

## COMPLICATIONS IN DIABETES MELLITUS TYPE 2 : SOCIAL DETERMINANTS AND EDUCATE THE PEOPLE IN TERTIARY CARE HOSPITAL

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**ABSTRACT:** Social determinants of health refer to the conditions in which individuals are born, grow, live, and age. A cross-sectional study was conducted of adults with type 2 diabetes who were attending the outpatient department of a tertiary care center between January and February. Data was analyzed from a questionnaire that was completed by 250 diabetic patients, of which both sexes were represented, with males being predominant. Results showed that 88% had heard about diabetes mellitus type II, 80% were aware of high blood pressure, 60% knew that diabetes can be prevented if treated early, 88% were aware of the importance of a balanced diet, 72% were aware of the importance of exercise in managing diabetes, 32% were aware of insulin titration by self-administration, and 28% were aware of the proper storage temperature of insulin. Additionally, 88% of the patients knew to carry sweets with them to avoid hypoglycemia. It is essential to increase awareness about the proper storage temperature of insulin and create advertisements via social media and posters in public places and hospitals to help raise awareness about diabetes and its management.

**Key words:** Diabetes type 2, knowledge of awareness DM type2, storage insulin

### INTRODUCTION:

Diabetes mellitus is the most prevalent non-communicable disease and has emerged as the pandemic of the 21st century. About 425 million people have diabetes worldwide, with numbers expected to rise to 600 million by 2045 [1]. The International Diabetes Federation reported a 7.6-11% prevalence of diabetes in the Pakistani population in 2011, projected to rise to 15% by 2030 [2]. Diabetes has become a huge burden on the healthcare resources of the developing world due to its chronic nature and associated morbidities [3]. The management of diabetes is a challenge for physicians. Treatment aims at achieving glycemic control with lifestyle changes and a wide array of pharmacological agents. These need to be continued for life as there is no curative treatment. Educating and motivating patients to adopt a healthy lifestyle and remain adherent to drug treatment can help achieve good glycemic control and prevent the development of complications [4][5]. Thus, education regarding self-management and sustained control is a cornerstone of the disease's management; the ultimate target is a change in attitude [6][7]. Though there is abundant literature from the developed world on this topic, local data is scarce. Our patients come from different cultural backgrounds, and the results of international studies may not apply to our setups. India leads the world in the alarming epidemic of diabetes mellitus with the highest number of 50.8 million diabetics, followed by China and the United States [8]. Rapid epidemiological transition in India with increased urbanization and westernization has contributed to a substantial rise in diabetes [9]. Prevalence estimates of diabetes in India range from 5.6% to 12.4% in urban areas and 2.4% to 2.7% in rural areas [10]. This difference not only exists across the rural-urban divide but also across the Indian states because different states in India are at diverse stages of demographic transition [11]. A community-based cross-sectional survey in urban Kerala recorded the highest prevalence of 19.5% in India [12]. As Kerala has the highest proportion of aging population in India, the prevalence of diabetes mellitus is highest in Kerala. In addition, a drastic change in the living standard of people in Kerala over the last two decades has also significantly contributed to it [13]. It is now being considerably agreed that knowledge of diabetes mellitus and its risk factors and preventive lifestyle among the population will likely have a substantial benefit in the prevention of the disease [14]. Unfortunately, there is inadequate awareness about the real dimension of the problem among the general public. There is also a lack of awareness about existing intervention for the prevention of the disease [15]. Keeping in view the increasing burden of diabetes mellitus in Kerala, it is highly important to know about the awareness of the disease among the general population to chalk out culturally appropriate and need-oriented educational strategies. Even though ample literature on the prevalence of diabetes mellitus is available from Kerala, to our knowledge, no comprehensive study on knowledge about diabetes mellitus has been undertaken so far. With this perspective, a community-based study was undertaken with the objective of assessing the

awareness of diabetes mellitus, its risk factors, treatment, complications, and the role of lifestyle modifications in controlling diabetes in a rural population in Kerala. Family history, environmental factors, sedentary lifestyle, obesity, age, and high blood pressure are important risk factors for diabetes. Good food habits, physical activities, and regular check-ups can help people in controlling diabetes. Complications of diabetes include cardiovascular disease, diabetic neuropathy, diabetic nephropathy, diabetic retinopathy, foot damage, skin conditions, hearing impairment, Alzheimer's disease, and depression. More than 50% of the Indian population still lives in rural areas, where knowledge and awareness about the risk factors of diabetes and its complications are very poor, particularly in North India [16]. Thousands of people, including patients and their attendants, visit eye care facilities daily, and these facilities can play a pivotal role in educating people about diabetes and its complications. Murthy et al. highlighted the need for an integrated approach in which eye care and diabetic care services work together to prevent and manage diabetes [17]. Therefore, this study was planned to examine the correlation between diabetes knowledge and glycemic control and to identify demographic factors that could predict a better understanding of the disease process.

#### **METHODOLOGY:**

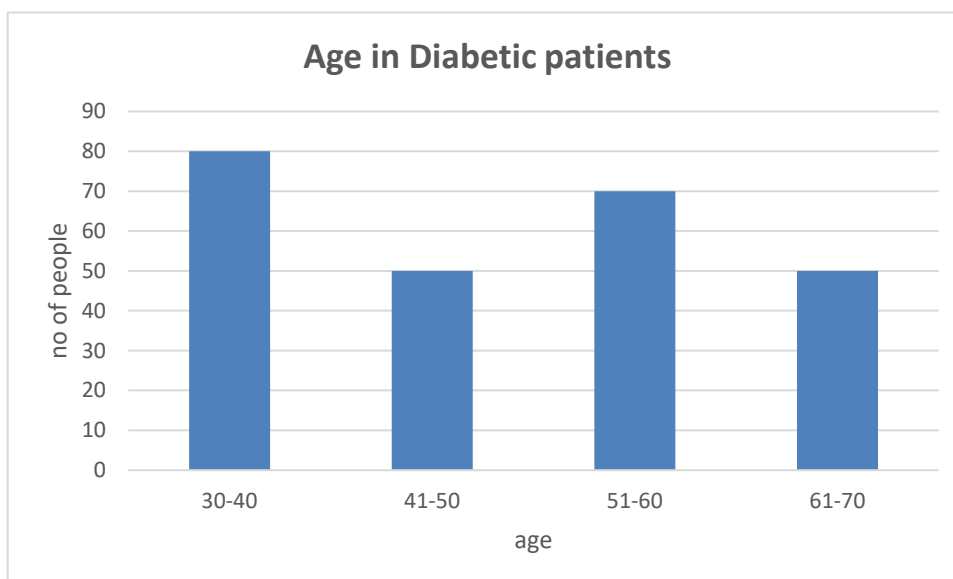
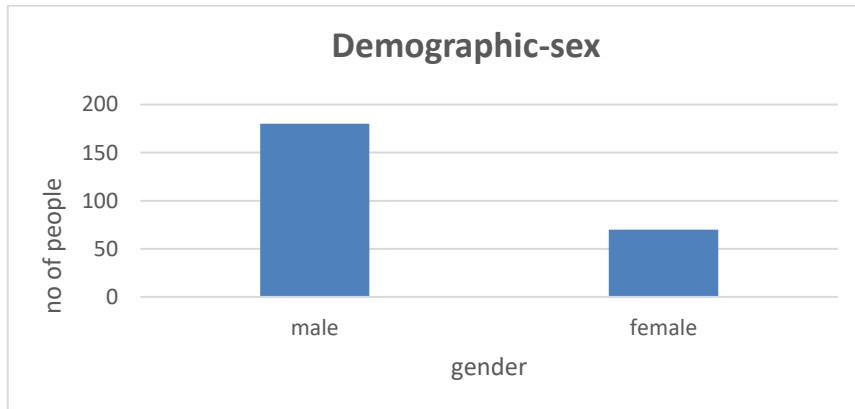
The main objective of this survey was to evaluate the overall awareness and understanding of diabetes among patients visiting a diabetic outpatient department in a tertiary care hospital situated in South Tamil Nadu, India. This cross-sectional survey was conducted randomly and used a questionnaire that comprised of eight sections, with each section designed to examine different aspects related to diabetes mellitus. The survey aimed to gather information about the general knowledge of patients about diabetes, its causes, symptoms, treatment, prevention, and complications. The information collected through the survey provides valuable insight into the current level of understanding and awareness of the different sections of the survey covered a wide range of topics related to diabetes, including general information about the condition, knowledge of risk factors, symptoms, potential complications, various treatment options available to patients, lifestyle considerations, non-medical measures, and things that diabetics should avoid. Overall, the purpose of the survey was to collect data on patients' comprehension of diabetes and identify any gaps or deficiencies in their understanding of the condition [18].

In our cross-sectional survey-based study, conducted in Vellore in Tamil Nadu between January 2023 and March 2023, we recruited participants using snowballing sampling. The target population was invited to participate by accessing a web link to the survey in tertiary care hospital in Vellore hospital. To be included in the study, participants had to be between 18 and 74 years old at the time of the survey. All participants diagnosed with diabetes at the time of the survey were excluded from the sample.

This study aimed to assess the knowledge and awareness regarding diabetes among the general population. A questionnaire consisting of 19 questions was distributed among 500 individuals, including questions related to demographic data, general knowledge of diabetes, diet in diabetes, exercise, medication, symptoms, foot care, follow-up, complications, lifestyle and non-medical measures, and monitoring of diabetic condition [19]. The data collected showed that the majority of the respondents (70%) had heard about diabetes, and 60% knew that it is a condition of high blood sugar. Only 45% of the respondents knew that diabetes can be prevented. Regarding diet, 55% of respondents believed that a diabetic diet is a healthy and balanced diet, and 60% were aware of taking 3 big meals and 3 small snacks [20]. Regarding exercise, only 40% of respondents knew about checking blood glucose before exercise, and only 30% knew that 150 hours of exercise per week is adequate. In terms of medication, only 50% of the respondents knew that insulin can be stored at room temperature [21]. Furthermore, 80% of the respondents believed that low sugar can be corrected with glucose, and 75% knew that giddiness, sweating, and blurred vision are symptoms of low sugar. In terms of foot care, only 50% of the respondents knew that daily inspection of feet can prevent major foot complications. Regarding follow-up, 70% of respondents knew that annual eye check-up is done to prevent eye complications. Furthermore, only 40% of respondents knew that diabetics should not skip meals when busy [22]. Overall, the study showed a lack of awareness and knowledge among the general population regarding diabetes, emphasizing the need for education and awareness campaigns to prevent and manage diabetes effectively [24].

## RESULT:

Survey of awareness of Diabetes I patient attending OPD N=250 patients (using surveyquestionnaires)



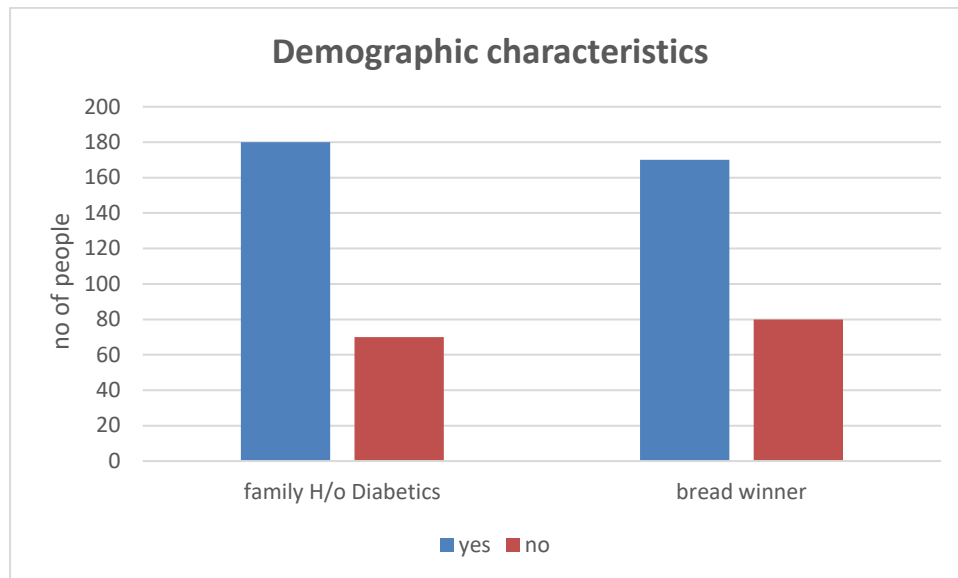


TABLE: 1 –GENERAL KNOWLEDGE OF DIABETICS

General knowledge of diabetes - n =250	yes	no	Unsure
Have you heard about a condition called diabetes	22(88%)	2(8%)	0
Diabetes is a condition of high blood sugar	20(80%)	3(12%)	2(8%)
Diabetes is a condition of inadequate or absence of insulin in the blood	17(68%)	4(16%)	5(20%)
Diabetes can be prevented	15(60%)	4(16%)	6(24%)

60% of patients are not aware that diabetes can be prevented \*\*

Diabetes, also known as diabetes mellitus (DM; from here on, "diabetes"), is a long-term endocrine condition defined by hyperglycemia. This is brought on by either a lack of pancreatic insulin production, a body's inability to properly use its insulin, or both. Type 1 diabetes (T1D) and type 2 diabetes are the two main forms of diabetes that may be clinically distinguished based on the type of impairment in insulin physiology (secretion or sensitivity)(T2D). According to estimates, 451 million people worldwide had diabetes in 2017. The International Diabetes Federation estimated that 72.9 million adults in India were living with diabetes in 2017. Tamil Nadu had the highest prevalence of diabetes in India.

TABLE 2: DIET IN DIABETES

Diet in Diabetes	yes	no	Unsure
A diabetic diet is a healthy and balanced diet	22(88%)	2(8%)	1(4%)
Are you aware of taking 3 big meals and 3 small snacks	20(80%)	3(12%)	2(8%)
A diabetic patient is advised to take low fat and high-fiber diet	18(72%)	5(20%)	2(8%)

### 72% of patients are aware of a fiber diet, which lowers sugar levels \*\*

The management of diabetes heavily relies on the diet. Maintaining appropriate blood sugar levels and avoiding diabetes-related problems including heart disease and nerve damage are the two major objectives of the diabetic diet.

**TABLE 3- EXERCISE IN DIABETICS**

Exercise in Diabetics	yes	no	Unsure
Are you aware of checking blood glucose before exercise	21(84%)	1(4%)	3(12%)
On average, 150 hours of exercise per week is adequate	18(72%)	3(12%)	4(16%)
During fever, strenuous activity can increase the sugar level	16(64%)	4(16%)	5(20%)

Most of the patients are not aware that exercise – is important to lower their sugar level

Exercise can assist to improve blood sugar management, lower the risk of complications, and improve general health, making it a crucial component of controlling diabetes. When it comes to exercising with diabetes, keep the following in mind: Before beginning an exercise program, consult with your healthcare provider: It's crucial to speak with your healthcare practitioner before beginning an exercise program to make sure it's safe for you to exercise and to find out what kinds of activities are acceptable for your fitness level and health condition.

**TABLE 4- MEDICATION IN DIABETICS**

Medication in Diabetics	Yes	No	Unsure
During the day, the insulin dose can be selfly titrated	8(32%)	12(48%)	5(20%)
Insulin can be stored at room temperature	7(28%)	10(40%)	8(32%)

Insulin storage and titration are not aware of the patients\*\*\*

Medication is a crucial component of controlling diabetes, particularly for those with type 1 or type 2 diabetes who are unable to regulate their blood sugar levels only via dietary and lifestyle adjustments. Following are a few typical forms of diabetic medications: By allowing glucose to enter cells for energy, the hormone insulin aids in controlling blood sugar levels. To maintain normal blood sugar levels, people with type 1 diabetes or severe type 2 diabetes frequently need insulin injections or an insulin pump. Many groups of oral medicines are used to treat type 2 diabetes. These drugs stimulate the pancreas to generate more insulin in various ways, assisting the body to utilize insulin efficiently.

TABLE 5- SYMPTOMS OF DIABETICS

Symptoms in diabetics	Yes	No	Unsure
Low sugar can be corrected with	18(72%)	2(8%)	5(20%)
Giddiness, sweating, and blurred vision is a symptom of low sugar	16(64%)	2(8%)	7(28%)

Symptoms of low sugar (Hypoglycaemia) are not aware more than 80% \*\*\*

Medication is a crucial component of controlling diabetes, particularly for those with type 1 or type 2 diabetes who are unable to regulate their blood sugar levels only via dietary and lifestyle adjustments. Following are a few typical forms of diabetic medications: By allowing glucose to enter cells for energy, the hormone insulin aids in controlling blood sugar levels. To maintain normal blood sugar levels, people with type 1 diabetes or severe type 2 diabetes frequently need insulin injections or an insulin pump. Many groups of oral medicines are used to treat type 2 diabetes. These drugs stimulate the pancreas to generate more insulin in various ways, assisting the body to utilize insulin efficiently.

TABLE 6- FOOT CARE IN DIABETICS

Foot care for diabetics	Yes	No	Unsure
Daily inspection of feet can prevent major foot complications	20(80%)	4(16%)	1(4%)
Warm water soak and MCR footwear is recommended for Diabetics	18(72%)	3(12%)	4(16%)

Foot care in diabetes more than 80% are not aware of \*\*\*

Due to nerve damage and poor circulation, persons with diabetes are more likely to experience foot issues, making foot care an essential component of diabetes management. Here are some pointers for diabetics on how to take care of their feet: Daily foot inspection: Look for any wounds, sores, blisters, or other ailments on your feet. Use a mirror or get assistance if you need it to see the bottoms of your feet.

Wash your feet every day: Use warm water and mild soap to wash your feet every day. Dry your feet completely, paying careful attention to the space between your toes. Apply a moisturizing cream or lotion to your feet every day to keep them soft. Avoid putting anything in between your toes, though, since doing so increases the chance of getting an infection.

**TABLE 7- COMPLICATIONS IN DIABETICS**

Complication in diabetics	Yes	No	Unsure
Eye problems	22(88%)	2(8%)	1(4%)
Kidney problems	20(80%)	3(12%)	2(8%)
Loss of sensation in feet	23(92%)	2(8%)	1(4%)

The complication in diabetes 90% are aware .Many problems associated with diabetes exist, some of which are significant and even fatal. The following are some typical issues that might affect diabetics: Diabetes can harm the kidneys' tiny blood arteries, which can result in renal disease or even kidney failure. Eye damage: Diabetic retinopathy, a disorder that can result in vision loss or blindness, is brought on by damaged blood vessels in the eyes. Diabetes can cause nerve damage and poor circulation in the feet, which can result in foot ulcers, infections, and in severe cases, amputation.

**TABLE 8- LIFESTYLE AND NON- MEDICATION**

Lifestyle and non-medical measures	Yes	No	Unsure
Diabetics should carry sweets when they are out	22(88%)	2(8%)	1(4%)
Diabetics should exercise regularly	18(72%)	5(5%)	2(8%)
Diabetics should have a low-fat and high-fiber diet	20(80%)	4(16%)	1(4%)
Diabetics should care for their toes and feet	20(80%)	3(12%)	2(8%)
Diabetics should have a good weight control	18(72%)	4(16%)	3(12%)

Lifestyle modification diabetics patient are not aware more than 80% \*\*

Altering one's lifestyle can help manage diabetes in addition to taking medication. The following lifestyle modifications might be helpful: Healthy eating: Maintaining a healthy diet is crucial for controlling blood sugar levels. Emphasize entire meals, such as fruits, vegetables, whole grains, lean meats, and healthy fats, that are high in fiber and low in sugar. Regular exercise: Regular exercise helps lower the risk of heart disease and other consequences while also improving blood sugar management. Try to exercise for at least 30 minutes, most days of the week, at a moderate level. Management of stress: As stress can cause blood sugar levels to rise, diabetics must learn how to handle stress. This could involve exercises like deep breathing or meditation.

Weight management: Maintaining a healthy weight can help to improve blood sugar control, as well as reduce the risk of other health problems.

**TABLE 9- THINGS –DIABETICS SHOULD NOT**

Things diabetics should not do	Yes	No	Unsure
Diabetics should not donate blood	22(88%)	1(4%)	2(8%)
Diabetics should not smoke	20(80%)	2(8%)	3(12%)
Diabetics should not wear tight shoes	17(68%)	3(12%)	5(20%)
Diabetics should not skip meals when busy	20(80%)	2(8%)	3(12%)

The following should be kept in mind and avoided as much as possible by diabetics: Meal skipping: Skipping meals or going for extended periods without eating can lead to dangerously low blood sugar levels in diabetics. Smoking: Smoking can make diabetic problems including heart disease, stroke, and kidney disease more likely. Neglecting foot care: Diabetics are more likely to experience foot issues, so it's crucial to take good care of the feet by cleaning them frequently, checking for cuts or sores, and wearing comfortable shoes that fit properly. Not taking prescribed drugs: Even if blood sugar levels appear to be under control, it's crucial to take prescriptions as directed by a healthcare professional.

**TABLE 10- MONITORING DIABETICS**

Monitoring of the diabetic condition	Yes	No	Unsure
Diabetics should test their blood sugar regularly	22(88%)	2(8%)	1(4%)
Diabetics should go for regular eye check-ups	17(68%)	2(8%)	6(24%)
Diabetics should go for regular check-ups	23(92%)	1(4%)	1(4%)

Keeping an eye on blood sugar levels is crucial for treating diabetes. Here are a few typical techniques for keeping an eye on diabetes: Self-monitoring of blood glucose (SMBG): This entails checking blood sugar levels at home with a glucose meter. Typically, a finger prick is used to collect a little amount of blood, which is then analyzed on a test strip and recorded on the meter. A tiny sensor is implanted under the skin to continuously monitor blood sugar levels throughout the day with continuous glucose monitoring (CGM). The outcomes are sent to a receiver or a mobile app. Tests for hemoglobin A1c (HbA1c) examine the average blood sugar levels over the previous two to three months. Usually, it's done every three to six months.

Regular check-ups in the eye to prevent cataract /neuropathy disease of more than 70%

**TABLE 11 – FOLLOW IN DIABETICS**

Follow-up in diabetics	Yes	No	Unsure
Annual eye check-up is done to prevent eye complications	18(72%)	4(16%)	3(12%)
Average blood glucose is checked at once in 3 months duration	22(88%)	2(8%)	1(4%)



Taking medications as directed: Even if blood sugar levels appear to be under control, it's crucial to take prescriptions as directed by a healthcare professional. Regularly checking your blood sugar levels can help you spot issues early and give you time to take action. You should also routinely check your blood pressure and cholesterol levels. Our study showed that the patient had an average level of Knowledge of diabetes although there were areas of shortage. Their knowledge about symptoms and complications of diabetes and management of diabetes and storage of insulin, titration, foot care, etc is inadequate. Taking into consideration the high prevalence of diabetes in south Tamil Nadu it is highly recommended to elaborate on the knowledge about diabetes in young ages and older patients. Diabetes such as doing projects, posters, and seminars. World Diabetes Day should be celebrated in all schools and colleges and work-shops and lectures given by professionals in collaboration with hospitals are recommended to increase the level of awareness of diabetes

#### **DISCUSSION & FEATURES DEVELOPING IN TAMIL NADU:**

There are a few potential fresh approaches for treating diabetes mellitus in Tamil Nadu based on the information offered. DR projects are being implemented in more Tamil Nadu districts. The success of the DR project in the Tirunelveli District raises the possibility that similar initiatives to enhance diabetic eye care may be undertaken in other Tamil Nadu districts. Using less dangerous medications can lower the risk of hypoglycemia. A recent study by Dr. Mohan's Diabetes Specialty Institute in Tamil Nadu discovered that some medications reduce the risk of hypoglycemia while being both effective and safe. This can result in a change in the diabetic drugs Tamil Nadu uses. Integration of traditional Siddha medicine into diabetes care: According to Brigitte Sébastia's case study, traditional Siddha medicine may be a beneficial complement to Tamil Nadu's existing diabetes care program. This can entail working with traditional healers to incorporate Siddha medicine into contemporary medical procedures.

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#### **CONCLUSION:**

Diabetes has become a major concern in many parts of the world, especially in Tamil Nadu, where a significant portion of the population is affected by this condition. However, despite the high prevalence of diabetes, there is still a lack of education and awareness about it in the region. To address this issue, it is essential to improve people's knowledge about the disease and its treatment options. Various approaches can be taken to achieve this goal, such as creating awareness campaigns through social media, posters in public places, and hospitals. By educating people about the latest treatments and ways to manage diabetes successfully, we can help them lead a healthy life and prevent complications related to this condition. Therefore, it is crucial to increase awareness about diabetes to promote a healthy lifestyle and improve the quality of life for people living with this condition.

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