various internet sources. All the data available in secondary sources such as reports, authorised websites, journals, articles and research papers are used for gathering effective data regarding the concerned research topic. After collecting effective data in this study, a proper discussion is made by the researcher for analysing all the facts associated with the research topic.

RESULTS

Types of diabetes

Type 1 diabetes which is also known as juvenile or insulin dependent diabetes can be observed due to the deficient production of insulin. According to the reports of 2017, around 9 million people in this world suffered from diabetes. Most of them belong to high income countries. On the other hand, type 2 diabetes occurs when the body of a person does not use glucose or sugar for making energy in an appropriate manner. Thus, type 2 diabetes prevents the body from applying insulin in a proper way that leads to high sugar levels in blood. Moreover, over time type 2 diabetes can impact on the body in a serious manner especially blood vessels and nerves. However, this type of diabetes can be easily preventable by focusing on following a healthy lifestyle. Early diagnosis is essential for preventing the negative effects of type 2 diabetes among people. The most effective way to detect diabetes is to follow blood tests and regular check ups.

However, diabetes needs to be predicted effectively and thus a proper diagnosis process can be helpful to avoid these issues. Approximately, 95% of the diabetic patients are suffering from type diabetes. Type 2 diabetes is known as non-insulin dependent. However, gestational diabetes is considered as another type of diabetes that is often known as hyperglycemia. This type of diabetes occurs during pregnancy. Women who are having gestational diabetes may suffer from complications during delivery or pregnancy.

Pharmacoeconomic analysis

Pharmacoeconomics refers to the branch where health economics focuses on creating interventions and also balances cost through the use of limited resources. However, pharmacoeconomics aims to increase value to patients, society and healthcare payers through data driven decision making. According to the data of NCBI, the average time cost of drugs in India for diabetes treatment is around 1945135 INR within a life cycle of the patient. The expenditure per patient in one month is 1265 INR along with 993 INR medical expenditure and 271 INR non medical expenditures. Patients using different kinds of antidiabetic drugs such as insulin and insulin secretagogues are spending much more in glucose strips than others who are using different drugs [4].

According to the reviews of 400 papers published in the previous 20 years, it can be stated that the cost of treatment of diabetes has increased in the last few years. The total cost for diabetic care was 22456 INR per patient without any kind of complications in a year. On the other hand, around 30634 INR per patient was spent who were having complications [5]. However, clinical appointments in India are also costly and affect the economic condition of patients. Reports state that both money and time are involved in the cure procedure of

diabetes. Different kinds of health settings of the government must take the responsibility to fulfil the needs of the patients. The average expenditure of normal people in India is 912 INR per visit and the direct cost of healthcare is 553 INR per individual. On the other hand, the indirect expenditure of a diabetic patient is 359 INR. A lot of intervention strategies are adopted by the government in order to treat diabetes among patients in India. However, effective analysis is essential for following the proper procedure. Presently, medical insurance and government interventions are inadequate for resolving the issues of normal people. Medical expenses in India are increasing, creating more challenges for people suffering from diabetes.

Prevalence rate of Diabetes

In addition to this, Diabetes mellitus (DM) is a global public health issue that affects around 415 million people in this world and it is expected that by 2040 this will affect 642 million global population [6]. According to the results, 10.7% prevalence rate of Diabetes mellitus is found in Arab states while 11.5% is observed in North America as well as Caribbean region. Currently, high glucose level within patients is causing life threatening and life changing complications. Furthermore, a study was conducted to observe diabetes among 5221 patients from Oman that resulted in 52% of them suffering from hypertension, 37% of them having microalbuminuria, 40% suffering from dyslipidemia and 5% of them having diabetic nephropathy.

Treatment of diabetes can reduce the glucose level that can cause hypoglycemia. Stroke can happen due to the treatment of diabetes. Possible long term impact on diabetes treatment can cause heart attack, kidney issues, and stroke. However, negligence of food habits and physical activity can cause several issues for the patients suffering from this disease. Creating proper health campaigns is essential for making people aware regarding health issues. Type 1 and Type 2 diabetes can cause several issues like cancer, gum disease, nerve damage, heart attack and stroke [7].

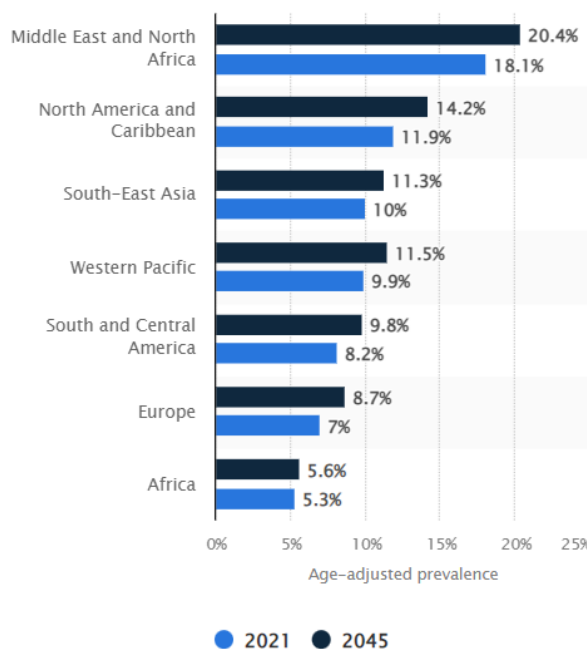


Figure 1: Prevalence rate of Diabetes in different regions

Source: [1]

According to the above image, the prevalence rate of Diabetes in Middle East and North Africa was 18.1% in 2021 that is expected to reach 20.4% in 2045. In addition, the lowest prevalence of Diabetes is observed in Africa. In the year 2021, the prevalence rate of Diabetes in Africa was 5.3% and is expected to reach 5.6% in 2045. On the other hand, in North America and the Caribbean region the prevalence rate is expected to increase from 11.9% in 2021 to 14.2% in 2045 [1]. Additionally, 1.3% of increase in Diabetes prevalence is expected to be observed in South East Asia. In Europe, the prevalence rate is expected to increase by 1.7% by 2045. Hence,

it can be assumed that the prevalence rate in Europe will increase from 7% in 2021 to 8.7% in 2022. A diabetes prevention study is conducted in order to prevent the disease.

According to the reports of WHO, the number of diabetic people increased from 108 million in 1980 to 422 million in the year 2014. The prevalence rate has increased more in middle income and low income nations than the high income nations. The major cause of kidney failure, blindness, heart attack and stroke is diabetes. However, the reports stated that a 3% increase in mortality rate due to diabetes has been observed between 2000 and 2019 [8].

DISCUSSION

Diabetes a public health emergency

Diabetes mellitus is a global public health issue which is important to be discussed in order to improve the current situation of patients suffering from this disease. According to worldwide data it has been found that presently 415 million people are suffering from this disease in different regions of the world. Life threatening complications can be observed by people suffering from diabetes around the worldwide region. The United Nations conducted a lot of meetings in order to address this chronic disease and also take some prevention strategies for reducing the impact of this disease. According to the results of these meetings it can be stated that the underlying risk factors and social determinants that are causing diabetes among the population is important to be understood by everyone [9]. Health campaigns can be arranged by the public health care organisations for educating people about the consequences of having this disorder. The commitment of the government to address this chronic disease is an essential part of improving the current situation of the world. Physical activity is considered as a major cause of having this disorder among children to adults that due to the obesity and excessive use of tobacco can also create several critical types of issues for people. Sugary beverages, unhealthy food and food taxation policies for obesogenic foods are the main reasons for growing health issues among the population [10]. Public health emergencies are important to be looked after by the healthcare professionals in order to provide clear guidance to the locals for living a healthy lifestyle. Few researches were done on the importance of lifestyle modification to prevent diabetes. Conducting more research on this topic can be helpful to analyse the best possible ways to avoid this critical disorder.

Low calorie diet plan is important to be followed by the people suffering from this critical disease. As diabetes can create renal complications as well as cardiovascular diseases, these four people should be more concerned about their health to avoid this disease. The healthcare expenditure in the country is a lot in comparison to the GDP growth of India [11]. However the population of this country must analyse the proper ways to prevent this disease in an effective manner. Promoting physical activities in schools as well as workplace can help to provide a better environment to all the people for preventing different kinds of diseases.

Monitoring the blood sugar level is also an integral part of preventing this disease from being spread to the population. There is a lot of technology cal equipment available in the market that can be successfully used by normal people for measuring their glucose level in blood easily. In recent days, governments of multiple countries are spending a lot on technology development. The introductions of technology equipment for medical purposes are helping people to access remote diagnosis. For example glucometer is now being used by a lot of people in this world [13]. People suffering from diabetes can easily check their glucose level and consume food according to the results. Information regarding the glucose level can be easily transmitted through a mobile device to the physicians. In case of severity proper medications and insulin consumption can be taken by the particular patient. There are multiple kinds of drugs available in the market that can help to control the insulin level in blood. Nerve damage is the most common complication due to diabetes. However it can affect the legs or feet of an individual. The blood vessels and kidney disease can be a result of diabetes among the population of the world [14]. High blood sugar level can create kidney damage to a lot of patients. Improper treatment of diabetes can cause several issues for patients suffering from different kinds of symptoms. People with diabetes are leaving with few complications and their by greater awareness should be created in order to improve the current situation of this world.

Treatment plan and effects

Depending on the type of Diabetes among patients, it is essential to follow proper treatment methods. Oral drugs, insulin and blood sugar monitoring processes can be followed by the patients in order to control the disease. Firstly, healthy eating can be a major step that can be followed by patients in order to follow the diabetes prevention process. Hence, creating a healthy eating plan can be helpful for people that will control the blood sugar level of patients. In addition to this, a person suffering from the complications of diabetes must rely on whole grains, lean proteins, vegetables, fruits and so on. All of these fruits are high in fibre and nutrition. Along with that, these food items are having low refined sweets, carbohydrates as well as saturated fats. However, this can be considered as the best eating plan for patients as well as the entire family. Understanding the exact requirements of nutrition for a person is challenging for a person. Hence, a meal plan is important to be created by the nutritionist in order to provide proper guidance to patients. Health goals, lifestyle and food preferences of an individual are important to be settled for following a healthy eating process [15].

Apart from that, physical activity is another important part of preventing Diabetes among patients. A regular aerobic function can help in dealing with critical issues of Diabetes. Physical activity reduces the blood sugar level through transforming sugar into energy. Hence, the body requires less insulin for transporting sugar to the cells of the body. Hence, regular exercise is a crucial part of having a healthy life. Biking, swimming, walking, and any kind of physical activity can be followed by people in order to have a healthy life. Treatment of Type 1 Diabetes includes insulin injection through the application of an insulin pump. On the other hand, checking blood sugar as well as carbohydrate counting can also help a person to treat diabetes among patients [16]. Along with that, Type 2 Diabetes can be treated through some basic lifestyle changes, monitoring blood sugar level and taking oral diabetes medicines or insulin.

Depending on the treatment plan and checking the blood sugar level can help in preventing the disease. However, careful management of maintaining blood sugar level is possible through following a proper treatment plan. Hence, physical activity, food plan, and medications are important to be taken actively for avoiding the complications of this disease. There are multiple kinds of medications prescribed by the physicians in order to control this disorder. Metformin like Fortamet and Glumetza are applicable for controlling Type 2 Diabetes among patients. On the other hand, SGLT2 is another inhibitor that might be applied for curing this disease [17]. This drug works by preventing both of the kidneys from absorbing filtered sugar into the blood. Thus, in Urine sugar can be eliminated through the use of this drug.

Transplantation is another way of treating this critical disease. For example, Type 1 Diabetes can be treated well through pancreas transplant. Along with that, the study of Islet transplant is also performed by many researchers. A successful transplant of pancreas will provide an opportunity to eliminate insulin therapy. Although transplantation is not always successful as this process includes serious risks, more research can help to identify a better treatment procedure for resolving the issue [18]. There are some immune suppressing medications which can help in preventing rejection of organs. However, these drugs are having serious side effects. In case of critical issues Diabetes can cause kidney issues as well and then Kidney transplant is the only way to cure. Research showed that Bariatric surgery can be helpful in controlling type 2 diabetes. In addition, people who are having gastric bypass majorly see major development in blood sugar level. However, the benefits and risks of this procedure are still unknown to medical professionals.

Gestational diabetes can be treated through monitoring the blood sugar level of a patient. Due to critical issues suffered by patients, oral drugs and insulins can be taken as well. On the other hand, as a result of this treatment process low blood sugar after birth can be observed among infant [19]. In addition to this, prediabetes can be treated by following healthy choices in lifestyles. Exercising for 150 minutes minimum in a week or losing 7% of the body weight can help in preventing type 2 diabetes. Conversely, drugs like metformin, and statins can be taken to avoid this disease or other conditions like heart disease. There are many home remedies and lifestyle changes that can be followed by people to treat this disease. Thus, glucose level in blood should be identified accurately in order to follow proper prevention strategies [20].

Prevention methods can be followed by stop taking tobacco, eat a healthy diet as well as avoid saturated fat and sugar. Researchers also mentioned that becoming physically active can help in maintaining the glucose level in blood [21]. Thus, the pharmaco-economic study done in this paper is beneficial to follow suitable strategies that

will help in reducing the cost of prevention. In addition to this, treatment methods can be followed easily at low cost through studying pharmacoeconomics in diabetes treatment.

CONCLUSION

According to the findings of this study, it can be concluded that Diabetes is a critical disease for people. The prevalence rate of diabetes is increasing in North Africa and the Middle East region. However, making people aware regarding the benefits of following a healthy lifestyle can help in preventing this disease. In addition to this, low carbohydrates should be taken by people for following a healthy lifestyle. Apart from that, physical activities are also important to be followed by patients in order to achieve goals. There are multiple medications that can be taken by patients in order to treat this disorder. However, the risk of this disease is important to be analysed by people in order to follow proper and healthy prevention plans. Pharmacoeconomics studies are essential to be conducted in future for providing more knowledge regarding this disease. Following correct strategies for prevention can help in having a healthy life without any kind of physical complications. Different kinds of health regulations should be created by the government of the country as well as healthcare practitioners in order to prevent diabetes as it can cause several issues to other human organs. The importance of having a healthy and physically active life should be known by the population of this world as it can help to avoid different kinds of critical issues. Hence health campaigns can be arranged that will help to make people aware about the complications of diabetes in different regions of the world. Especially the cost of treating these disorders should be known by the local population of the country in order to take proper prevention strategies. Other critical issues related to diabetes can also be prevented by following a proper healthy lifestyle.

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