Awareness of Complications of Type 2 Diabetes Mellitus and Role of Physiotherapy Among Urban Diabetic Population in Jalgaon City: An Observational Study

Sakshi Vikram Lahane [1*], Dr. Pavan Chopade [2], Dr. Jaywant Nagulkar [3]

[1] Bachelor of physiotherapy, Dr. Ulhas Patil college of Physiotherapy, Jalgaon 425001, Maharashtra University of Health Science, India

[2] Assistant Professor, Department of Musculoskeletal Physiotherapy, Dr. Ulhas Patil college of physiotherapy, Jalgaon 425001, Maharashtra University of Health Science, India

[3] Professor, Department of Musculoskeletal Physiotherapy, Dr. Ulhas Patil college of physiotherapy, Jalgaon 425001, Maharashtra University of Health Science, India

* Corresponding Author: **Sakshi Vikram Lahane**

Article Info

ISSN (online): 2582-8940
Volume: 07
Issue: 01
Received: 07-11-2025
Accepted: 08-12-2025
Published: 07-01-2026
Page No: 59-68

Abstract

Background: Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder associated with significant microvascular and macrovascular complications that adversely affect quality of life. Adequate awareness of diabetic complications and the role of physiotherapy is essential for effective disease management and prevention of disability, especially among the urban diabetic population.

Aim: To evaluate the awareness of complications of type 2 diabetes mellitus and the role of physiotherapy among urban diabetic populations in Jalgaon city.

Methodology: This cross-sectional observational study was conducted among 60 urban diabetic patients aged above 40 years diagnosed with type 2 diabetes mellitus. Participants were selected using convenient sampling. Data were collected using a validated, self-structured questionnaire assessing awareness of diabetic complications and the role of physiotherapy. The collected data were entered in Microsoft Excel and statistically analysed using SPSS software. Results were expressed using descriptive statistics in the form of frequencies, percentages, mean, and standard deviation.

Results: The mean awareness score for diabetic complications was 6.76 ± 2.94, indicating an overall awareness level of 67.6%. Awareness regarding the role of physiotherapy showed a mean score of 6.1 ± 3.44, corresponding to 67.78%. High awareness was observed for complications such as foot ulcers, reduced sensation in feet, and eye-related complications, whereas lower awareness was noted for severe outcomes like stroke and coma. A moderate level of awareness was also observed regarding physiotherapy's role in improving joint range of motion, pain-free movements, quality of life, and activities of daily living.

Conclusion: The study concludes that urban diabetic patients in Jalgaon city demonstrate nearly equal and moderate levels of awareness regarding both diabetic complications and the role of physiotherapy. However, existing knowledge gaps highlight the need for structured education programs and early physiotherapy interventions to improve self-management and reduce the risk of long-term complications.

DOI: https://doi.org/10.54660/IJMBHR.2026.7.1.59-68

Keywords: Type 2 Diabetes Mellitus, Diabetic Complications, Physiotherapy, Awareness, Urban Diabetic Population, Exercise Therapy, Quality of Life

Introduction

Diabetes mellitus refers to a group of metabolic disorders marked by high blood sugar levels (hyperglycaemia), caused by issues with insulin production, insulin action, or a combination of both. Hyperglycaemia occurs due to problems in insulin secretion, insulin action, or both, and appears as a long-term and varied disturbance in the metabolism of carbohydrates, fats, and proteins.

Global and regional trends from 1990 to 2017 of type 2 diabetes for all ages were compiled. Forecast estimates were obtained using the SPSS Time Series Modeler. In 2017, approximately 462 million individuals were affected by type 2 diabetes mellitus. Type 2 diabetes mellitus (T2DM) is a disease that affects more than 400 million people around the world.

Diabetes mellitus is a major health concern of the 21st century. The number of people living with diabetes has been rising steadily over the past three decades and is expected to keep increasing—from about 463 million adults aged 18 to 99 years in 2019 to an estimated 700 million by 2045 worldwide. According to a survey, the prevalence of diabetes and prediabetes among individuals aged 40–49 years is 11.1% and 40.3%, respectively. Among those aged 60–69 years, these rates increase to 23.9% for diabetes and 47.6% for prediabetes.

Diabetes mellitus can be classified into three main types Type 1 diabetes occurs due to the destruction of pancreatic β-cells, usually leading to an absolute insulin deficiency. It can be either immune-mediated or idiopathic in nature. Type 2 diabetes ranges from a condition predominantly characterized by insulin resistance with relative insulin deficiency to one primarily involving an insulin secretory defect accompanied by insulin resistance. Gestational diabetes mellitus (GDM) refers to diabetes that is first recognized during pregnancy.

Type 2 diabetes is the most common form of diabetes, accounting for approximately 90–95% of all diabetes cases. It is associated with significant morbidity and mortality, adversely affecting patients' overall health and quality of life, and is therefore considered a major public health concern. In recent years, type 2 diabetes has also been increasingly observed among younger adults and adolescents. The condition results from a defect in insulin action, which predisposes patients to both macrovascular and microvascular complications, ultimately leading to a decline in health-related quality of life.

Type 2 diabetes mellitus (T2DM) is one of the most common forms of diabetes, affecting people across nearly all age groups. It is clinically characterized by a key feature chronic hyperglycaemia, which refers to persistently elevated levels of sugar in the blood.

Type 2 diabetes mellitus is a chronic condition that gradually affects the normal functioning of almost every organ in the human body. The most common complications include: Macroangiopathy This involves serious damage to the heart and blood vessels, leading to conditions such as hypertension, arterial narrowing, coronary artery disease, stroke, and erectile dysfunction in men. Diabetic retinopathy Caused by damage to the blood vessels of the eyes, this condition leads to significant vision impairment and is one of the leading causes of blindness in the Western world. Diabetic nephropathy this complication affects the kidneys and can eventually lead to renal insufficiency or kidney failure. Diabetic neuropathy Characterized by sensory disturbances, muscle atrophy, walking difficulties, and wounds on the lower limbs accompanied by severe pain.

Foot ulcers are defined as open lesions characterized by a break in the skin and loss of the epithelial layer, which may extend into the dermis and deeper tissues, sometimes affecting muscles and bones. Amputation is defined as the surgical removal of a terminal, non-viable part of a limb. Nontraumatic lower extremity amputations are associated with high morbidity and mortality among people with diabetes.

The progression of diabetes, particularly with poor glycaemic control, results in numerous potentially life-threatening complications. Nearly half of all adults with chronic kidney disease come from the diabetic population. Additionally, 9.8% of diabetics have had a heart attack, 9.1% suffer from coronary artery disease (CAD), 7.9% experience congestive heart failure, 6.6% have had a stroke, and over a quarter (27.8%) suffer from chronic kidney disease. Furthermore, almost a quarter (22.9%) have foot problems, and 18.9% experience eye damage. Managing these complications, along with the metabolic decline, requires significant daily energy, planning, and mental effort from the patient, a state referred to by Rubin as "diabetes overwhelms".

Currently, ten classes of oral pharmacological agents are available for the treatment of type 2 diabetes mellitus (T2DM). These include: (1) sulfonylureas, (2) meglitinides, (3) metformin (a biguanide), (4) thiazolidinediones (TZDs), (5) alpha-glucosidase inhibitors, (6) dipeptidyl peptidase IV (DPP-4) inhibitors, (7) bile acid sequestrants, (8) dopamine agonists, (9) sodium-glucose cotransporter 2 (SGLT2) inhibitors, and (10) oral glucagon-like peptide-1 (GLP-1) receptor agonists. Additionally, GLP-1 receptor agonists, dual GLP-1 and GIP receptor agonists, and pramlintide are available in injectable forms.

Exercise is usually one of the first management strategies recommended for individuals newly diagnosed with type 2 diabetes. Along with dietary changes and behaviour modification, it forms a key part of diabetes and obesity prevention as well as lifestyle intervention programs. Regular physical activity—whether aerobic, resistance, or a combination of both—helps improve glucose regulation. Additionally, high-intensity interval training (HIIT) has proven to be effective and offers the advantage of being time-efficient.

According to the World Confederation of Physical Therapy, physical therapy focuses on diagnosing conditions and enhancing the quality of life.

A study by Kaur *et al*. (2015) examined the effects of aerobic, resistance, and combined exercise programs on patients' physical quality of life and found that all three forms of exercise led to improvements. In addition to endurance training, segmental strength training targeting major muscle groups is also recommended in the management of type 2 diabetes.

Need of Study

- The global incidence of diabetes is increasing, leading to higher number of individuals at risk for complications. Understanding the level of awareness can help to address this public health issue.
- Diabetes can lead to severe complications, including neuropathy, nephropathy, retinopathy, diabetic foot ulcer and cardiovascular diseases. Assessing awareness can identify gaps in knowledge that may contribute to the development of these complications.
- Physiotherapy plays a crucial role in managing diabetes and its complications through exercise, education, and rehabilitation. Understanding awareness level can help to promote its benefits and encourage more patients to engage in physiotherapeutic interventions. Hence the need for study is to assess awareness of diabetic complications and role of physiotherapy among diabetic

populations.

Aim

To evaluate the awareness of diabetic complications and role of physiotherapy among diabetic populations.

Objective

1. To assess the awareness of diabetic complications among diabetic populations.
2. To assess the awareness of role physiotherapy among diabetic populations.

Review of Literature

1. **Aditi Singh, Suchitra Saha Dangi *et al* (2025)** [9] Conducted Study on Type 2 Diabetes Mellitus: A Comprehensive Review of Pathophysiology, Comorbidities, and Emerging Therapies. Type 2 diabetes mellitus (T2DM), the most common form of diabetes, affects people across all age groups and is clinically characterized by persistent hyperglycaemia (high blood sugar levels). This condition, along with pancreatic β-cell dysfunction, insulin resistance, and chronic inflammation, worsens the disease's progression. Poorly controlled T2DM poses a major public health challenge, as it increases the risk of microvascular and macrovascular complications, including retinopathy, nephropathy, neuropathy, atherosclerosis, cardiovascular disorders, and even cancer. This review explores the epidemiology, causes, pathophysiology, and related comorbidities of T2DM, while highlighting current and emerging therapeutic strategies and potential future directions for alternative drug discovery in its management.

2. **Kenneth R. Feingold *et al* (2024)** [14] Conducted Study on Oral and Injectable (Non-Insulin) Pharmacological Agents for the Treatment of Type 2 Diabetes. This chapter aims to provide healthcare professionals with an overview of the currently available oral and injectable (non-insulin) medications used in the management of T2DM. At present, there are ten classes of oral pharmacological agents for T2DM treatment: Sulfonylureas, Meglitinides, Metformin (a biguanide), Thiazolidinediones (TZDs), Alpha-glucosidase inhibitors, Dipeptidyl peptidase-4 (DPP-4) inhibitors, Bile acid sequestrants, Dopamine agonists, Sodium-glucose co-transporter 2 (SGLT2) inhibitors, Oral glucagon-like peptide-1 (GLP-1) receptor agonists. Additionally, certain medications such as GLP-1 receptor agonists, dual GLP-1 and glucose-dependent insulinotropic polypeptide (GIP) receptor agonists, and pramlintide are available in injectable form. These agents may be used individually (monotherapy) or in combination, utilizing drugs from different classes with complementary mechanisms of action.

3. **Hafiza Muriam Ghani, Layba Marrium *et al* (2024)** [17] Conducted Study on Awareness of the Diabetic Population Towards Diabetic Complications: A Descriptive Cross-Sectional Study. The aim of this study was twofold: (1) to assess the level of awareness regarding diabetic complications among diabetic patients, and (2) to determine the prevalence of the most common diabetic complications within this population. Data were collected using a structured questionnaire completed by male and female diabetic patients aged 18 years and above. A total of 320 participants were recruited from both private and public healthcare facilities in Lahore, Pakistan. The collected data were analysed using SPSS version 21.0. Results were More than 70% of the participants demonstrated awareness of most diabetic complications, except for stroke and frequent infections. Among the various complications, peripheral neuropathy was perceived as the most common, reported by approximately 82.2% of patients, while amputation was identified as the least common, with a frequency of about 3.8%. They concluded Overall, the study indicates a relatively high level of awareness about diabetes and its associated complications among diabetic patients in Lahore, Pakistan.

4. **Rajeev, Mayank Singhal *et al* (2023)** [1] Conducted Study on Type 2 Diabetes mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycaemia resulting from impaired insulin secretion, resistance to insulin action, or a combination of both. This study reviews the pathophysiology of diabetes mellitus and emphasizes the critical role of an interprofessional healthcare team in its effective management. Objectives were to describe the etiological factors of diabetes mellitus, to review the pathophysiological mechanisms underlying diabetes mellitus, to summarize the available treatment options for diabetes mellitus, to highlight the importance of interprofessional collaboration in improving care coordination and clinical outcomes for patients with type 2 diabetes mellitus.

5. **Zihui Yan 1, Mengjie Cai1 *et al* (2023)** Conducted Study on The Interaction Between Age and Risk Factors for Diabetes and Prediabetes: A Community-Based Cross-Sectional Study. This study aimed to examine the interaction between age groups and various risk factors for diabetes and prediabetes among community residents in Shanghai, as well as to determine how age influences other risk factors associated with these conditions. Methods was A total of 3,540 participants with undiagnosed diabetes or prediabetes. Each participant completed a detailed questionnaire and underwent a comprehensive health assessment, including a physical examination, a 75 g oral glucose tolerance test (OGTT), and blood sample collection. Logistic regression analysis was performed to evaluate the interaction between age and risk factors for both diabetes and prediabetes. Results was Statistical analysis was conducted on data from 2,776 participants. The overall prevalence of diabetes and prediabetes was 15.1% and 52.3%, respectively, with higher rates observed in the elderly compared to the middle-aged group. Among the risk factors for diabetes, overweight status showed a significant interaction with age (P-interaction = 0.028). For prediabetes, a higher level of education was associated with increasing age (P-interaction = 0.039), while elevated serum cholesterol levels were more strongly associated with younger age (P-interaction = 0.019). They Concluded that findings demonstrate a significant interaction between age and other risk factors

for diabetes and prediabetes, highlighting differences in risk profiles between middle-aged and elderly populations.

6. **Sophia Rossboth, Monika Lechleitner *et al* (2021)** [5] conducted study Risk factors for diabetic foot complications in type 2 diabetes – a systematic review Aim of the study is with the global increase in patients diagnosed with type 2 diabetes mellitus (T2DM), the incidence of diabetic foot (DF) complications is likely to rise. Their methodology includes A comprehensive search of six electronic databases was conducted for publications up to August 2019, using predefined stringent inclusion and exclusion criteria. Results: Out of 9,476 articles identified, 31 articles from 28 different study populations met the criteria for evaluation. Significant heterogeneity was observed in study protocols and the patient populations analysed. A total of 79 risk factors were examined in this review. They concluded that this up-to-date literature review identified glycaemic control and smoking as the only modifiable risk factors consistently associated with DF.

7. **Muzeeb Z Bandey, Aga S Sameer *et al* (2020)** Conducted Study on Pathophysiology of diabetes: An overview Diabetes mellitus (DM) is a chronic, heterogeneous metabolic disorder with a complex pathogenesis. It is characterized by persistently elevated blood glucose levels (hyperglycaemia) resulting from defects in insulin secretion, insulin action, or both. Hyperglycaemia presents in various forms and leads to disturbances in carbohydrate, fat, and protein metabolism. Prolonged hyperglycaemia contributes to the development of both microvascular and macrovascular complications, which are the major causes of diabetes-related morbidity and mortality. Moreover, hyperglycaemia serves as the key biomarker for diagnosing diabetes. This review focuses on the classification and pathophysiology of diabetes mellitus, encompassing its different types and underlying mechanisms.

8. **Moien Abdul Basith Khan *et al* (2020)** [3] Conducted Study on Epidemiology of Type 2 Diabetes- Global Burden of Diseases and Forecasted Trends. This study aimed to analyse the worldwide epidemiology of type 2 diabetes, focusing on its incidence, prevalence, and overall disease burden. Epidemiological data were obtained from the Global Burden of Disease (GBD) dataset compiled by the Institute for Health Metrics and Evaluation, Seattle. Global and regional trends in type 2 diabetes from 1990 to 2017 across all age groups were assessed, and future projections were generated using the SPSS Time Series Modeler. In 2017, approximately 462 million people were living with type 2 diabetes, representing 6.28% of the global population—4.4% among individuals aged 15–49 years, 15% among those aged 50–69 years, and 22% among those aged 70 years and above with a prevalence rate of 6,059 cases per 100,000 population Projections indicate that the global prevalence of type 2 diabetes will increase to approximately 7,079 cases per 100,000 population by 2030, reflecting a consistent upward trend across all regions, including low-income countries. These findings underscore the urgent need for effective public health strategies and preventive interventions to curb the escalating diabetes epidemic.

9. **Marcie Harris-Hayes, Mario Schootman *et al* (2020)** [12] Conducted Study on The Role of Physical Therapists in Fighting the Type 2 Diabetes Epidemic. In 2014, an estimated 422 million people worldwide were living with diabetes. Diabetes is associated with numerous complications, including cardiovascular disease, stroke, peripheral arterial disease, nephropathy, neuropathy, retinopathy, lower-limb amputation, and various musculoskeletal impairments. Result was Physical therapists play a vital role in managing diabetes and related chronic conditions such as cardiovascular disease and osteoarthritis through the prescription of appropriate physical activity. They also screen patients for diabetes risk factors and related complications, adapting musculoskeletal exercise programs as needed. Furthermore, physical therapists should consistently promote regular physical activity as an essential component in the prevention and management of chronic diseases during all patient interactions

10. **Juan José Marín-Peñalver, Iciar Martín-Timón *et al* (2016)** [4] Conducted study on update on treatment of type 2 diabetic mellitus. The aim of this review is to perform an update on the benefits and limitations of different drugs, both current and future, for the treatment of T2DM. Initial intervention should focus on lifestyle changes. Metformin remains the first choice of treatment for most patients. Other alternative or second-line treatment options should be individualized depending on the characteristics of each patient. This article reviews the treatments available for patients with T2DM, with an emphasis on agents introduced within the last decade.

11. **Ibrahim Suliman Al-Aboudi, Mohammed Azmi Hassali *et al* (2015)** [8] Conducted study on Knowledge, attitudes, and quality of life of type 2 diabetes patients in Riyadh, Saudi Arabia the purpose of this study was to investigate the association between knowledge and attitude with health-related quality of life (HRQoL) among patients with type 2 diabetes mellitus in Riyadh, Saudi Arabia. A cross-sectional descriptive study was undertaken with a cohort of 75 patients. The EuroQoL-five-dimensional (EQ-5D) scale was used to assess HRQoL. The brief diabetic knowledge test in questionnaire format developed by the University of Michigan Diabetes Research and Training Center and the attitude toward self-care questionnaire based on the diabetic care profile were used. The result is Fifty-eight (77.35%) respondents were male with a mean 12.6 ± 8.4 years of a history of diabetes. Thirty-four (45.3%) were in the age group of 45–55 years with a mean age of 54 ± 9.2 years. The mean EQ-5D score was lower in females compared to male patients (0.58 ± 0.23 vs. 0.74 ± 0.20). they concluded HRQoL and knowledge scores were moderate in type 2 diabetic patients in Riyadh, Saudi Arabia. Patient attitude toward the disease was positive, and this was positively associated with HRQoL.

Methodology and Materials

Study design – Cross Sectional Study
Study Type - An Observational Study
Method of sampling – convenient sampling

Sample size – 57
Calculated by using formula –

$$N = \frac{Z1^2pq}{d^2}$$

p	your guess population p (any value <1)	0.70
q	1-p	0.30
1-	Confidence level set by you	0.95
Z	Z value associated with confidence	1.96
d	Absolute precision	0.12
N	Minimum sample size	57

Materials

1. Consent form
2. Pen
3. Paper
4. Questionnaire (validated by senior faculty members and Reliability was 0.96)

Selection Criteria

➢ **Inclusion criteria:**

1. Age group above 40 years
2. Patient diagnosed with type 2 diabetes.
3. Patient with or without diabetic complications.
4. Patient capable of providing informed consent to participate in the study.
5. Patient who are able to understand and communicate.
6. Patients who are willing to participate will be included.

➢ **Exclusion criteria**

1. Non-diabetic individuals.
2. Individual with type 1 diabetes or other specific type of diabetes (gestational diabetes)
3. Patient with Severe psychiatric disorder (schizophrenia, bipolar disorder).

Statiscal Analysis

All data was collected and entered into Microsoft Excel. All the results are shown in tabular as well as graphical format to visualize the statistically significant difference more clearly. All the data was analysed using SPSS software.

Procedure

1. Prior commencement of the study the Ethical clearance was taken from the Institutional Ethical Committee.
2. The study was undertaken at Dr. Ulhas Patil college of Physiotherapy and in Jalgaon city.
3. The nature and the purpose of the study was explained to the participants.
4. Participants were included by screening based on the inclusion and exclusion criteria mentioned earlier.
5. Firstly, consent was obtained from the participants.
6. The Basic demographic information of all patients was gathered.
7. Participants provided the information about type 2 diabetes and Complications and role of physiotherapy among urban diabetic Population.
8. Then the participants were given all the information about questionnaire and how to answer them.
9. Participants were provided with the questionnaire which was validated and ask to answer the question according to their knowledge.
10. 10) Data was collected and it was statistically analysed and results was obtained.

Result

A total 60 participants were in the study. All participants completed the questionnaire. The data obtained from the participants were entered into a Microsoft Excel sheet and subsequently analysed statistically to obtain the results.

Frequency Distribution Table

Table 1: Age (in years)

Sr. No.	Variable	Groups	Frequency	Percentage
1	Age (in years)	41-50	19	31.67
		51-60	24	40.00
		61-70	14	23.33
		above 70	3	5.00

Age	Mean	SD
	55.57	9.02

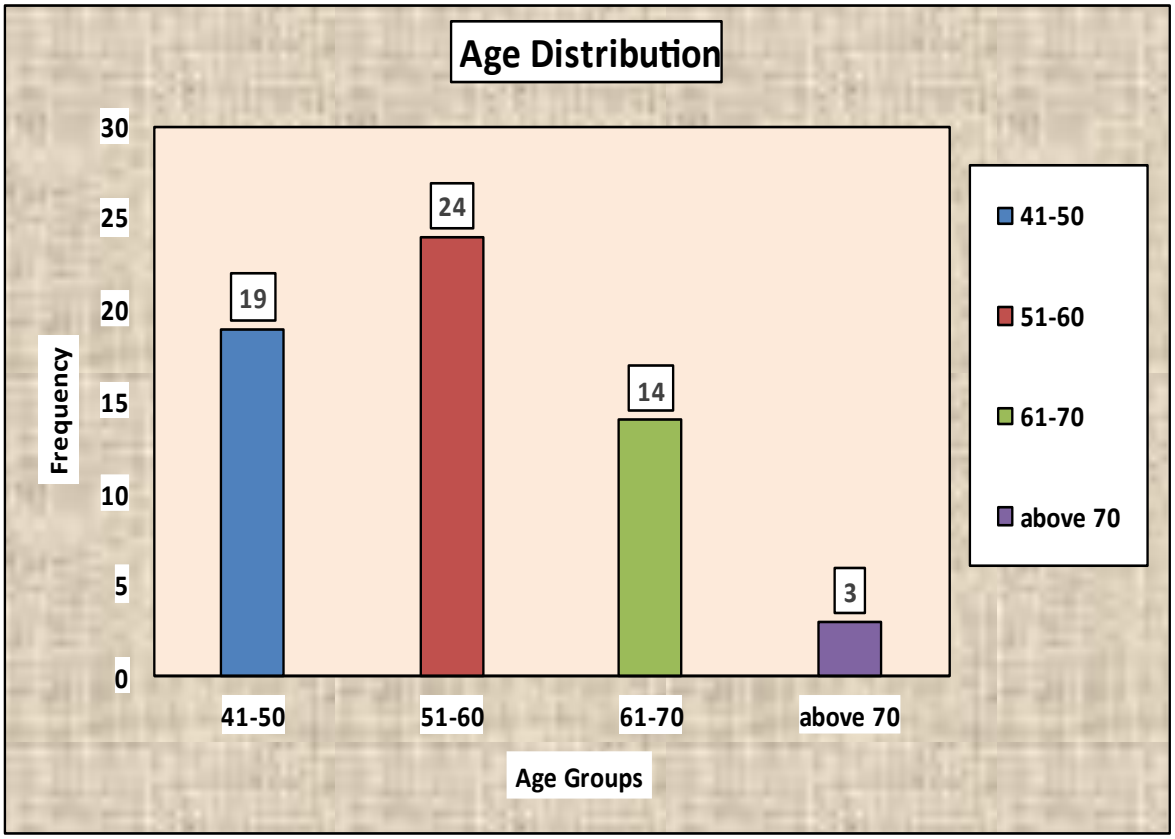

Fig 1: Showing Age Distributions

This table and graph show that the majority of participants (40%) belonged to the age group of 51–60 years, followed by 31.67% in the 41–50 years group, 23.33% in the 61–70 years group, and only 5% were above 70 years of age. The mean age of participants was 55.57 ± 9.02 years.

Table 2: Gender

Sr. No.	Variable	Groups	Frequency	Percentage
2	Gender	Male	26	43.33
		Female	34	56.67

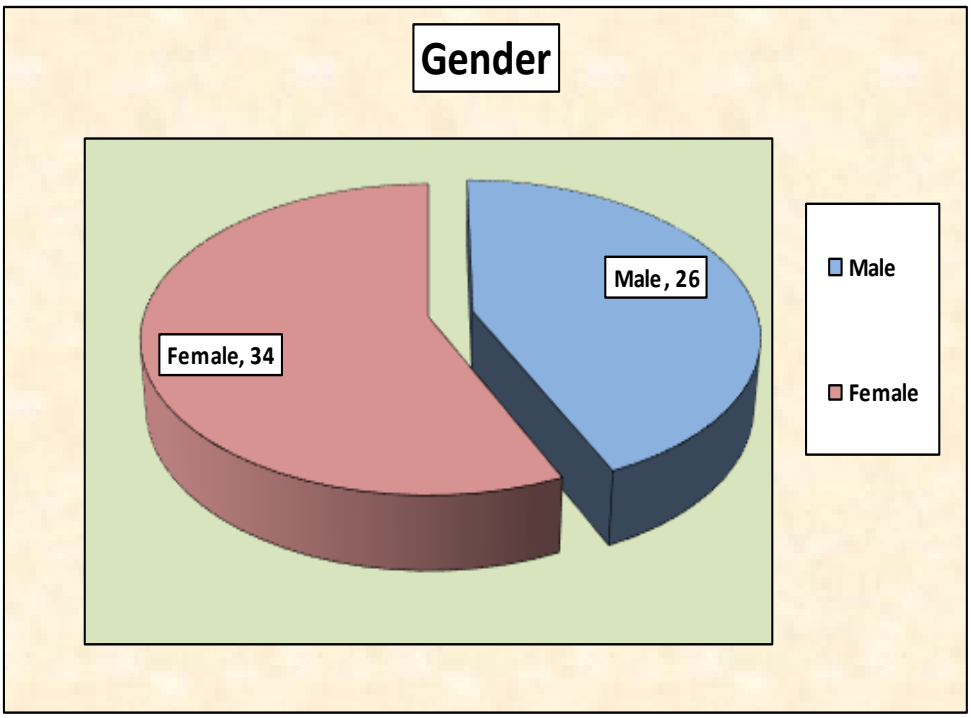

Fig 2: Showing Gender Distribution

This table and graph show that the 56.67% were females and 43.33% were males, indicating that the majority of the study participants were female.

Table 3: Duration of diabetes

Sr. No.	Variable	Groups	Frequency	Percentage
3	Duration of diabetes (years)	below 5	17	28.33
		6-10.	39	65.00
		11-15.	3	5.00
		above 15	1	1.67

Duration of diabetes	Mean	SD
	7.16	3.43

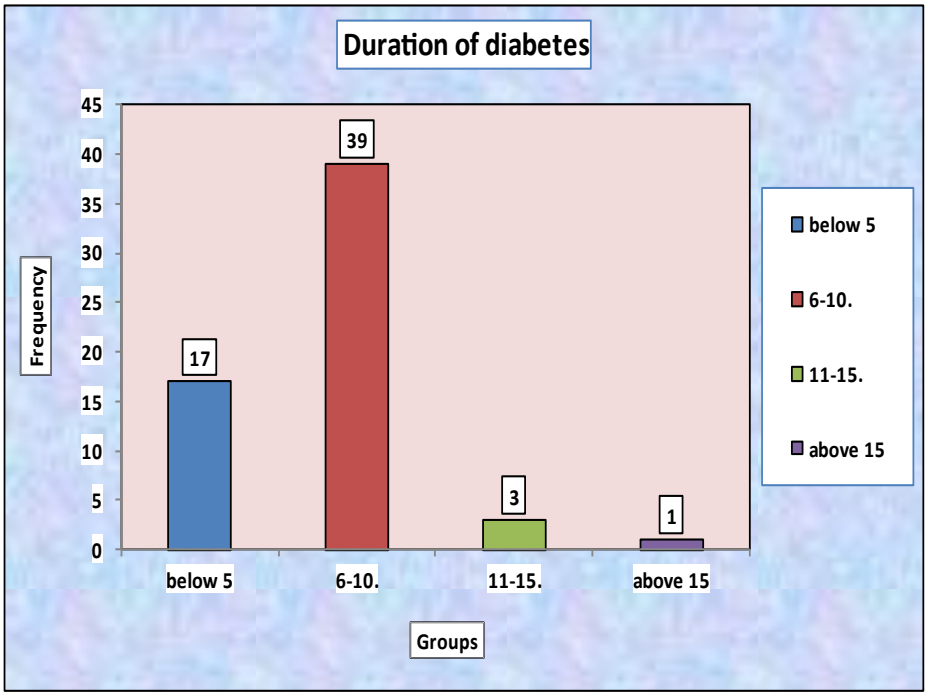

Fig 3: Showing Duration of diabetes

This table and graph show that the majority of participants (65%) had a duration of diabetes between 6–10 years, followed by 28.33% who had diabetes for less than 5 years. A smaller proportion of participants (5%) had diabetes for 11–15 years, and only 1.67% had diabetes for more than 15 years. The mean duration of diabetes among participants was 7.16 ± 3.43 years.

2) Awareness about Complications Type 2 Diabetes Mellitus Among Urban Diabetic Population

Awareness about Complications Type 2 Diabetes Mellitus Among Urban Diabetic Population		
Mean	SD	Mean %
6.76	2.94	67.60

The mean score for awareness about diabetic complications was 6.76 ± 2.94, indicating that participants had an overall 67.6% level of awareness regarding diabetic complication

Sr. No.	Question	YES		NO	
		Frequency	Percentage	Frequency	Percentage
1	Are you aware that you are suffering from diabetes mellitus?	55	91.67	5	8.33
2	Are you aware diabetes has complications?	55	91.67	5	8.33
3	Are you aware diabetes mellitus can cause rapid breathing with fruity Odor?	43	71.67	17	28.33
4	Are you aware diabetes mellitus can cause foot ulcers?	54	90.00	6	10.00
5	Are you aware diabetes mellitus can cause decreased sensation in feet?	42	70.00	18	30.00
6	Are you aware diabetes mellitus can cause eye- related complications?	41	68.33	19	31.67
7	Are you aware diabetes mellitus can cause kidney- related complications?	33	55.00	27	45.00
8	Are you aware diabetes mellitus can cause increased BP?	35	58.33	25	41.67
9	Are you aware diabetes mellitus can cause heart diseases?	32	53.33	28	46.67
10	Are you aware diabetes mellitus can cause coma or can lead to stroke?	16	26.67	44	73.33

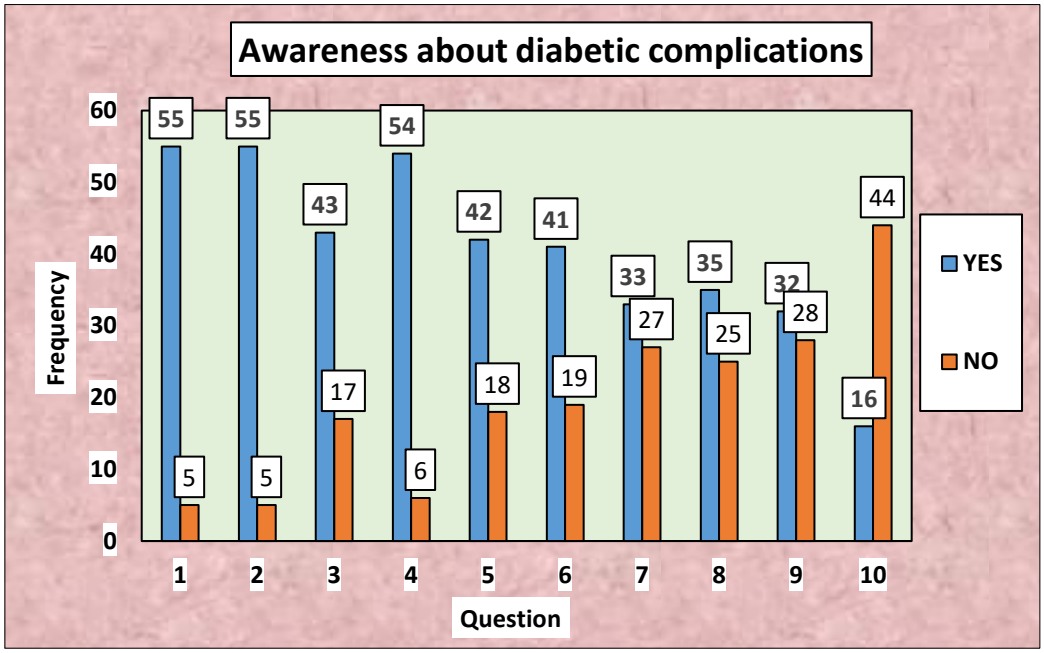

Fig 4: Showing Awareness about Complications Type 2 Diabetes Mellitus Among Urban Diabetic Population**.**

This graph titled "Showing Awareness about Complications Type 2 Diabetes Mellitus Among Urban Diabetic Population" shows participants' responses to ten questions related to their knowledge of diabetes complications.

The graph the level of awareness regarding various diabetic complications among the participants. The findings show that 91.67% of respondents were aware that they were suffering from diabetes mellitus, and an equal proportion (91.67%) knew that diabetes has complications. Awareness about diabetes causing rapid breathing with a fruity Odor was reported by 71.67% of participants, while 90% were aware that it can lead to foot ulcers.

Similarly, 70% of participants were aware that diabetes can cause decreased sensation in the feet, and 68.33% recognized eye-related complications as a possible outcome. Awareness about kidney-related complications was observed in 55% of respondents, while 58.33% were aware that diabetes can cause increased blood pressure. In contrast, only 53.33% associated diabetes with heart diseases. The lowest level of awareness was noted for severe outcomes such as coma or stroke, with only 26.67% of participants being aware of these complications.

3) Awareness about Role of Physiotherapy Among Urban Diabetic Population.

Awareness about Role of Physiotherapy Among Urban Diabetic Population.		
Mean	**SD**	**Mean %**
6.1	3.4	67.78

The mean score for awareness about the role of physiotherapy in diabetes mellitus patients was 6.1 ± 3.44, indicating an overall 67.78% level of awareness among the participants regarding the importance of physiotherapy in diabetes management.

Sr. No.	Question	YES		NO	
		Frequency	Percentage	Frequency	Percentage
11	Are you aware that physiotherapy can help to manage diabetes and its complications?	44	73.33	16	26.67
12	Do you know Physiotherapy can help in increasing ROM of your Joint in diabetic Population?	42	70.00	18	30.00
13	Do you know physiotherapy can make your movements pain free?	42	70.00	18	30.00
14	Do you think the diabetic population benefits from physiotherapy?	42	70.00	18	30.00
15	Have you taken exercise prescription for managing diabetes?	34	56.67	26	43.33
16	Do you find physiotherapy treatment effective in managing diabetes mellitus?	34	56.67	26	43.33
17	Do you engage in physical activity or exercise daily or several times a week?	60	100.00	0	0.00
18	Are you aware that physiotherapy can improve your quality of life?	34	56.67	26	43.33
19	Are you aware that physiotherapy can improve activities of daily living (ADLs)?	34	56.67	26	43.33

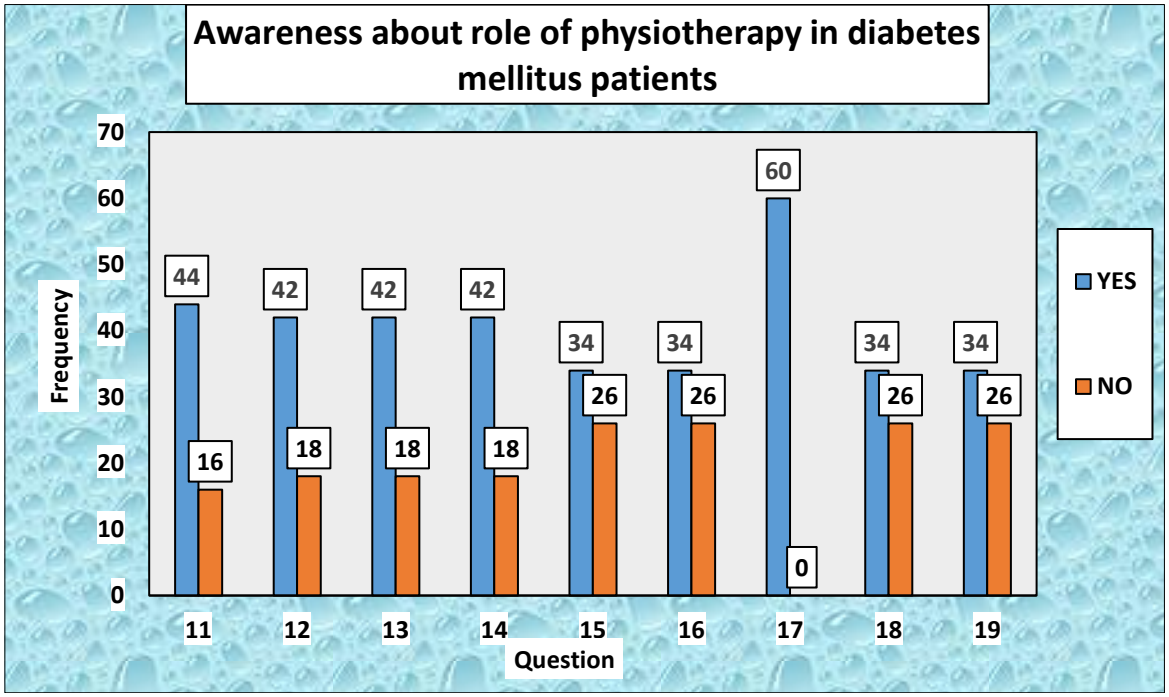

Fig 5: Showing Awareness about Role of Physiotherapy Among Urban Diabetic Population.

This graph titled "Awareness about role of Physiotherapy Among Urban Diabetic Population" illustrates participants' responses to nine questions (Q11–Q19) assessing their understanding of physiotherapy's importance in diabetes management.

The graph shows the level of awareness among participants regarding the role of physiotherapy in diabetes mellitus patients. The results show that 44 participants were aware that physiotherapy plays a role in diabetes management, while 16 were not. Similarly, 42 participants each responded positively to questions 12, 13, and 14, whereas 18 participants responded negatively to each.

A moderate level of awareness was observed for questions 15 and 16, where 34 participants responded "Yes" and 26 responded "No." The highest awareness was recorded for question 17, where 60 participants were aware of the physiotherapy role and none responded negatively. In contrast, for questions 18 and 19, 34 participants were aware and 26 were unaware.

Discussion

Diabetes mellitus is a long-term, non-communicable, and multisystem disorder that has reached epidemic levels. Prolonged exposure to high blood glucose levels damages the microvasculature, resulting in complications such as diabetic nephropathy, retinopathy, and neuropathy, which significantly affect quality of life and reduce overall life expectancy. [16]

In the current study, a total of 60 patients included 56.67% females and 43.33% males. Most patients had diabetes for more than 5 years. In contrast to this, a study conducted in Multan Pakistan by Ramzan *et al* in 2022 had a total of 151 patients of which 53% were males and 47% were females, and most patients had diabetes for last 1 to 5 years.[17]

This study shows that almost equal levels of awareness exist among the participants regarding both the complications of the diabetes mellitus and the role of physiotherapy in its management.

Type 2 diabetes mellitus is mainly defined by two key insulin-related abnormalities: insulin resistance and β-cell dysfunction. Insulin resistance occurs due to disruptions in cellular pathways, reducing the responsiveness or sensitivity of peripheral tissues especially the muscles, liver, and adipose tissue to insulin. In the early stages, this decreased sensitivity causes β-cells to overwork, leading to increased insulin secretion to maintain normal blood glucose levels. The resulting high insulin levels (hyperinsulinemia) temporarily prevent hyperglycaemia. However, over time, β-cells lose their ability to compensate for the growing insulin resistance, and their function progressively declines, ultimately resulting in insulin deficiency. [9]

Participants in this study are aware of diabetes, its risk and complications as 91.67% of population knows diabetes mellitus has its related complication. and 73.33% population are aware that the physiotherapy can help to manage diabetes and its complications. Some patients were aware that sedentary lifestyle and poor dietary habits can cause diabetes. In contrast, a study was conducted at Maharaja Sayajirao University Vadodara, India, in 2022 by Khanna reported that most of the subjects were aware of what diabetes is, but awareness regarding diabetes symptoms, complications, preventive factors, and risk factors was deficient. For example, around 23% of the subjects were not aware that obesity and physical inactivity are risk factors of diabetes. [17]

One aim of this study was to evaluate the awareness of diabetic complications and role of physiotherapy among diabetic populations. The conclusion suggested that participants are well aware of diabetic complications such as rapid breathing with fruity odour, foot ulcers, decreased sensation in feet, eye related like blindness, kidney related disease, hypertension, heart diseases, stroke or coma, with the frequency of 44%, 54%, 42%, 41%, 33%, 35%, 32%, 16% respectively.

Fourty two percent (42%) of patients were aware that physiotherapy helps in improving the range of motion of joints, 42% recognized its role in achieving pain-free movements, 34% understood that it contributes to improving quality of life, and 34% were aware that physiotherapy can

enhance activities of daily living (ADLs).

In this study, about 54% of the participants were aware of diabetic foot ulcers. Most of the diabetic patients were well aware of diabetic foot and caring for it. In addition, the participants had a positive attitude towards foot care management.

Conclusion

It was concluded that participants that Almost equal levels of awareness exist among the participants regarding both the complications diabetes mellitus and the role of physiotherapy among urban diabetic population. The slightly more physiotherapy awareness than complication of diabetes mellitus among urban diabetic population.

Clinical Implication and Future Scope

The nearly equal but slightly more physiotherapy awareness (67.67% and 67.78%) indicate that while patients have understanding of both disease complications and the role of physiotherapy, there is still a significant gap in comprehensive knowledge. This highlights the need for clinicians and physiotherapists to strengthen patient education programs, emphasize preventive care, and promote early physiotherapy intervention to reduce complication risks.

Future Scope

Future initiatives should focus on developing structured awareness campaigns, community-based education programs, and interdisciplinary collaboration to enhance understanding of physiotherapy's role in managing and preventing complications. Further research could evaluate the impact of targeted education on improving patients' self-management and overall quality of life.

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How to Cite This Article

Lahane SV, Hindustan AA, Nagulkar J. Awareness of complications of type 2 diabetes mellitus and role of physiotherapy among urban diabetic population in Jalgaon city: an observational study. Int J Med All Body Health Res. 2026;7(1):59–68. doi:10.54660/IJMBHR.2026.7.1.59-68.

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